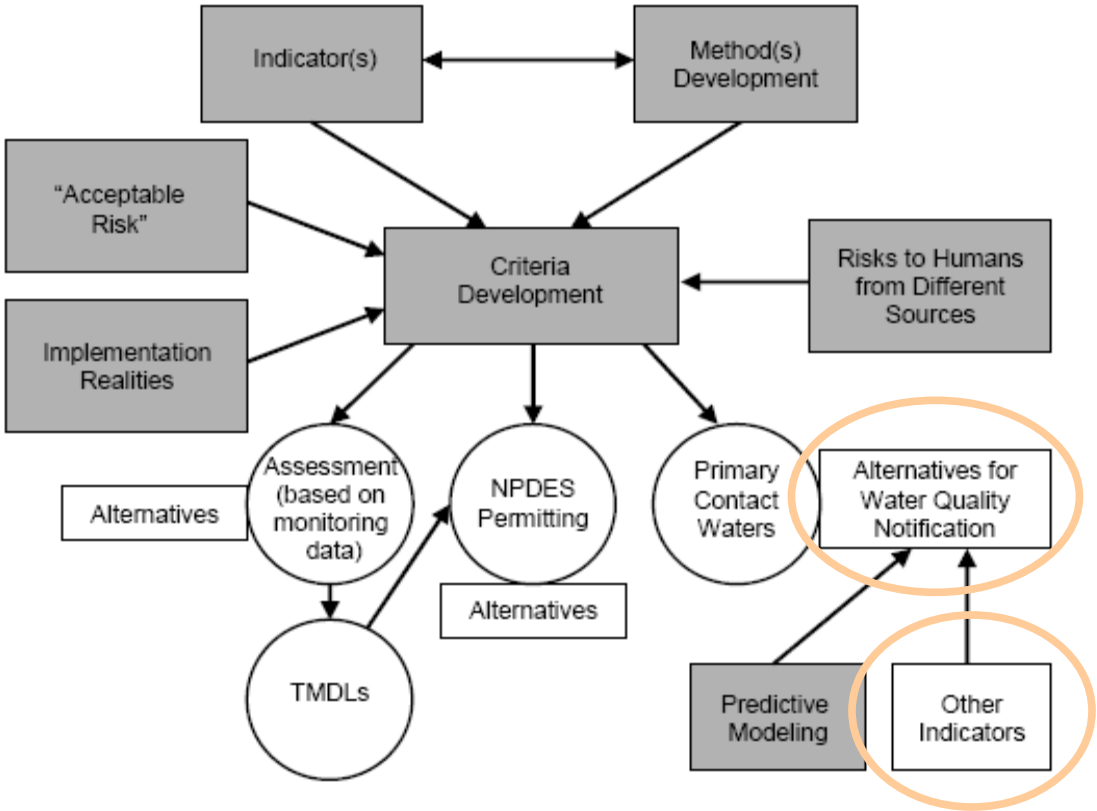


new recreational water quality criteria, USEPA Experts Workshop 2007

In a 30-day period, geometric mean of samples may not exceed 100 fecal coliforms/100 ml

Alaska, current

1) a geometric mean of 126 organisms E. coli / 100 ml collected during dry weather or
2) a geometric mean of 235 organisms E. coli /100 ml for any single water sample
>corresponds to approximately 8 gastrointestinal illnesses per 1000 swimmers

USEPA 1986

The geometric mean of at least 5 samples, taken during a period not to exceed 30 days, should not exceed 2000 *E. coli*/L.

Health Canada 1992

E. coli (cfu/100 mL)	500 (excellent),	1,000 (good)	900 (sufficient)

EU 2006

TORONTO DOWNTOWN: Current Air Quality Reading

Air Quality Readings TORONTO DOWNTOWN	
Note: AQI readings on this web page are based on automatically polled data and have not undergone final verification.	
Date:	**Thursday, March 15, 2007**
Time:	**7:00 PM**
AQI:	**15**
Reason:	**Ozone (O_3)**
Health Effects:	**No health effects are expected in healthy people.**

Air Quality Index (AQI) Categories	
AQI	**Colour**
0-15 Very Good	
16-31 Good	
32-49 Moderate	
50-99 Poor	
100+ Very Poor	

