# WETLANDS
# From Bogs to Swamps



Geography 1130: David :Lam Campus,
**Douglas College, Coquitlam BC, 2009**

**Pamela Zevit RPBio, Adamah Consultants**

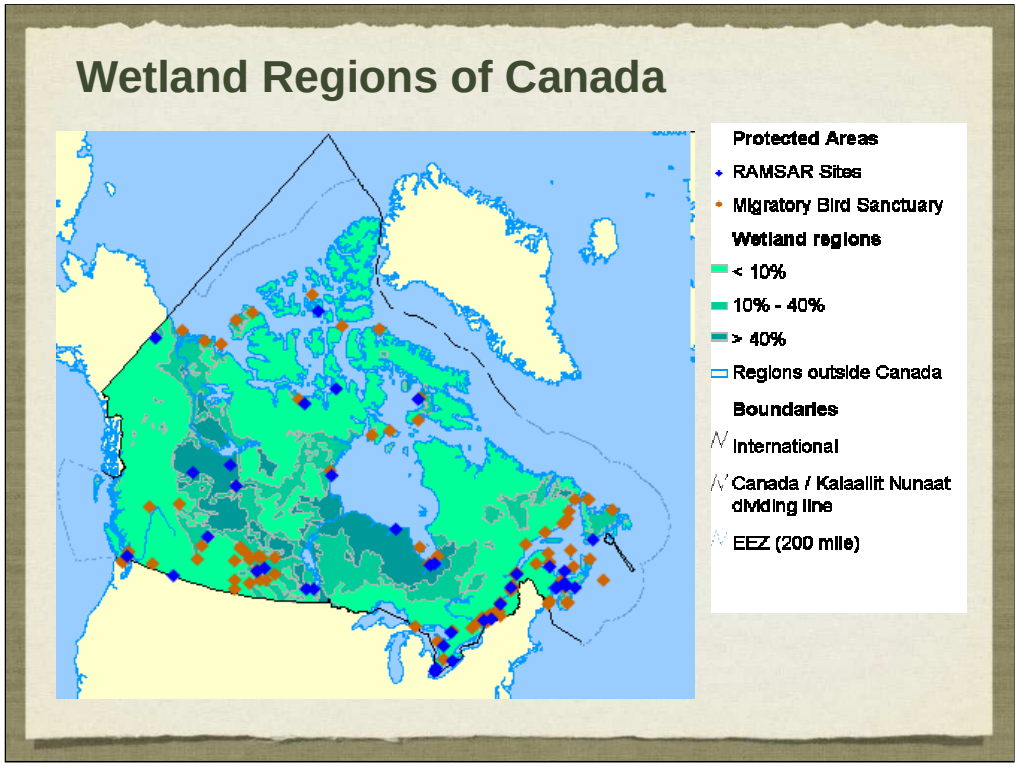
## What Are Wetlands?

*"Areas inundated or saturated by surface or groundwater of a frequency or duration sufficient to support distinct vegetation communities adapted for wet conditions."*

Distinguishing features:

hydric soils - flooded or saturated for long periods

plants - hydrophytes - adapted to wet conditions




Source: Natural Resources Canada - http://atlas.nrcan.gc.ca/site/english/maps/freshwater/distribution/wetlands

## Wetland Functions

### *Ecological Services*

- **Regulation/Absorption (cleansing, CO2 absorption, flood control, water storage)**
- **Ecosystem Health (nutrient cycling, food chain support, habitat, biomass storage, biodiversity, rare and endangered species)**

Define Ecosystem/Ecological services and natural capital?

Natural or ecosystem services are things that nature and natural areas provide, at no cost to us.

Natural capital are the assets that enable and sustain ecosystem services. Both ecosystem services and natural capital can have measurable values (e.g. comparable dollar value for goods and service in human terms) and difficult to measure values (e.g. spiritual, aesthetic, well being).

## *Social/Cultural Services*

- **Science/Information (research, representative ecosystems, education)**
- **Aesthetic/Recreational (viewing, photography, bird-watching, hiking)**
- **Cultural/Psychological (ceremonies, traditions)**

Any other social or cultural services come to mind?

