Geography & Planning
UNIVERSITY OF TORONTO

GEORGIAN TRIANGLE LIFELONG LEARNING INSTITUTE
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WATER ISSUES IN ONTARIO

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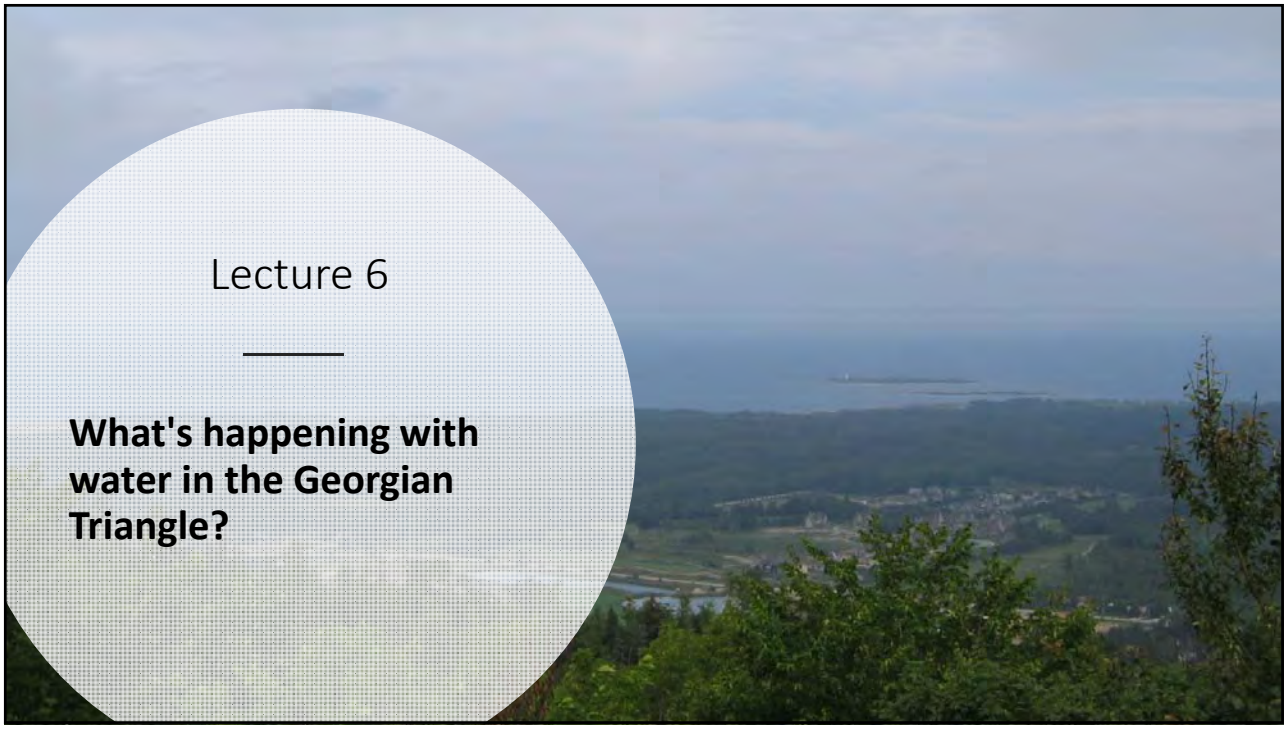


CONTENT

Water in Anthropocene

https://www.youtube.com/watch?v=LvWPO_ZfIMM

1. From Area Of Concern to Delisting.
2. Water Issues:
   - Lake levels
   - Invasive Species
   - Municipal Infrastructure
   - Fisheries
   - Development
3. Quiz Time!
4. My Story
5. Four Pillar Approach to Water Sustainability

Georgian Triangle…

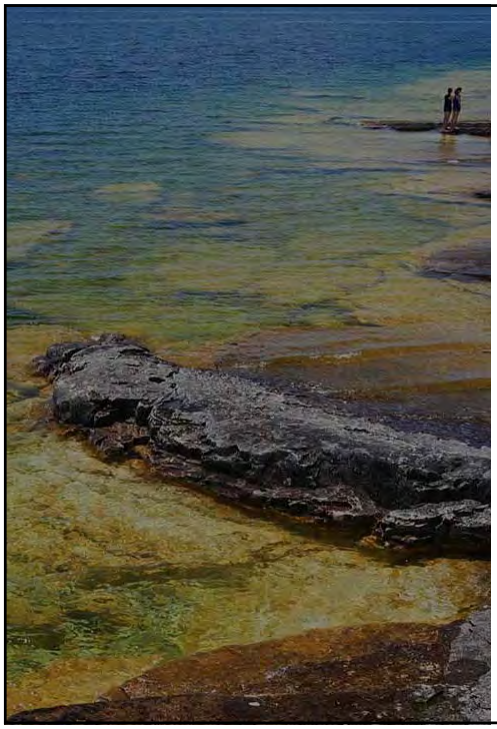
- Located on the southern shores of Georgian Bay, Blue Mountain and Niagara Escarpment, this is a vibrant geographical, cultural and recreation area for the southern Ontario.
- Blue Mountain, noted for skiing and its Scenic Caves.
- Wasaga Beach Provincial Park, a popular beach destination.
- Collingwood, known for its charm and hospitality.
- It received the title of Biosphere Reserve in 2004.