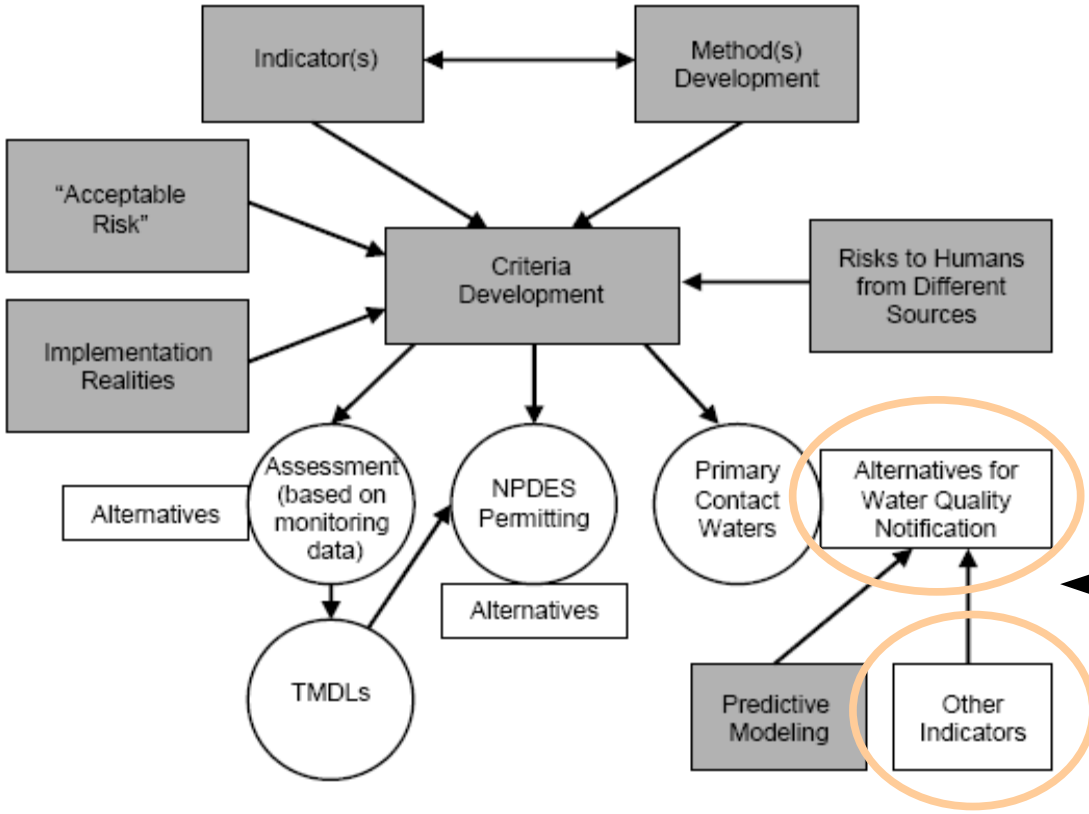
Swimming Conditions as of: Sun, 03 Sep 2006

Roll your mouse over the beach of your choice for more information. Click for details.

Safe to Swim Unsafe to Swim

Important Toronto Beach Information

1. Marie Curtis Park East Beach
2. Sunnyside Beach
3. Hanlan's Point Beach
4. Centre Island Beach
5. Ward's Island Beach
6. Cherry/Clarke Beach
7. Woodbine Beaches
8. Kew Balmy Beach
9. Bluffer's Beach Park
10. Rouge Beach



swimming pleasure measure (SPM)

Tiered approach to establish the *swimming pleasure measure* (full body interspecies experience)

established
day of year, time of day,conductivity, water and air temperature, pH, dissolved oxygen, algae, chlorophyll, turbidity, ammonium-nitrogen in 3 dimensions (GPS location, depth, time)

narrative-accepted
barometric pressure, wave height, insolation

numeric-experimental
in situ realtime e-coli (invited research)

second order narrative-experimental
presence of fish, crustaceans, presence of human artifacts (motorboats)

post experience survey
how was the water?

Typical performance specifications

	Range	Resolution	Accuracy
Rapid Pulse dissolved oxygen % air saturation	0 to 500%	0.1%	0 to 200%: ±2% of reading or 2% air saturation, whichever is greater; 200 to 500%: ±6% of reading
Rapid Pulse dissolved oxygen mg/L	0 to 50 mg/L	0.01 mg/L	0 to 20 mg/L: ±2% of reading or 0.2 mg/L, whichever is greater; 20 to 50 mg/L: ±6% of reading
ROX optical dissolved oxygen# % air saturation	0 to 500%	0.1%	0 to 200%: ±1% of reading or 1% air saturation, whichever is greater; 200 to 500%: ±15% of reading; relative to calibration gases
ROX optical dissolved oxygen# mg/L	0 to 50 mg/L	0.01 mg/L	0 to 20 mg/L: ±1% of reading or 0.1 mg/L, whichever is greater; 20 to 50 mg/L: ±15% of reading; relative to calibration gases
Conductivity+	0 to 100 mS/cm	0.001 to 0.1 mS/cm (range-dependent)	±0.5% of reading + 0.001 mS/cm