## *Food & Resource Production*

- **Subsistence Production (natural production of birds, fish, plants e.g., berries, wild rice, rushes)**
- **Commercial Production (food, fish, fibre, wood, straw, peat)**

## Wetland Classes:

### 1. Bogs:

**Characteristics: sphagnum mosses, peat.**

- **Flow regime: high water table (restricted inflow/outflow)**
- **Water quality: acidic, low in nutrients and oxygen**
- **Soils: spongy, poorly drained**
- **Plant community: Labrador tea, cranberry, bog laurel**

**Bog types: domed bog (Burns Bog); basin bog, flat bog, shore bog**

Wetland classes adapted from the Canadian Wetland Classification System
http://www.qc.ec.gc.ca/faune/atlasterreshumides/html/classification_e.html

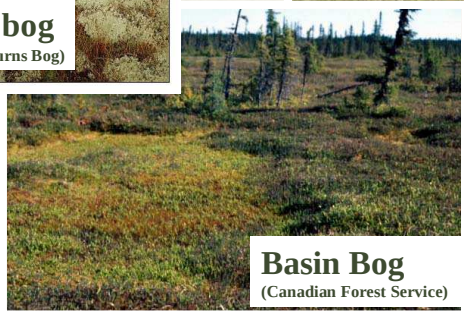
**Global extent:**

Bogs cover ~5-8% of the earth's surface.

Canada has the largest area of bogs in the world – about 130 million hectares (18% of our land area).


**Domed bog**
(Burns Bog)

**Flat bog**
(Mississippi)



**Basin Bog**
(Canadian Forest Service)

**Shore bog**
(Pacific Rim National Park)

**2. Fens:**

**Characteristics: peatlands, but more fertile than bogs.**

- **Flow regime: high water table (at or above surface) with some slow drainage.**
- **Water quality: alkaline.**
- **Soils: nutrient-rich.**
- **Plant community: sedges, grasses, reeds, some shrubs and sparse tree layer.**

**Fen types:**

**Shore fen - found along the shore of a pond or lake, stream fen - along banks or within channel of streams**

Can be confused with grassland areas or estuary marshlands

**Grass-dominated fen** (Halifax N.S., D.S. Davis

**Fens may be dominated by woody or herbaceous vegetation.**

## 3. Swamps:

**Characteristics: Transitional zone between marshes and upland forests**

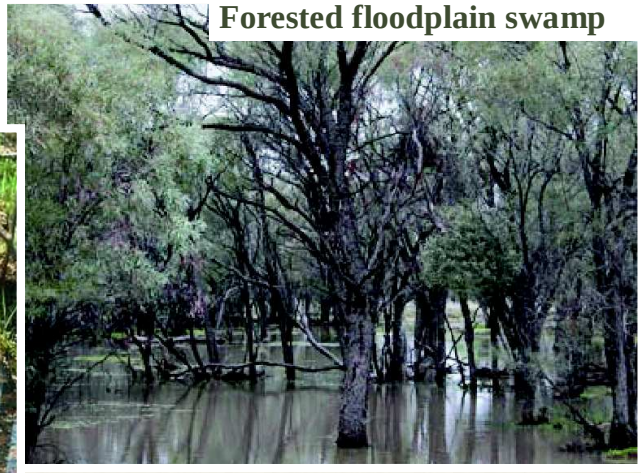
- **Flow regime: fluctuating water levels (at or near the surface)**
- **Soils: nutrient rich**
- **Plant community: Dense coniferous or deciduous trees, shrubs, herbs and some mosses**