History…

- The land in the area was first inhabited by the Iroquoian-speaking Petun nation, which built a string of villages in the vicinity of the nearby Niagara Escarpment.
- They were driven from the region by the Iroquois in 1650 who withdrew from the region around 1700.
- European settlers and freed Black slaves arrived in the area in the 1840s.
- Collingwood was incorporated as a town in 1858, nine years before Confederation and was named after Admiral Cuthbert Collingwood, Lord Nelson's second in command at the Battle of Trafalgar, who assumed command of the British fleet after Nelson's death.

AREA OF CONCERN (AOC)

- These are locations within the Great Lakes identified as having experienced high levels of environmental harm.
- Under the 1987 Great Lakes Water Quality Agreement between Canada and the United States, 43 such areas were identified, 12 of which were Canadian and 5 of which were shared binationally.



Why was it listed as an Area of Concern?

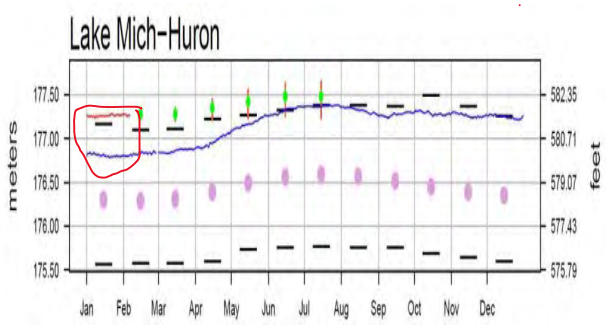
- Collingwood Harbour was designated as an AOC in 1987 because a review of available data indicated that water quality and environmental health were severely degraded.
- A history of industrialization, urbanization and agricultural land use activities along the shores and within the tributaries of the harbour had resulted in the impairment of beneficial use indicators of environmental quality.
- Major environmental concerns in the area that led to the designation included nuisance growths of algae in the harbour and contaminated sediments.

Why was it Delisted in 1994?

- In 1994, Environment and Climate Change Canada, in consultation with the Ontario Ministry of the Environment and Climate Change and local communities, determined that impaired beneficial uses in the area had been restored in accordance with the Great Lakes Water Quality Agreement (GLWQA).
- The Government of Canada then removed Collingwood Harbour from the list of AOCs.

Why was it Delisted in 1994?

- Introduction of new technology to the sewage treatment plant that better captured phosphorus before it got into the harbour.
- Mobilization of community volunteers to systematically eliminate purple loosestrife from wetlands. They re-naturalized Black Ash Creek, turning it from a straight flood-prevention channel back into a meandering, curving tributary capable of supporting fish habitats.
- Working with real estate developers to transform the shipyard brownfield into a mixed-use waterfront development with more than 600 homes.



Water Level

- Water levels continue to be well above average and near record high levels.
- High water levels and potentially record high water levels are expected to persist for at least the next six months, so flood prone areas are expected to remain vulnerable. Water levels and flows in the connecting channels can be significantly impacted by ice during the winter months.

Municipal Water Infrastructure

- Collingwood Drinking Water System (CDWS) consists of the Raymond A Barker Ultrafiltration Plant (RAB) and the Collingwood Distribution System. The raw water source is surface water from Georgian Bay, Lake Huron.

Municipal Water Treatment

- Surface water is taken from Nottawasaga Bay through a submerged inlet structure, approximately 765m off shore.
- Raw water flows by gravity through a 1067mm diameter intake pipe and surge chamber into the raw water well.
- Chlorine is applied to the raw water at the surge chamber, to assist in the disinfection process.
- Prechlorinated raw water then flows by gravity to the membrane distribution channel in the main building.