Temperature	-5 to 50°C	0.01°C	±0.15°C
pH	0 to 14 units	0.01 unit	±0.2 unit
Shallow depth	0 to 9.1 m (0 to 30 ft)	0.001 m (0.001 ft)	±0.018 m (±0.06 ft)
Medium depth	0 to 61 m (0 to 200 ft)	0.001 m (0.001 ft)	±0.12 m (±0.4 ft)
Deep depth	0 to 200 m (0 to 656 ft)	0.001 m (0.001 ft)	±0.3 m (±1 ft)
Vented level	0 to 9.1 m (0 to 30 ft)	0.001 m (0.001 ft)	±0.003 m (±0.01 ft)
Open-channel flow	Calculated measurement, requires vented level		
Free chlorine	0 to 3 mg/L	0.01 mg/L	±15% of reading or 0.05 mg/L, whichever is greater
ORP	-999 to +999 mV	0.1 mV	±20 mV in Redox standard solutions
Salinity	0 to 70 ppt	0.01 ppt	±1% of reading or 0.1 ppt, whichever is greater
Nitrate/nitrogen*	0 to 200 mg/L-N	0.001 to 1 mg/L-N (range dependent)	±10% of reading or 2 mg/L, whichever is greater
Ammonium/ammonia/ nitrogen*	0 to 200 mg/L-N	0.001 to 1 mg/L-N (range dependent)	±10% of reading or 2 mg/L, whichever is greater
Chloride*	0 to 1000 mg/L	0.001 to 1 mg/L (range dependent)	±15% of reading or 5 mg/L, whichever is greater
Turbidity#	0 to 1,000 NTU	0.1 NTU	±2% of reading or 0.3 NTU, whichever is greater in YSI AMCO-AEPA Polymer Standards
Rhodamine WT#	0-200 µg/L	0.1 µg/L	±5% of reading or ±1 µg/L, whichever is greater
Chlorophyll#++	**Range** 0 to 400 µg/L chl *a* 0 to 100 RFU	**Resolution** 0.1 µg/L chl *a* 0.1% FS; 0.1 RFU	**Linearity** R^2 > 0.9999 for serial dilution of Rhodamine WT solution from 0 to 500 µg/L
Blue-green algae# phycocyanin	**Range** 0-280,000 cells/mL	**Detection limit** 220 cells/mL§	**Linearity** R^2 = 0.9999 for serial dilution of Rhodamine WT from 0 to 400 µg/L
Blue-green algae# phycoerythrin	0-200,000 cells/mL	450 cells/mL§§	R^2 = 0.9999 for serial dilution of Rhodamine WT from 0 to 8 µg/L
PAR	**Range** 400-700 nm waveband	**Calibration** ±5%	**Stability** <±2% change over 1 year
	Linearity Max. deviation of 1%	**Sensitivity** Typically 3µA per 1000 µmol s-1 m-2 in water	