**Swamp types: basin swamp, floodplain swamp, stream swamp.**

Considered the most dominant wetland in much of N.A

**Skunk cabbage a typical BC swamp indicator species**

**Forested floodplain swamp**

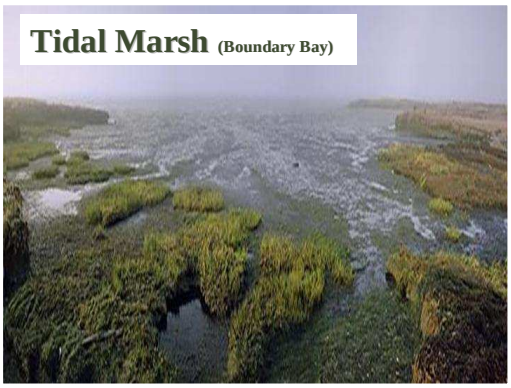


## 4. Marsh:

- **Flow regime: periodically or permanently inundated by standing or slowly moving water which can fluctuate widely (coastal marshes)**
- **Soils: nutrient rich**
- **Water quality: fresh to very saline, high oxygen saturation**
- **Plant community: sedges, grasses, rushes, reeds, cattails bordering grassing meadows and peripheral bands of shrubs or trees**

**Marsh types: saltwater, estuarine (brackish), freshwater, stream.**

**Tidal Marsh** (Boundary Bay)

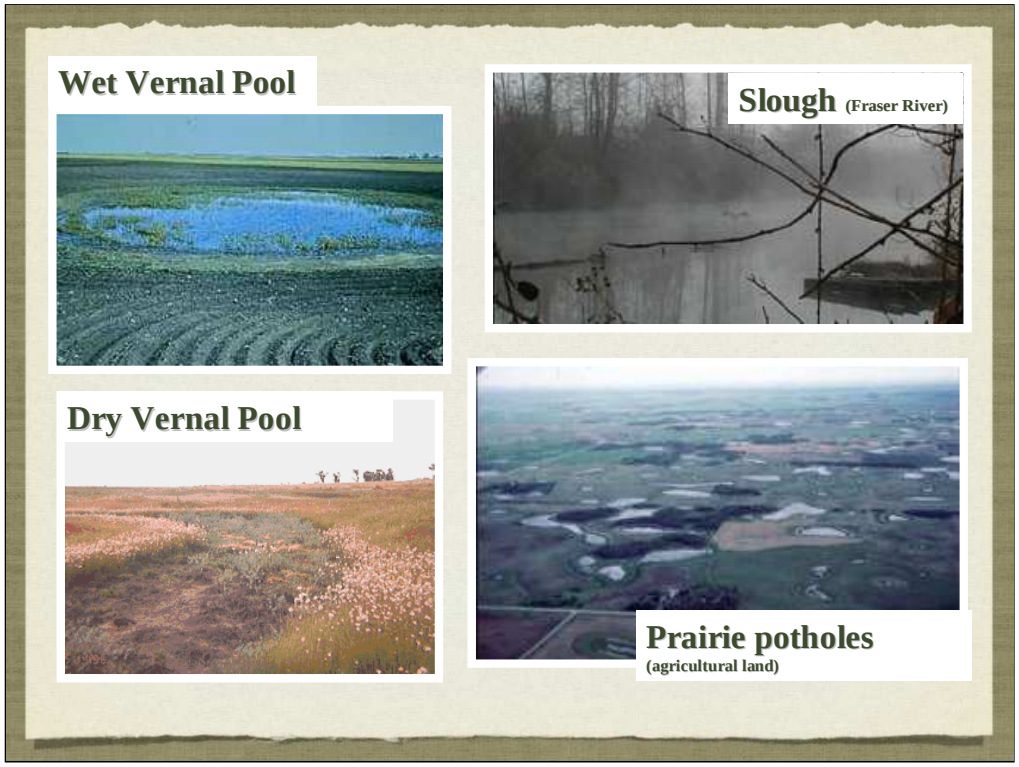


**Freshwater Marsh** (Pitt Lake)

## 5. Shallow open water wetlands:

- **Characteristics: Water covers more than 75% of wetland surface area in summer and usually less than 2 metres deep in summer.**
- **Plant community: submerged and floating aquatic plants.**
- **Often support rare species or species not found in connected permanent wetlands.**

