Application of Innovative Technologies for Water Monitoring - International Perspective

Haseen Khan, P.Eng
Amir Ali Khan, PhD

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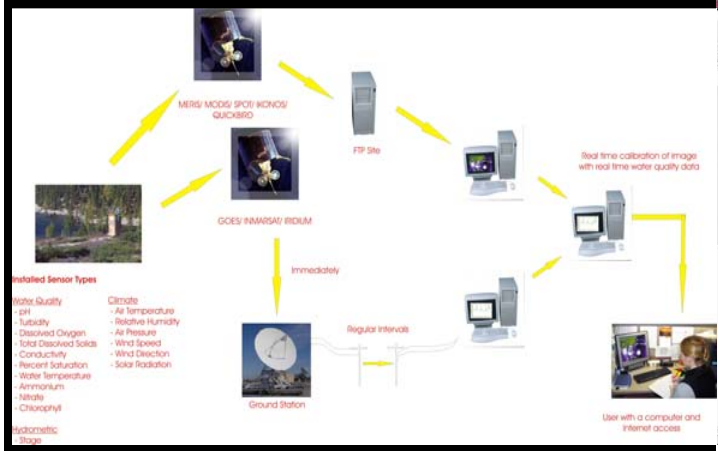

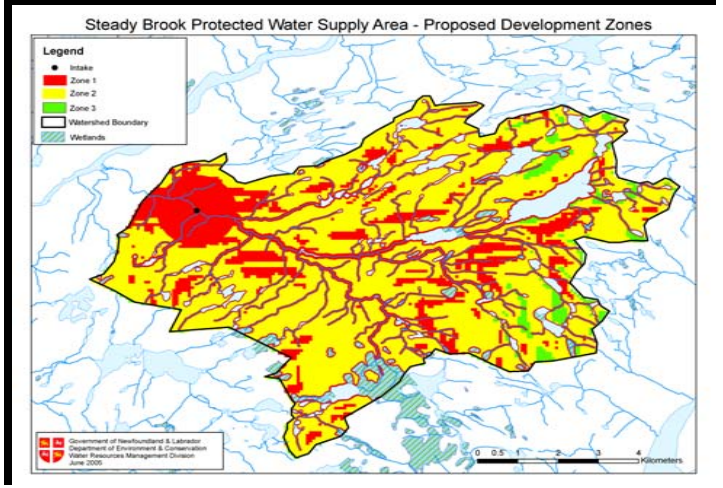

Presentation Layout

- Egypt Looming Challenges
- Two Projects
  - **NATO Science for Peace Project**
    "Real Time Water Quality Monitoring Network"
  - **ESA TIGER Project**
    "Remote Sensing to Measure Water Quality"
- Path Forward
  - Integration of RTWQ with Remote sensing
  - Expansion to Other Water Bodies
- Closing Thoughts