Descriptive

Statistics (geometric average > threshold)

Regression analysis

Predictive

Regression analysis

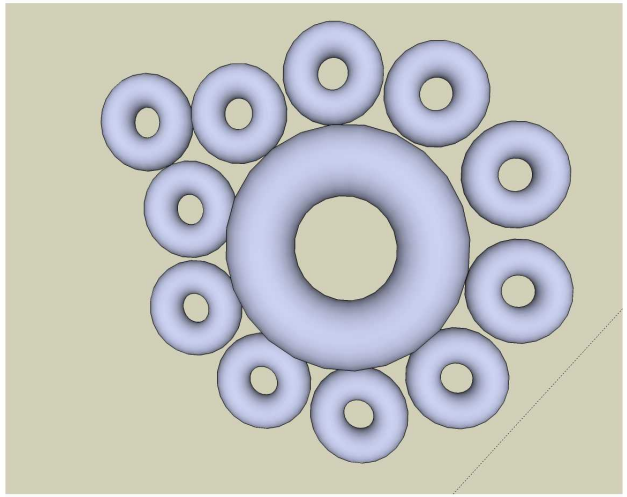
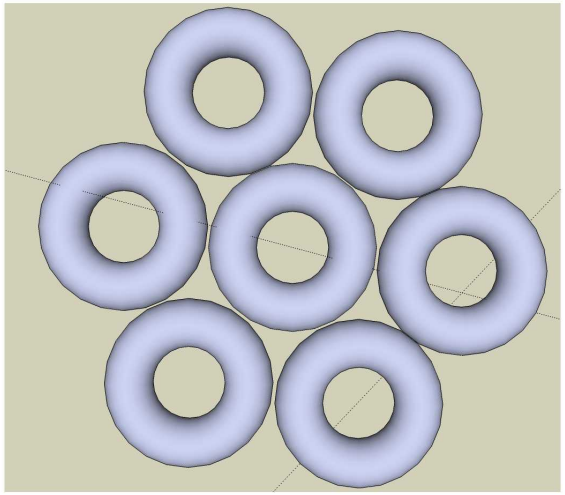
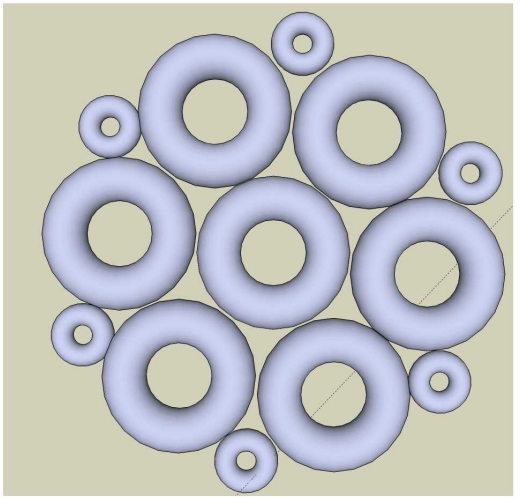
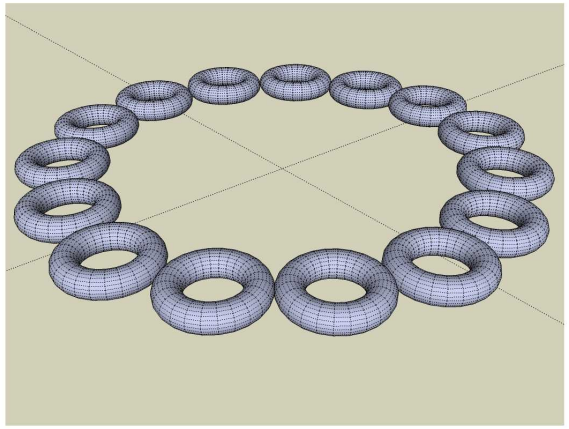
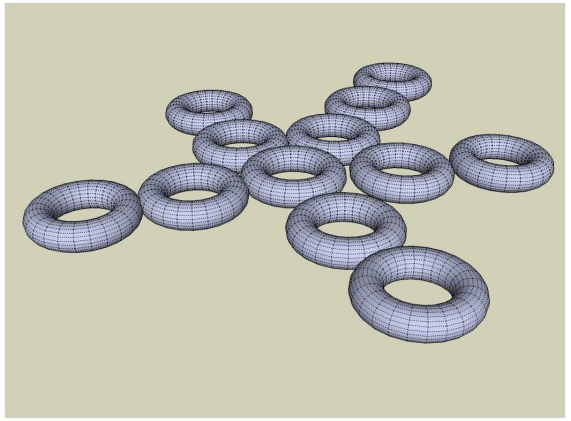
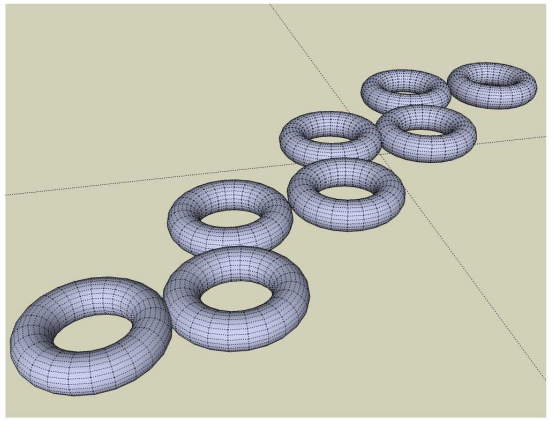
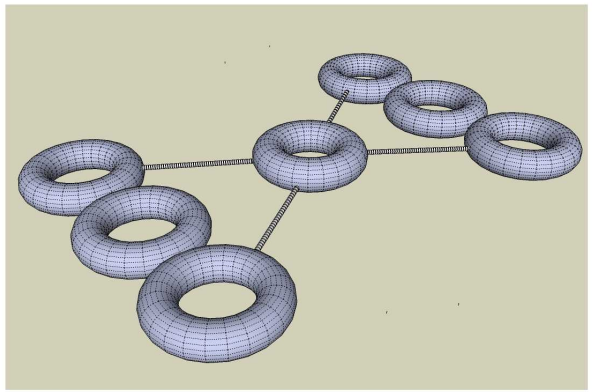
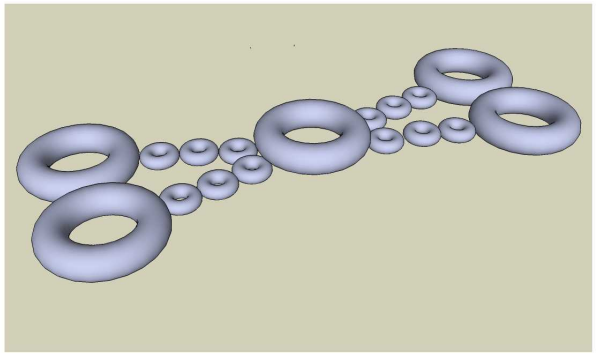
Probabilistic model