**Shallow open water wetland types: Isolated ponds, potholes, shallow lakes, sloughs, oxbows, vernal pools**




other types are the typical shallow ponds that form on the permafrost of the Arctic tundra

## 6. Mangrove wetlands:

- **Characteristics: Woody plant or plant communities between the sea and land in areas inundated by tidal action.**
- **Found throughout the tropics and subtropics in areas of high precipitation**
- **Cover approx. 180,000 sq km. They are most common around the mouths of large rivers and in sheltered bays.**

Mangroves are a species as well as a community of plants. It can be a tree but (like a 'rainforest plant') it can also be a shrub or palm. All share the ability to live in salt water.
Damage from the tsunami that hit Thailand in 2004 may have been exacerbated in areas that had lost coastal mangrove wetlands due to development.

# Wetland Protection – Regulation & Policy

**International:**

- **Ramsar Convention:1971 convention in Ramsar, Iran. Countries agreed to designate at least one wetland of international significance.**
- **Local Ramsar site : Boundary Bay**

**Canada:**

- **Federal Fisheries Act (No Net Loss requires compensation for unavoidable fish habitat loss, usually at a 2:1 ratio for wetland that support fish), Migratory Birds Convention Act. Indirectly the Species at Risk Act.**
- **National Wildlife Conservation Areas**

**British Columbia:**

- **B.C. Wildlife Management Areas**
- **Direct purchase of significant wetlands (e.g. Burns Bog, Blaney Bog).**
- **Wetland Stewardship Partnership and draft Wetland Action Plan (Province of BC & Ducks Unlimited Canada)**
- **Green Infrastructure Bylaw a model wetland conservation bylaw for local governments & "Wetlands Protection: A Primer for Local Governments" ((Province of BC & Ducks Unlimited Canada, Grasslands Conservation Council of BC).**

## Globally - The state of wetlands today:

**Globally 80% of wetlands have been impacted by human activities.**

**Direct Impacts:**

- **Alteration of complex and sensitive hydrology.**
- **Changes to land use (clearing, infilling agriculture, urbanization, aquaculture, peat extraction)**
- **Draining**
- **Dyking**
- **Impervious surfaces**
- **Impoundments**
- **Sedimentation**

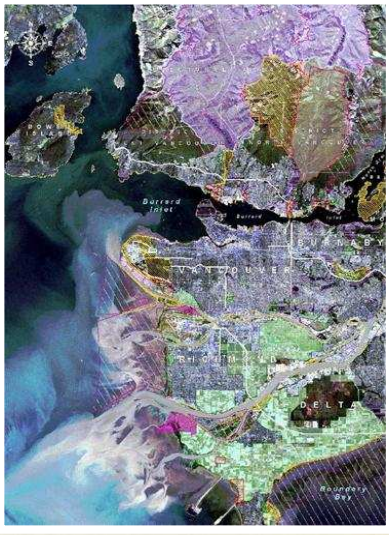
**Indirect Impacts:**

- **Climate change (sea level rise, release of CO2)**
- **Invasive species**

Yet even with all the legislative and regulatory tools hindsight still tends to be 20-20 where protecting wetland ecosystems are concerned