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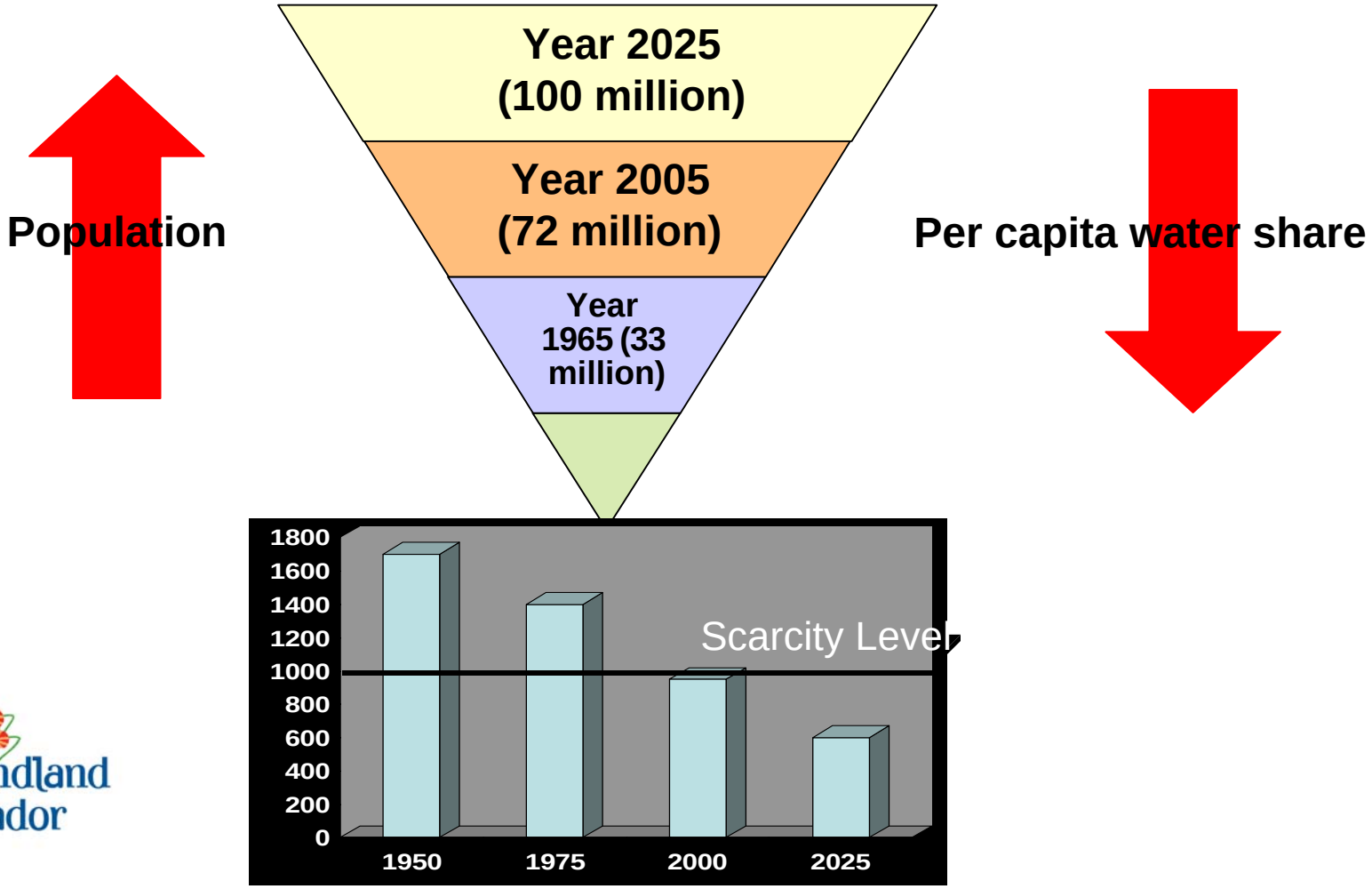
Egypt Looming Challenges

- Rapid population and urbanization growth
- Limited water resources
- Degradation of water quality



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Project 1

Real Time Water Quality Monitoring Network

NATO Science for Peace Project

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Project Team

End User

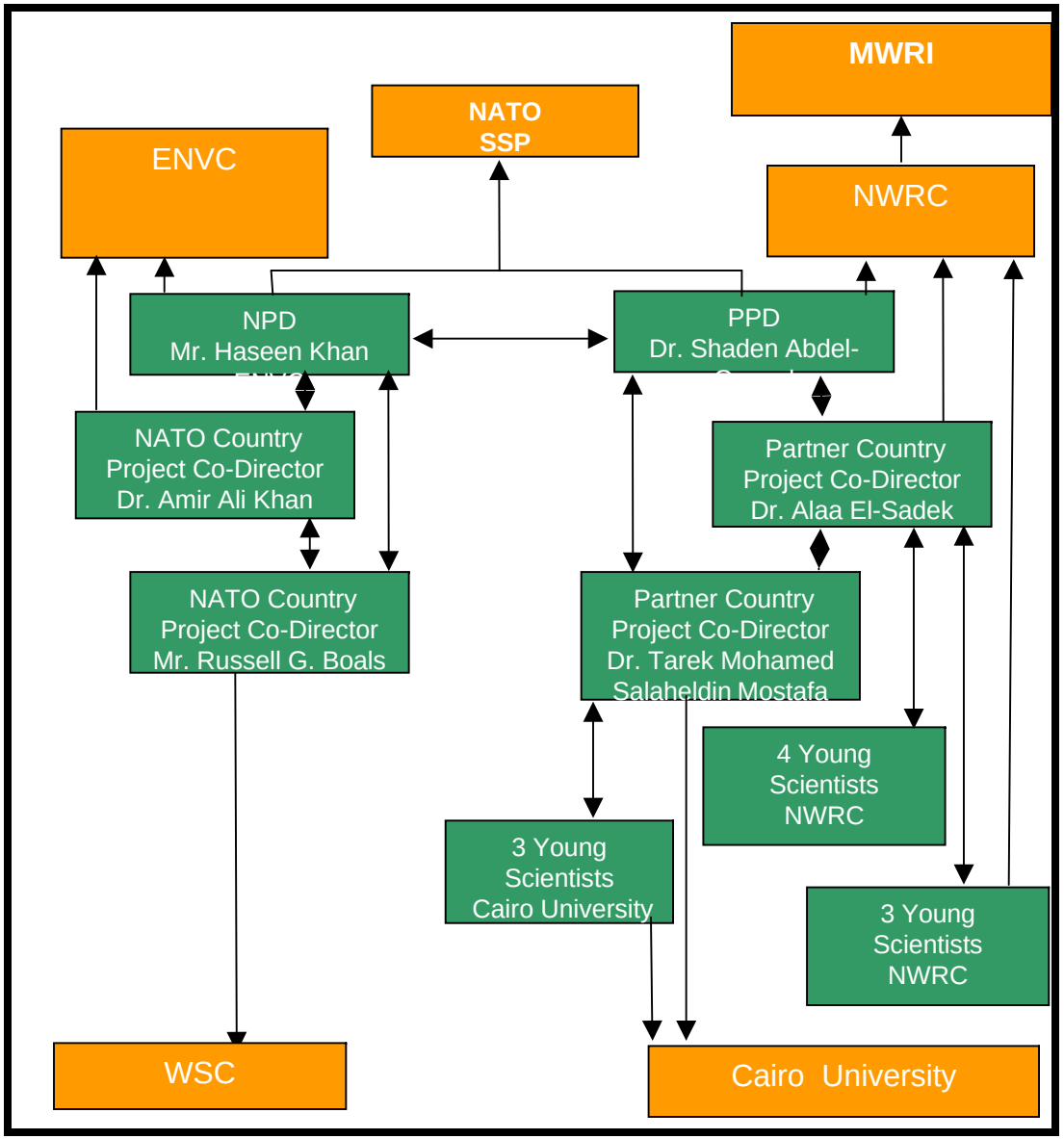
- Ministry of Water Resources and Irrigation