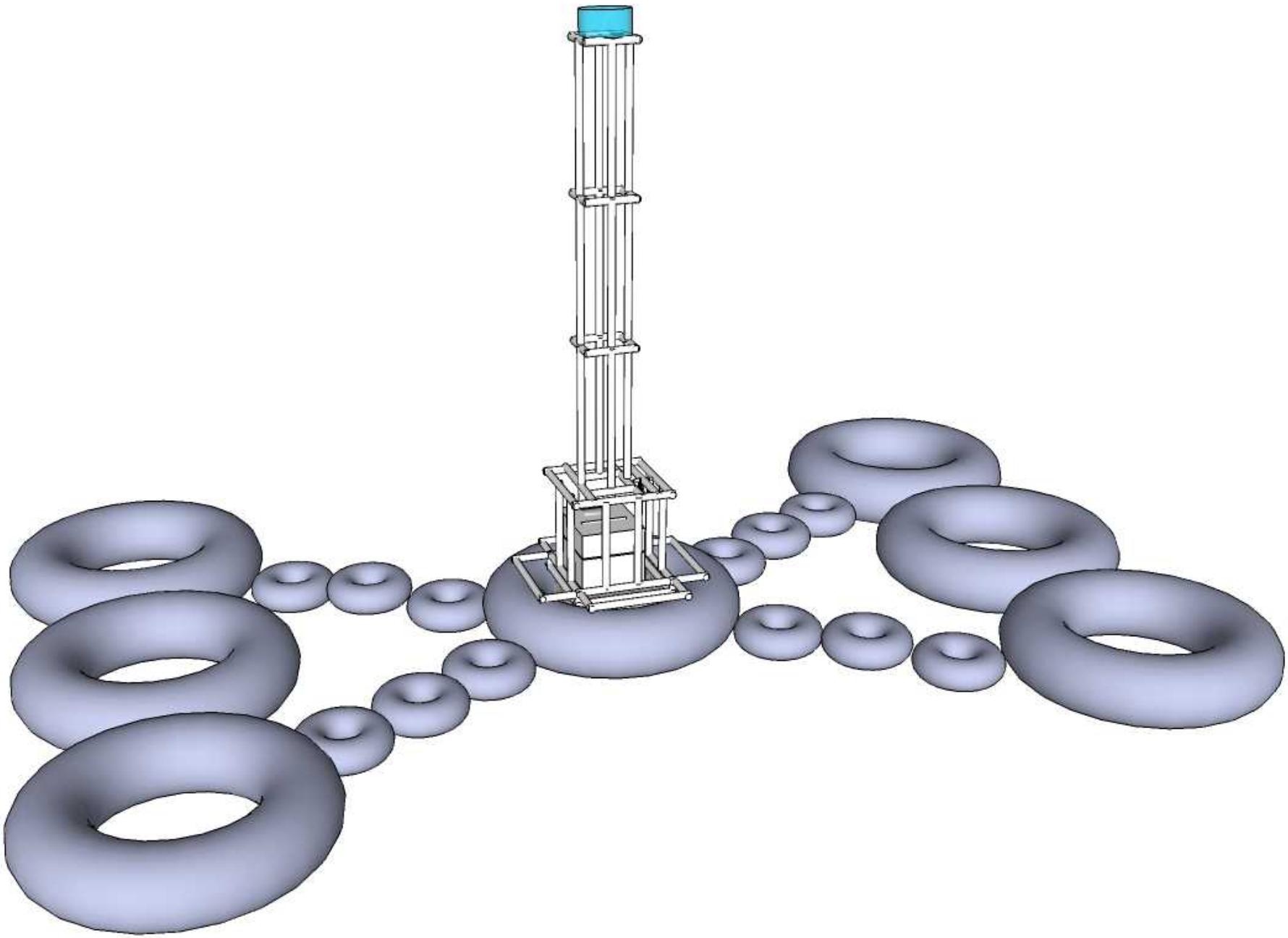
Fuzzy logic model

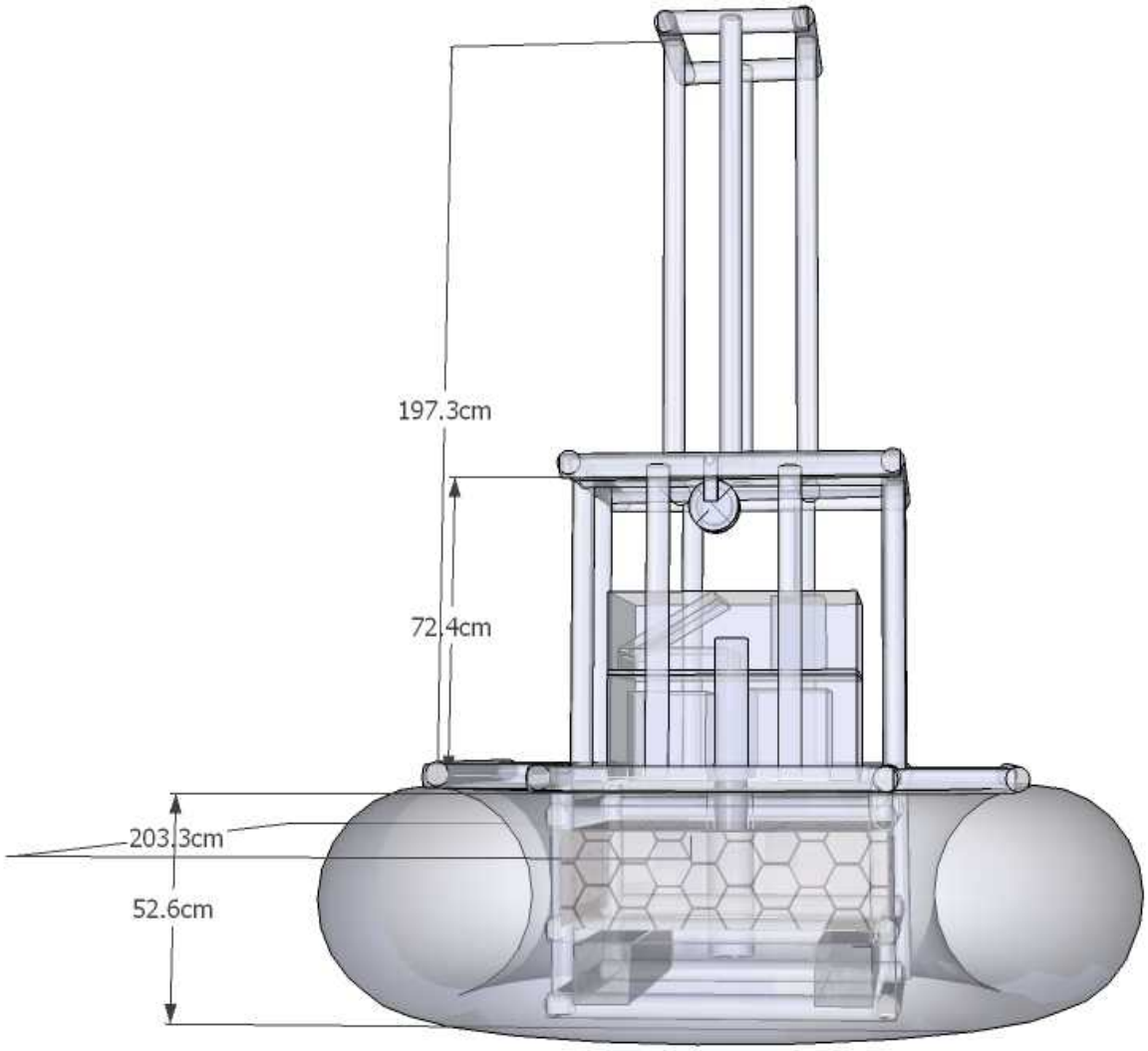
Neural net model