Distribution System

- The Collingwood Distribution System is comprised of approximately 157.75 km of ductile and cast iron watermains, ranging in size from 100 mm to 600 mm in diameter, 1198 fire hydrants and 1652 isolation valves in two pressure zones. There are also 24.1 km of private watermains.

Wastewater Treatment

- The Collingwood Wastewater Treatment Plant provides the treatment of residential and commercial wastewater.
- Raw sewage travels through the sewer system, boosted by seven pumping-stations, which is then treated by conventional activated sludge plant with alum addition for phosphorus removal.
- The treated water is then discharged into the Collingwood harbour.

Invasive Species

- More than 180 non-native aquatic species such as plants, animals, fish and microorganisms have entered the Great Lakes to date, and the impact of many of these introduced species can be catastrophic for native ecosystems.
- Why are Invasive Species so Destructive?
- They are highly adaptable.
- They have few predators.
- They thrive in disturbed systems.
- They outcompete native species for food and habitat.
- They reproduce quickly.

- **Phragmites**
- **European Frog-bit**
- **Yellow Iris**
- **Zebra Mussel**
- **Silver Grass**
- **Water Soldier**

Fishing

- Canada has one of the world's biggest fishing economies. The commercial fishing industry employs 80,000 people and generates nearly $7 billion (CAN) for the nation in both wild capture and aquaculture fisheries. Recreational fishing, too, is a major economic force, contributing nearly $9 billion to the Canadian economy each year.

Common Name	Scientific Name	Thermal Status
Walleye	Sander vitreus	Warmwater
Rainbow Trout ^	Oncorhynchus mykiss	Coldwater
Northern Pike	Esox lucius	Coldwater
Brown Bullhead	Ameiurus nebulosus	Warmwater
Channel Catfish	Lctalurus punctatus	Warmwater
Longnose Sucker	Catastomus catastomus	Coolwater
Yellow Perch	Perca flavescens	Warmwater
Largemouth Bass	Micropterus salmoides	Warmwater
Smallmouth Bass	Micropterus dolomieu	Coolwater
Rock Bass	Ambloplites rupertris	Warmwater
Black Crappie ^	Pomoxis nigromaculatus	Warmwater
Pumpkinseed	Lepomis gibbosus	Warmwater
Creek Chub	Semotilus atromaculatus	Warmwater
Common Carp*	Cyprinis carpio	Warmwater
Minnow (various species)	-	-
Brook Trout	Salvelinus fontinalis	Coldwater
Mottled Sculpin	Cottus bairdi	Coldwater
Brown Trout	Salmo trutta	Coldwater
Lake Sturgeon~	Acipenser fulvescens	Coldwater
Chinook Salmon	Oncorhynchus tshawytscha	Coldwater

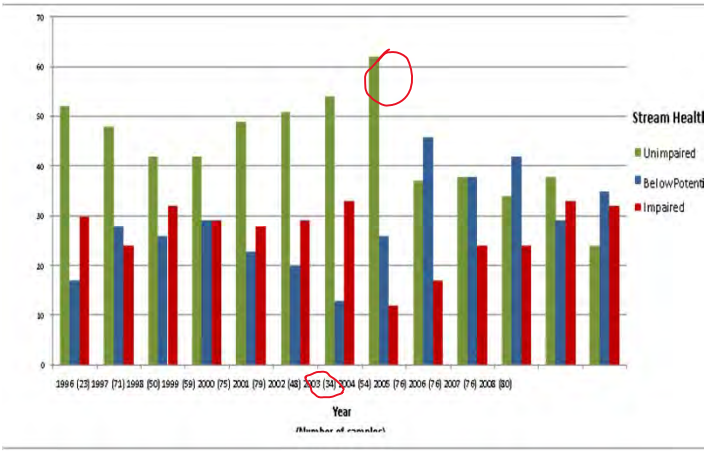
^ = *non-native*
* = *non-native, invasive species*
~ = *species at risk (in Ontario)*

Stream health in the Nottawasaga Valley Watershed: Condition of benthic community.

There is a marked change in the land uses adjacent to streams rated below potential or impaired.

Many of these had been channelized, causing unnatural flow patterns and bank erosion. The majority of sites going through agricultural areas were rated as impaired, as they are impacted by erosion, non-point source runoff of nutrients, and stream alterations.

Other land uses associated with impaired ratings include the presence of dams or online ponds, the presence of a stormwater pond or stormwater outlet or commercial, residential and urban land uses.