NATO

- Water Resources Management Division
- Water Survey of Canada

MDC

- National Water Research Center
- Cairo University



Motivation

- There is a need to develop a capacity in Egypt to monitor the strategic water bodies on a real time basis against any natural and man-made threats; take immediate corrective and mitigation measures; and
- To report the suitability of the River Nile water for various uses such as drinking, irrigation, livestock, fishing and recreational.

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Current Status of the Technology

- Four semi continuous drainage water quality monitoring sites (Not In situ)
- No central command centre and no RTWQ Reporting
- No exceedance based Water Quality Index

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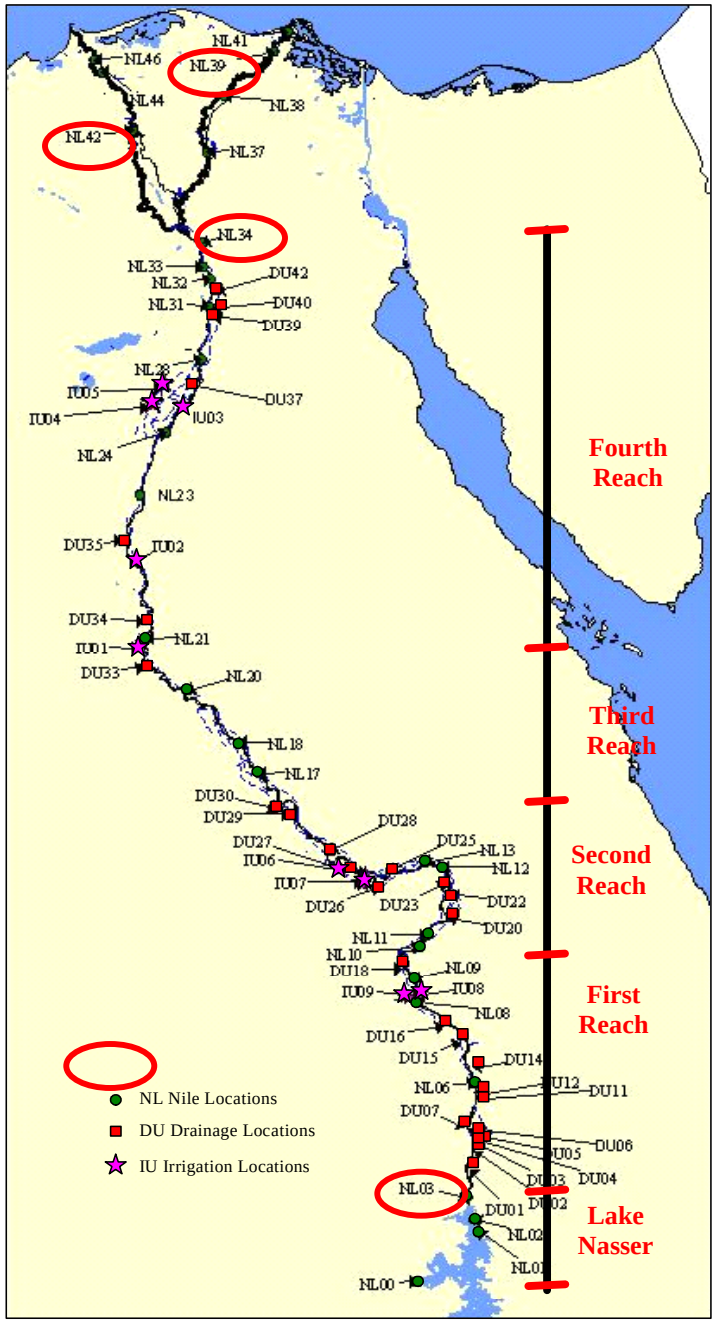
Project Work