surveys


AVIVA




197.3cm
72.4cm
203.3cm
52.6cm

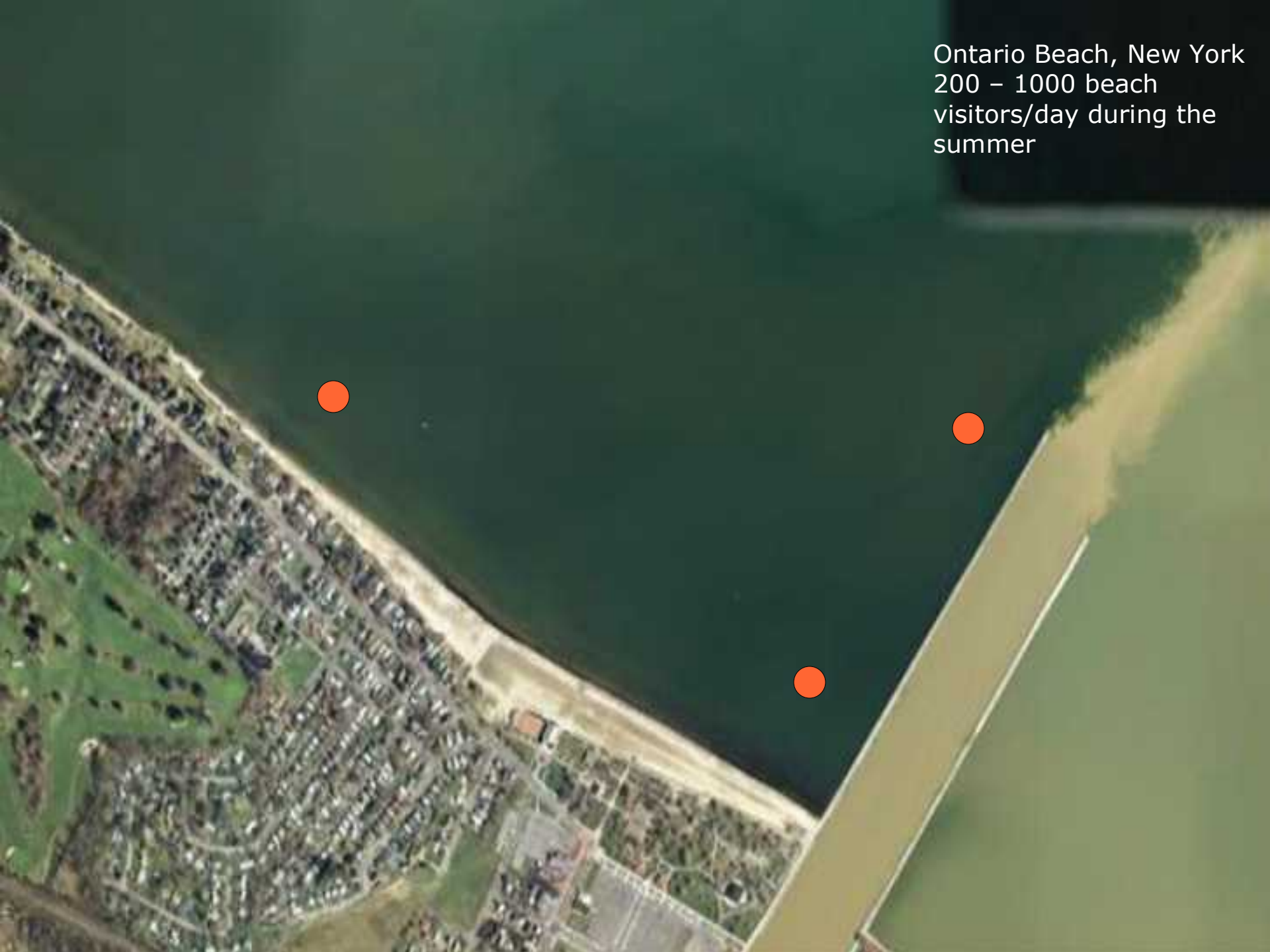

2:23 pm
Ontario Beach OK !