Land use in Nottawasaga Watershed

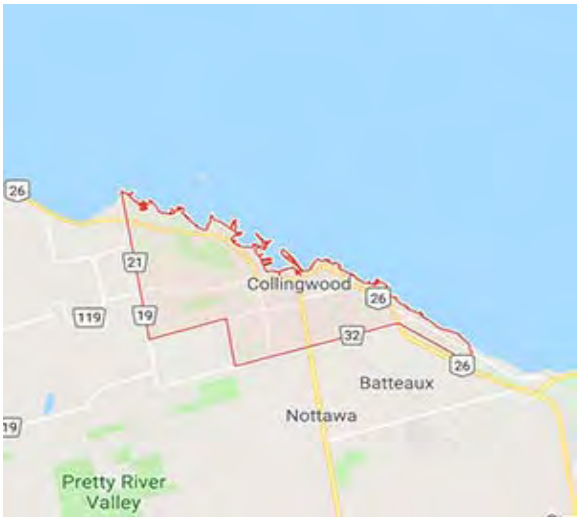
Land Use	Area (km2)	% of total
Beaches	0.1	0.003
Golf Course	15.0	0.476
Hay/Pasture	841.6	26.763
High-Intensity Development	116.6	3.709
Low-Intensity Development	4.5	0.144
Natural Vegetative Cover	1086.2	34.541
Probable Agriculture	19.3	0.614
Quarries	26.6	0.847
Roads	83.9	2.669
Row Crops	851.9	27.090
Sod Farms	29.8	0.947
Transitional	61.8	1.965
Water	7.3	0.232
TOTALS:	3,144.8	100

- The Nottawasaga Valley watershed is largely rural in character though urban areas such as Barrie, Shelburne, Wasaga Beach and Collingwood continue to grow.
- Aggregate resources constitute the major raw material used in the road building and constructions industries. Currently in the Nottawasaga watershed, there are 79 active licensed aggregate operations: 11 class B (<20,000 tonnes annually) & 59 class A (>20,000 tonnes annually) licenses. Nine of the active operations have no recorded annual tonnage limits.

Aggregates

- **Walker Quarry**
- A mega quarry is being developed at the intersection of County Roads 91 and 31 west of Duntroon.
- 'Quarry Corners' is the location of a MAQ Aggregates quarry, two Walker quarries and likely the home of a new Osprey quarry.
- The Walker Quarry is at the headwaters of four watersheds. It is very deep and was recently expanded.
- **Pretty River Provincial Park Gravel Pit**
- The owners of the Conn Gravel Pit have submitted a proposal to change the Official Plan to the Town of the Blue Mountains. The changes would allow a brand new quarry to be established bordering the Pretty River Valley Provincial Park at the intersection of the 6th Sideroad and 3rd Line.

Upcoming Developments…



https://www.collingwood.ca/building-business/proposed-developments

Good News!

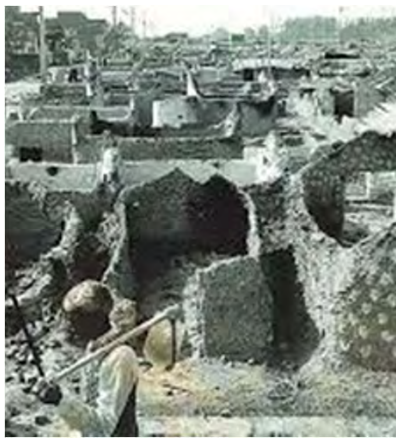
- Extension granted for I year on Bridgewater Expansion.
- On January 31, the Saugeen Ojibway Nation (SON) overwhelmingly voted down the proposed deep geological repository (DGR) for storage of low- and intermediate-level radioactive nuclear waste next to Lake Huron. The DGR had long been proposed by Ontario Power Generation (OPG), but in 2013 OPG had committed to SON that it would not build the DGR without their support.

My Story…

- ***Role of Women in Improvement of Slum's Environment in Delhi: A Report***
- ***Spatio-Temporal Analysis of 1984 Anti-Sikh Riots In India***
- ***Monitoring and Forecasting of Hydrological Parameters in Mahanadi River Basin***
- ***Naked Truth: Going Behind the Science of Lake Simcoe***