## Closer to home - the Fraser River Estuary – one of BC's most significant coastal wetlands.

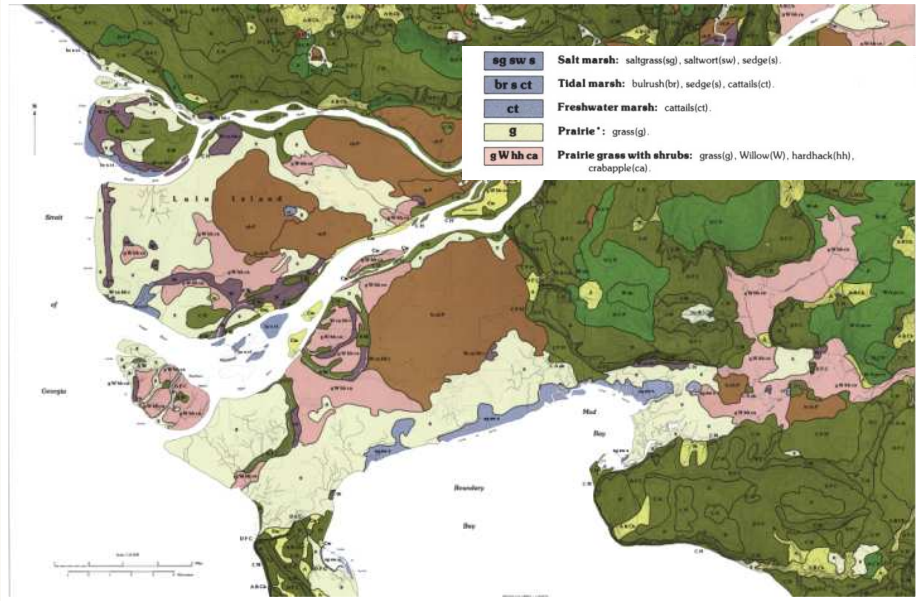
- **Vital for millions of wintering shorebirds and waterfowl migrating along the Pacific Flyway between Alaska and South America.**
- **The estuary drives primary food production and nutrient cycling for hundreds of fish and wildlife species in the lowlands and Straight of Georgia.**




Burns bog (distinct greenspace lower right) is one of the other internationally recognized wetlands close to home.

For further information see the Burns Bog Conservation Society: http://www.burnsbog.org/index.shtml

## The wetland mosaic of the Lower Fraser pre-settlement (1890's)




The Fraser lowlands were dominated by freshwater and estuarine marsh, bog and fen (prairie) habitats.

Source: Canadian Wildlife Service/Environment Canada derived from Teversham and North UBC

**75- 80% of the Lower Fraser Valley's wetlands have been lost since European settlement in the mid 1800's.**

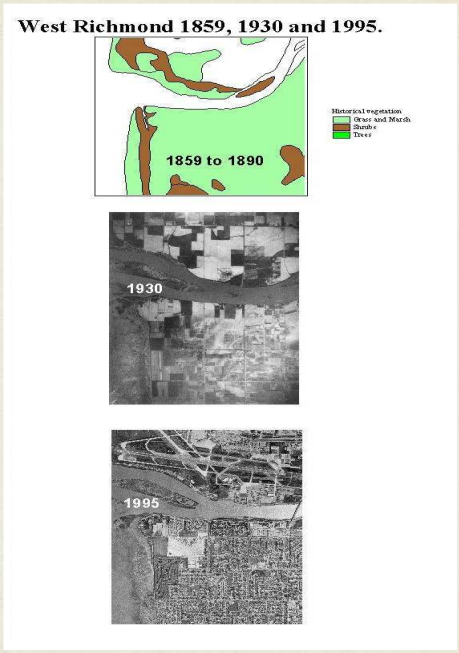



Image Source: Canadian Wildlife Service / Environment Canada

Wetlands composed 83,100 ha or 10% of the Lower Fraser land cover in 1827 and dropped to 12,100 ha or 1% of the land cover by 1990

(Boyle et al 1997)

Locally About 96 per cent of the wetlands in the North Arm of the Fraser estuary have been directly lost since the turn of the century. (Levings & Thom, 1994.)

## Globally What does the future hold for wetlands?

**“Coastal forests are key to preventing future disasters and restoring life and livelihood around the Indian Ocean.”**

**“Dying Forest: One year to save the Amazon. Time is running out for the Amazon rainforest. And the fate of the 'lungs of the world' will take your breath away.”**

**“Was some of the damage from Hurricanes Katrina and Rita exacerbated by the loss of Louisiana’s coastal wetlands? The answer is probably yes…”**

**“To even consider building a highway (through Burns Bog), however well designed and placed, would be tantamount to an act of international vandalism. Please, please don't let it happen.“**
**Dr. David Bellamy, International Peatland Expert in respect to Burns Bog and the proposed South Fraser Perimeter Road (part of the provincial Gateway Project in Metro Vancouver)**

So we know how important wetlands are and we have the tools to protect them – then why are we still losing them?