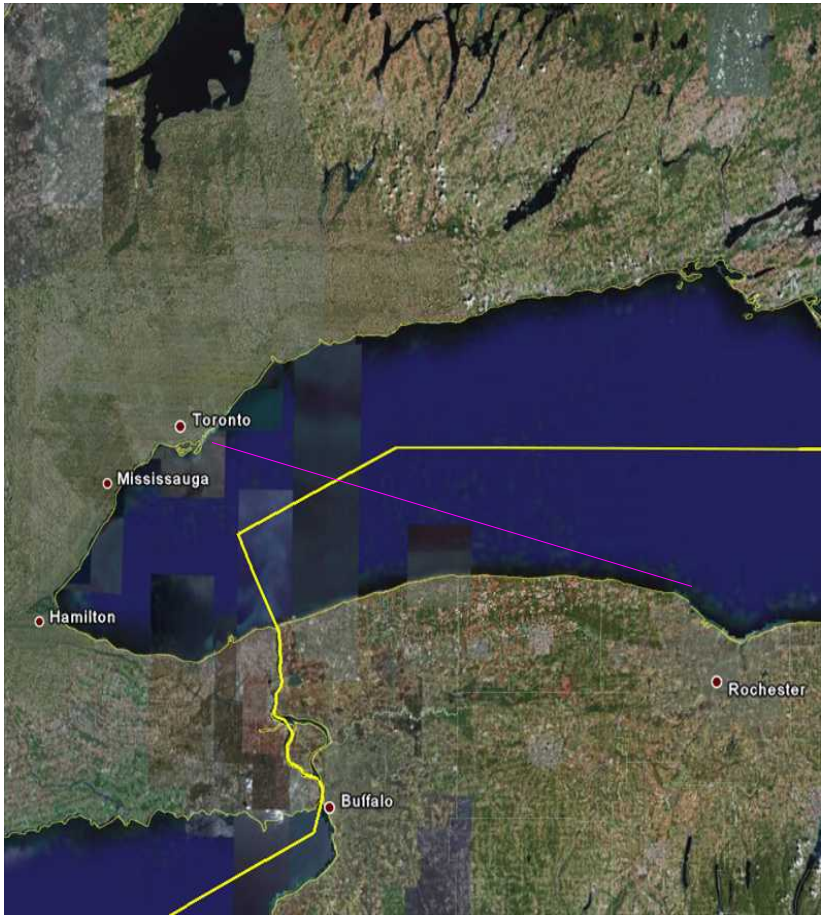

CoPilot
GPS

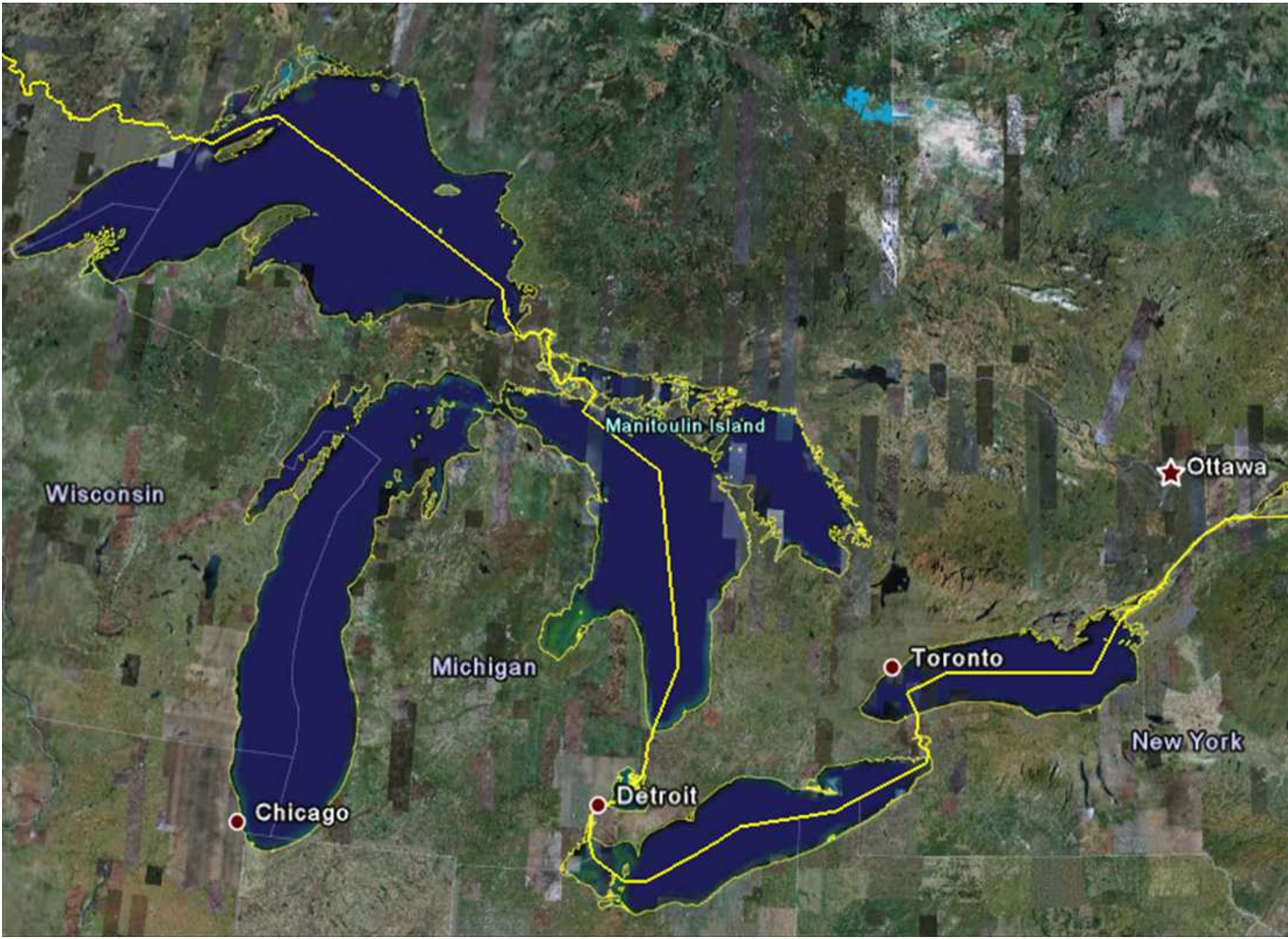

MINN KOTA
MK 24DP

energy use		**energy source**	**energy storage**
daytime	60 – 160 W/hr	$6m^2$ solar cells	3 x 12V cells@8A -> 8121 Whrs
nighttime	60 – 900 W/hr	600 W/hr	