Role of Women in Improvement of Slum's Environment in Delhi: A Report



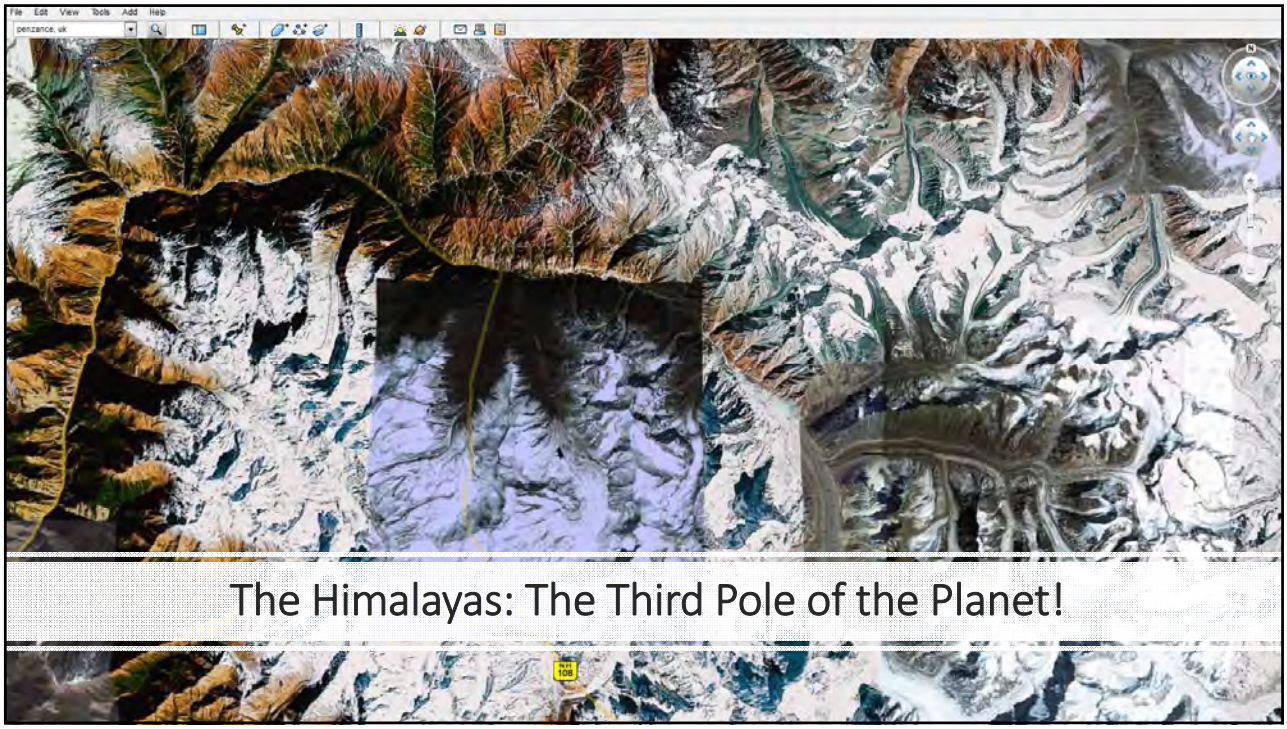

Spatio-Temporal Analysis of 1984 Anti-Sikh Riots In India

Monitoring and Forecasting of Hydrological Parameters in Mahanadi River Basin

Lake Simcoe Watershed Regeneration

Changemakers through innovative approaches:

- Creative fundraising
- Sound Science
- Community engagement
- Youth engagement
- Developing partnerships


The Himalayas: The Third Pole of the Planet!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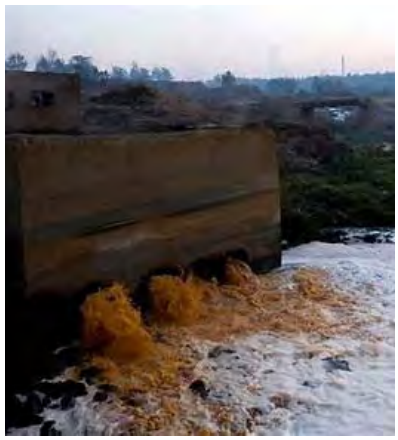
River Ganges