Establish an Index Network

- NL – 03
- NL – 34
- NL – 39
- NL – 42



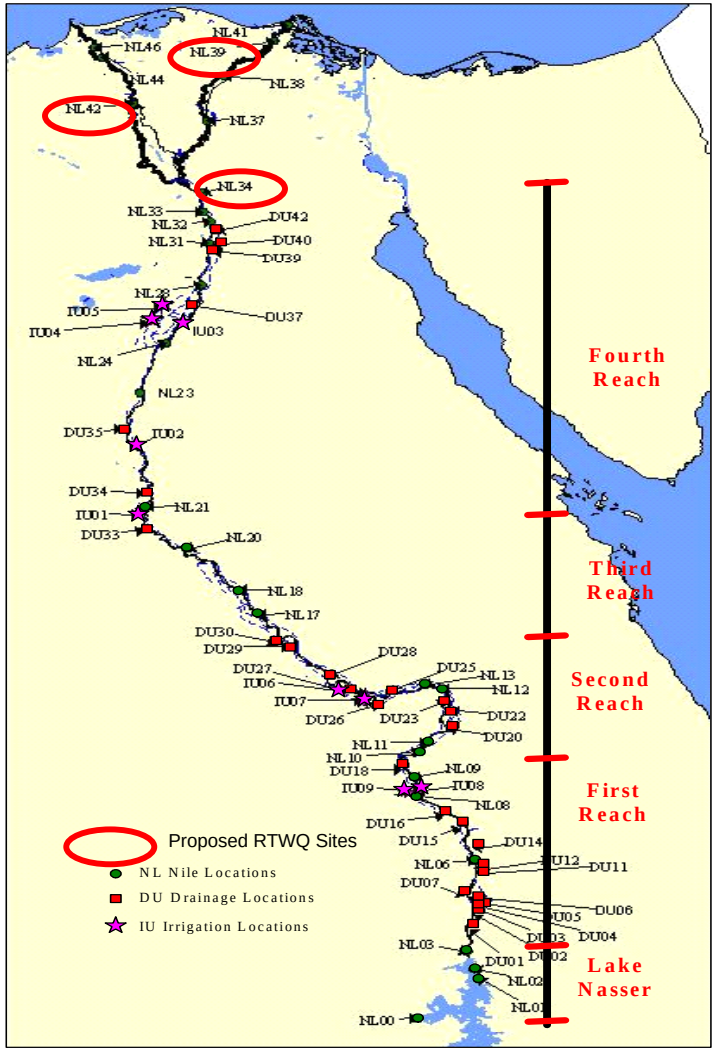
NL-34

NL- 39

NL-42

Project Contribution

- Capacity to monitor strategic water bodies in an early warning mode
- Protect and report strategic water uses
- Integrated Water Resources Management



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Project 2

Remote Sensing to Measure Water Quality

ESA TIGER Project

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Project Team

EGYPT

- **DRI**
- Primary end user
- Point of contact to other operational users (e.g. Ministry of Environment, MWRI, NWRC)
- Local provider of EO-based information

CANADA

C-CORE

- Project lead
- Development and implementation
- Training

Water Resources Management Division (WRMD), NL Department of Environment and Conservation

- Expert consultant: integrating EO and IWRM
- Training

FINLAND

Finnish Environment Institute (SYKE) and Helsinki University of Technology (HUT)

- Expert consultant: operational water quality monitoring using EO

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Motivation

- Lakes are vital component of Egypt's water resources
- Pressure of diverse, multiple uses creates potential for conflict and degradation
- Need for accurate, reliable lake water quality information