>> autonomous full action: 2+ days (no sun)
>> autonomous min action: 5+ days (no sun)
>> maintain min action: 3 hrs sun
>> maintain max action: 7 hrs sun


Ontario Beach, New York
200 – 1000 beach visitors/day during the summer


Toronto
Mississauga
Hamilton
Rochester
Buffalo


Manitoulin Island
Wisconsin
Ottawa
Michigan
Toronto
New York
Detroit
Chicago


अमर उजाला AMAR UJALA


U.P. POLLUTION CONTROL
BOARD - VARANASI

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Ganga Water Pollution and Occurrence of Enteric Diseases in Varanasi City

M. Pandey, V.K. Dixit, G.P. Katiyar, G. Nath, S.M. Sundram, N. Chandra, A.K. Shomvansi, S. Kar, V.K. Upadhay

Abstract

Research question : *Whether concentration of Ganga water pollutants is related to occurrence of water borne enteric diseases in Varanasi city.* ***Objectives :*** *1) To assess if the Ganga Action Plan(GAP), initiated in 1984 to clean Ganga, has been able to restore its water quality to WHO or Indian Standard Institution (ISI) standards. 2) To explore, if concentration of Ganga water pollutants is related to occurrence of enteric diseases in Varanasi city.* ***Study design :*** *Hospital based survey and office records.* ***Participants :*** *OPD patients during July 1998 to June 1999 and indoor patients during January 1996 to June 1999.* ***Setting :*** *Monthly visit to OPD of 5 city hospitals and secondary data from Central Water Commission (CWC), Varanasi.* ***Analysis :*** *Multiple regression, χ^2 -test, Standardised Euclidean distance.* ***Results :*** *Ganga water quality is still far below even the ISI standards and has a very high relationship with occurrence of said water borne enteric diseases in Varanasi city (R =.797). Survey data on OPD patients raise a suspicion that lack of water treatment practice at home may be major cause of said diseases, in some areas of city. Moreover, sample survey data also indicate that occurrence of enteric diseases is also affected by high population density and concentration of some ethnic and of weaker socio-economic groups.*

Key words : Water borne enteric diseases, Entero-pathogens.

Introduction

An unbalanced lopsided resource utilization on earth for fast growing urbanisation, industrialization and armament race (including nuclear and chemical ones) has led to global degradation of the environment. Same is the present situation of the air and water quality in our country. Central Water Commission (CWC) under Government of India, therefore, started monitoring the water quality aspects of Indian river system.

The holy Ganges flowing in the most populated northern India is also now declared unfit even for bathing. The city of Varanasi, of ascetic and tourist importance, and a seat of learning from ancient times, situated on the bank of Ganga draws about 50% of water for domestic consumption of city inhabitants from this river.

After realizing that huge amount of industrial and domestic discharges are being flown into the rivers, it was considered necessary in 1978 to study various quality aspects including pollution parameters in the river Ganga and its tributaries. In 1984 the GAP for cleaning Ganga, was formulated and commenced. By March 1990 Water Quality Monitoring (WQM) Network covered with the help of State Pollution Control Boards (SPCB), 103 rivers and its tributaries. Hence it is quite likely that quality of water will influence the health of surrounding inhabitants.

We therefore started this study with the following objectives :

1. to explore, if concentration of Ganga water pollutants is related to occurrence of enteric diseases in Varanasi city,
2. to assess if the Ganga Action Plan(GAP), initiated in 1984 to clean Ganga, has been able to restore its water quality to WHO or Indian Standard Institution (ISI) standards,
3. to assess trend of the monthly and seasonal mean concentration of 11 Ganga water pollutants parameters from January 1980 to June 1999,
4. to obtain Standardised Euclidean distances of monthly means from WHO and ISI Standards,
5. to check if seasonal means of concentration of various parameters in 1980-81, 1992-93 and 1997-98 are equal ot WHO and ISI Standard.

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Material & Methods

For last four points secondary data from CWC, Varanasi office has been collected. For the first, a hospital based study of indoor patients of five water borne enteric diseases has been conducted for a period of January 1996-June 1999 from the Admission /Discharge (A/D) registers of the General Medicine/ Gastroenterology and Pediatric wards of five hospitals. Multiple linear regression and Forward Stepwise regression analysis has been applied to quantify the degree of relationship of water pollutants concentration with occurrence of said enteric diseases. One year (July, 1998-June, 1999) sample survey of OPD patients of enteric diseases from the same hospitals was also conducted and χ^2 -test of significance is used to find out if type of source of water, food habits, personal hygiene and sanitary conditions are associated with occurrence of enteric diseases. A maximum of 10 OPD patients from General Medicine, Gastroentrology & Pediatrics wards were taken.

The considered 11 Ganga water quality parameters are : (i) 3 biological -BOD, Total and Faecal coliforms (ii) 2 physical - Temperature and Conductivity (λ) (iii) 1 Physico-chemical -pH and (iv) 5 chemical- DO, Sodium (Na^+), Chloride (Cl^-), Fluoride(Fl^-), and Nitrate ($NO3^-$).

The following five enteric diseases : (i) Diarrhoea (ii) Dysentery (iii) Viral Hepatitis (iv) Typhoid, and (v) Gastro-enteritis; have been considered and number of indoor patients of these diseases in the five hospitals during January 1996 to June

6D Beach Test and Beach Celebration: Late June 2008

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