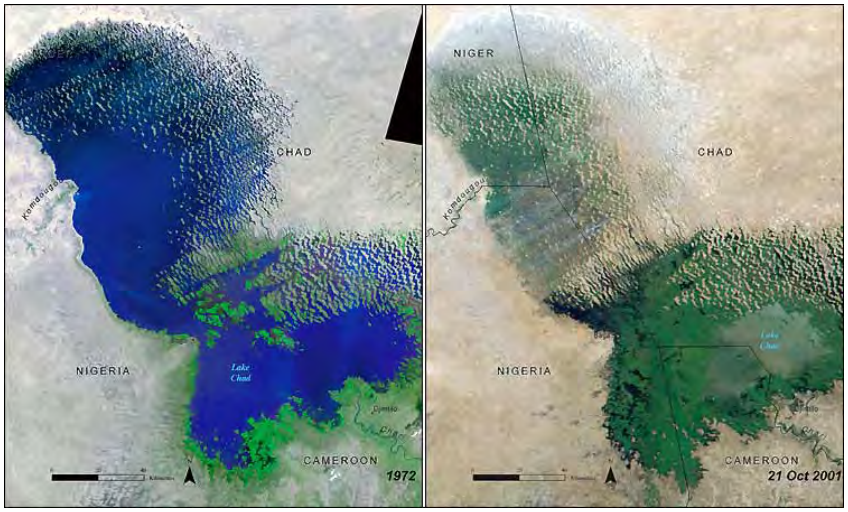
Gangotri Glacier

Gaumukh…Source of River Ganges

Ganges River



Satellite Views of Lake Chad
It has shrunk to ~5%



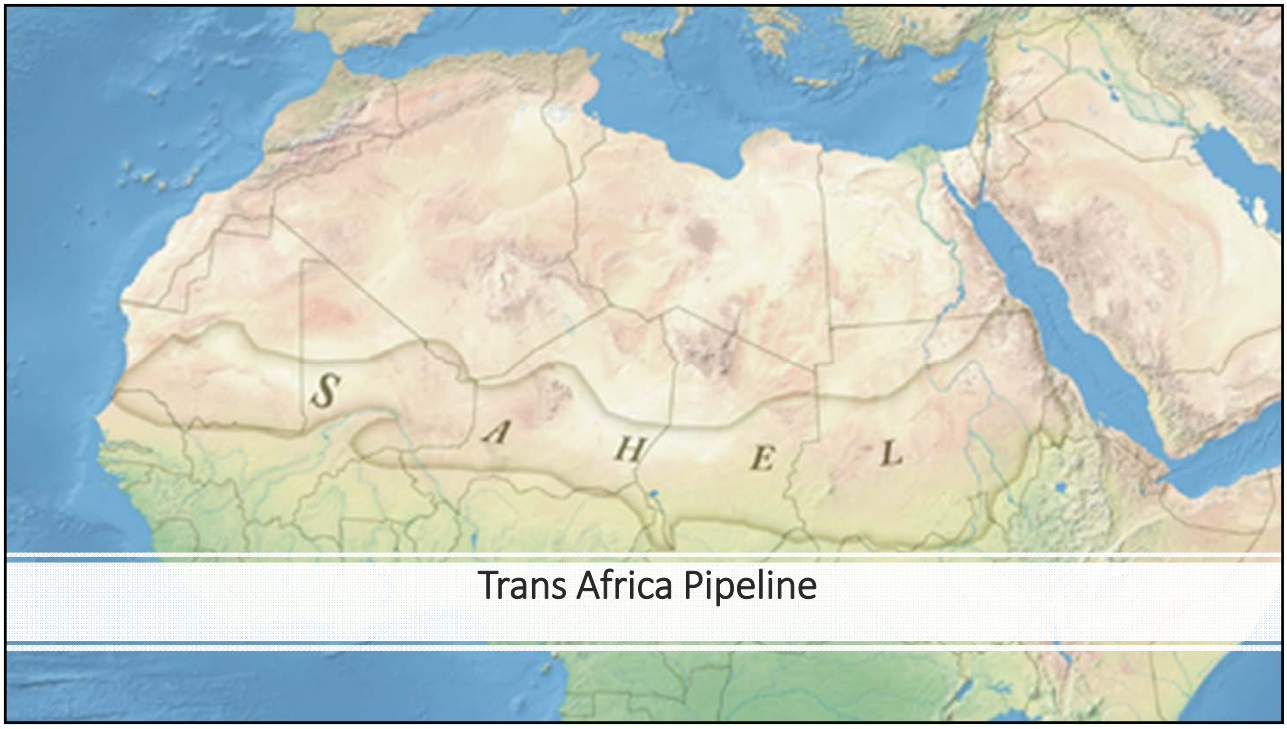
1972 2001

Aral Sea

- https://www.youtube.com/watch?v=irUguQ-eGjI

Lake Eerie

- Algal blooms visible as swirls of green in this image of Lake St. Clair and in western Lake Erie, taken on July 28, 2015.