## But it doesn't have to continue this way - The New York / Catskill watershed example:

**New York City has the largest unfiltered surface water supply in the world.**

**Every day, some 1.3 billions gallons of water from this vast system is delivered to 9 million+ consumers.**

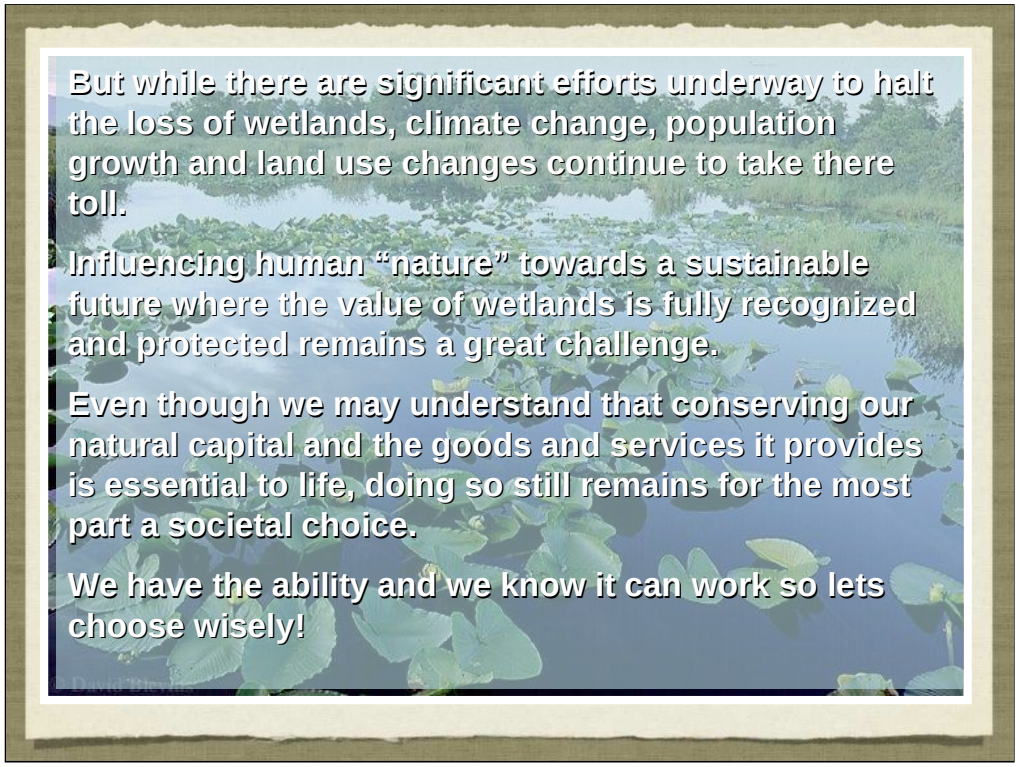
**The natural filtering abilities of New York's ecosystems, wetlands and waterways was being threatened by development, runoff from agricultural lands and impervious surfaces.**

**New York State decided it needed to protect this world class water supply - but instead of building water treatment plants, New York state protected the forests and wetlands of the Catskills where its drinking water originates.**


By spending $320 million from 1997-2007 to protect its natural capital the state saved $8 billion to $10 billion to build a filtration plant and the $400 million in annual maintenance and operation costs.

The State still considers the present $1.3 billion it pays for annual watershed protection to be a wise and worthwhile investment.

http://ice.ucdavis.edu/node/133


But while there are significant efforts underway to halt the loss of wetlands, climate change, population growth and land use changes continue to take there toll.
Influencing human “nature” towards a sustainable future where the value of wetlands is fully recognized and protected remains a great challenge.
Even though we may understand that conserving our natural capital and the goods and services it provides is essential to life, doing so still remains for the most part a societal choice.
We have the ability and we know it can work so lets choose wisely!