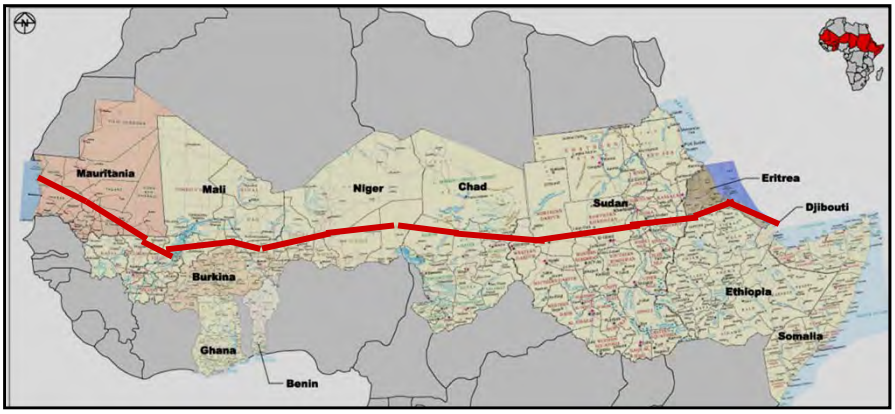


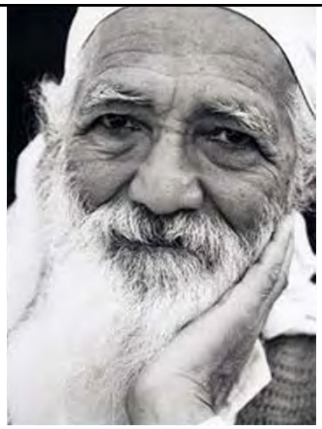
Trans Africa Pipeline

POSSIBLE TAP ROUTE USING AVAILABLE ROADS & RAILWAY LINES IN THE SAHEL

TAP PIPELINE

https://www.youtube.com/watch?v=KiLOWhcrxgo





The contractor says:
"You foolish village women, do you know what these forest bear?
Resin, timber, and therefore foreign exchange!"

The women answer:
"Yes, we know. What do the forests bear?
Soil, water, and pure air,
Soil, water, and pure air."

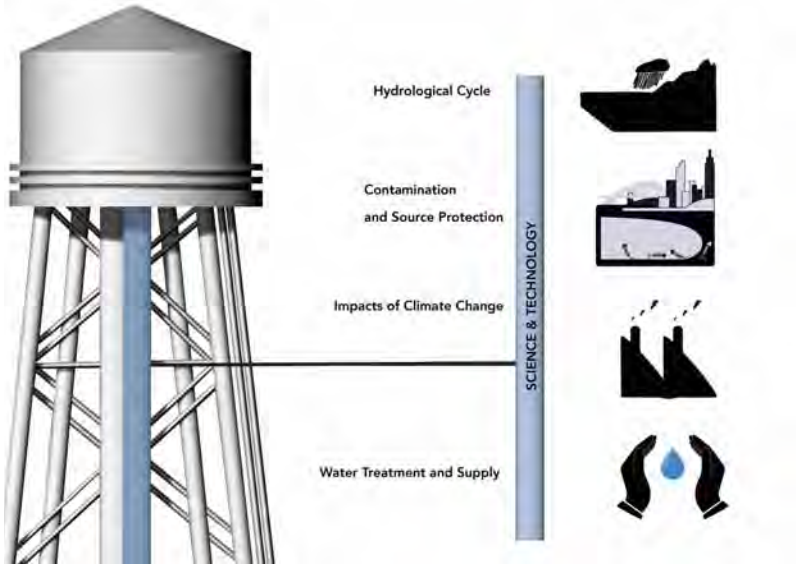
CHIPKO MOVEMENT: ORIGIN OF TREE HUGGERS

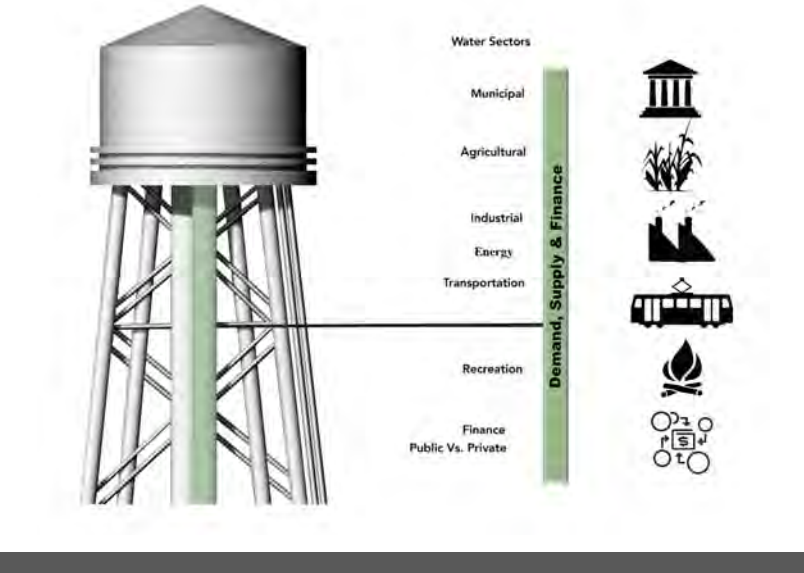
Four Pillar Approach to Water Sustainability

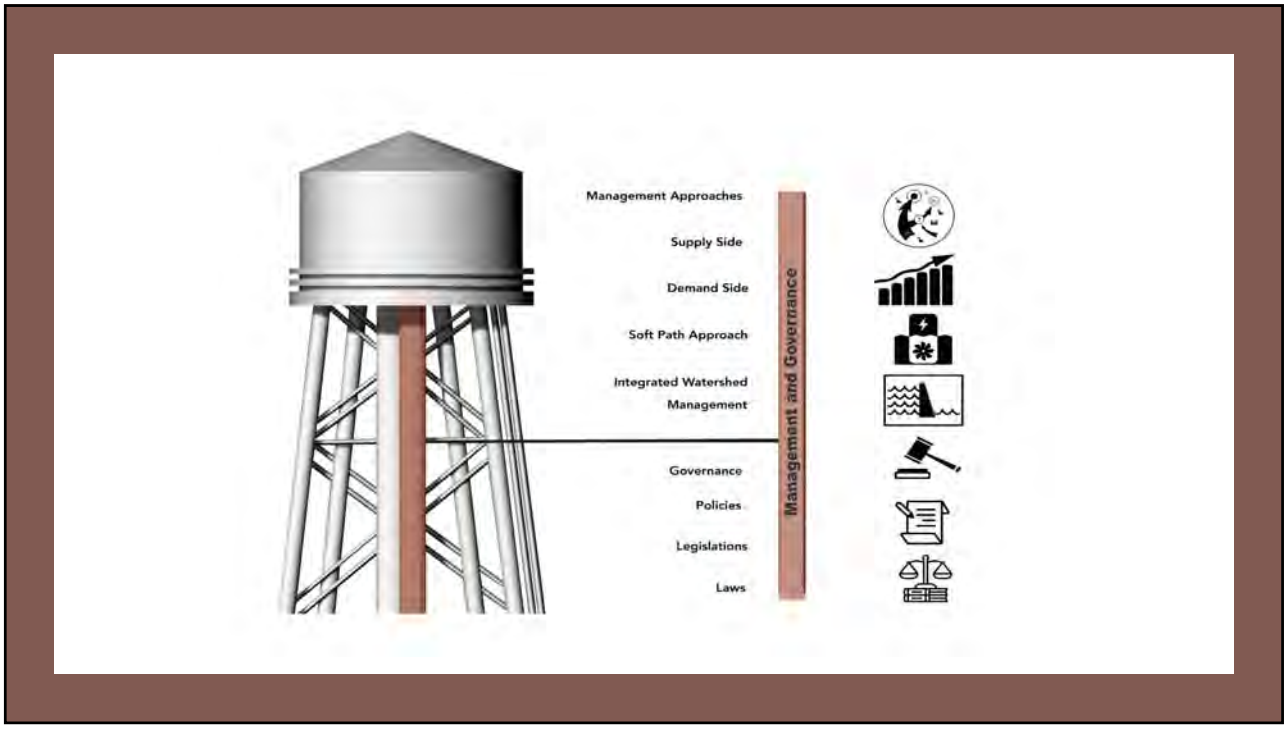
- Spirituality & Culture
- Science & Technology
- Demand, Supply & Finance
- Management & Governance

- Ethics: Equity and Ownership
- Intrinsic Value to Ecosystem
- Spiritual Connections
- Rights of Water Bodies

Spirituality & Culture


Hydrological Cycle
Contamination
and Source Protection
Impacts of Climate Change
Water Treatment and Supply
SCIENCE & TECHNOLOGY


Water Sectors
Municipal
Agricultural
Industrial
Energy
Transportation
Recreation
Finance
Public Vs. Private
Demand, Supply & Finance



Conclusion: Take Away Messages from this Course

- In this course we have examined some of the basic concepts of water issues from global, national, regional and local perspective.
- Water is a finite resource.
- Hydrological cycle is the driving engine of all weather systems.
- Major challenges: Depleting freshwater, increasing demands, expensive sector, easily polluted, climate change impacts, inequitable allocation and governing issues.
- The best fit solution is integrating water Philosophy, Science, Economics and Governance.

16-50

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