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Motivation - Lake Manzalah

- Physical Characteristics
  - Largest of Egypt's coastal lagoons
    - Total area ~1000 km^2
    - Free water surface ~500 km^2
  - ~1000 islands
  - Average depth ~1.3m
  - Several openings to Mediterranean Sea
  - Inflow of agricultural drainage water and wastewater
  - Population of 8 Million in area surrounding Lake Manzalah

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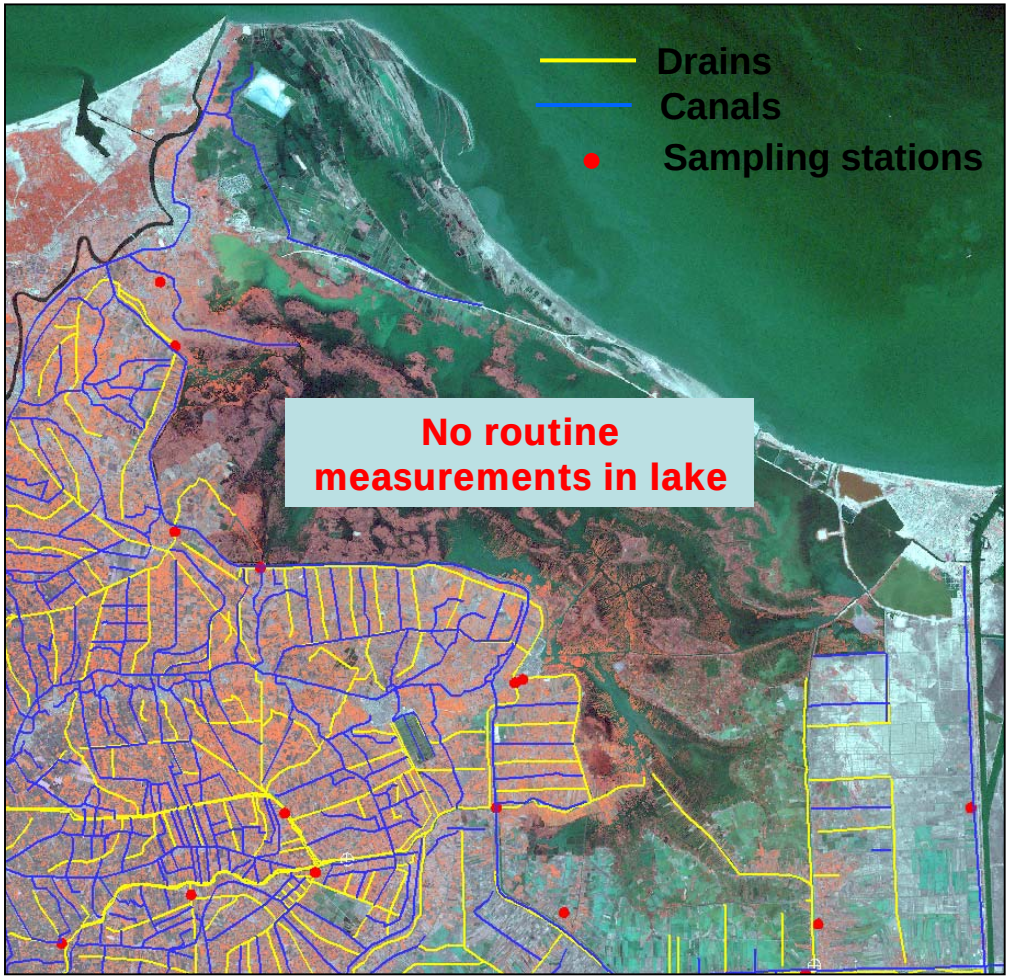
Current Status of Technology

- **Current monitoring program**
  - Monthly in-situ measurements of water quality in drains and canals leading into Lake Manzalah
- **Required information**
  - Knowledge of spatial and temporal variability of water quality in lake
  - Information on surface cover status and change, incl. land reclamation and vegetation overgrowth



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Project Work

- Demonstrate utility of EO for water quality monitoring and integrated water resources management (IWRM) in Egypt

EO Dataset	Quantity	Application
MERIS	30	• TUR, TSS, CHL
MODIS	10 - 30	• TUR, TSS
ASAR	8	• AVC, ARL
DMC	4	• AVC, ARL • TUR, TSS, CHL
SPOT	TBD	• AVC, ARL • TUR, TSS, CHL
LANDSAT	3	• Reference

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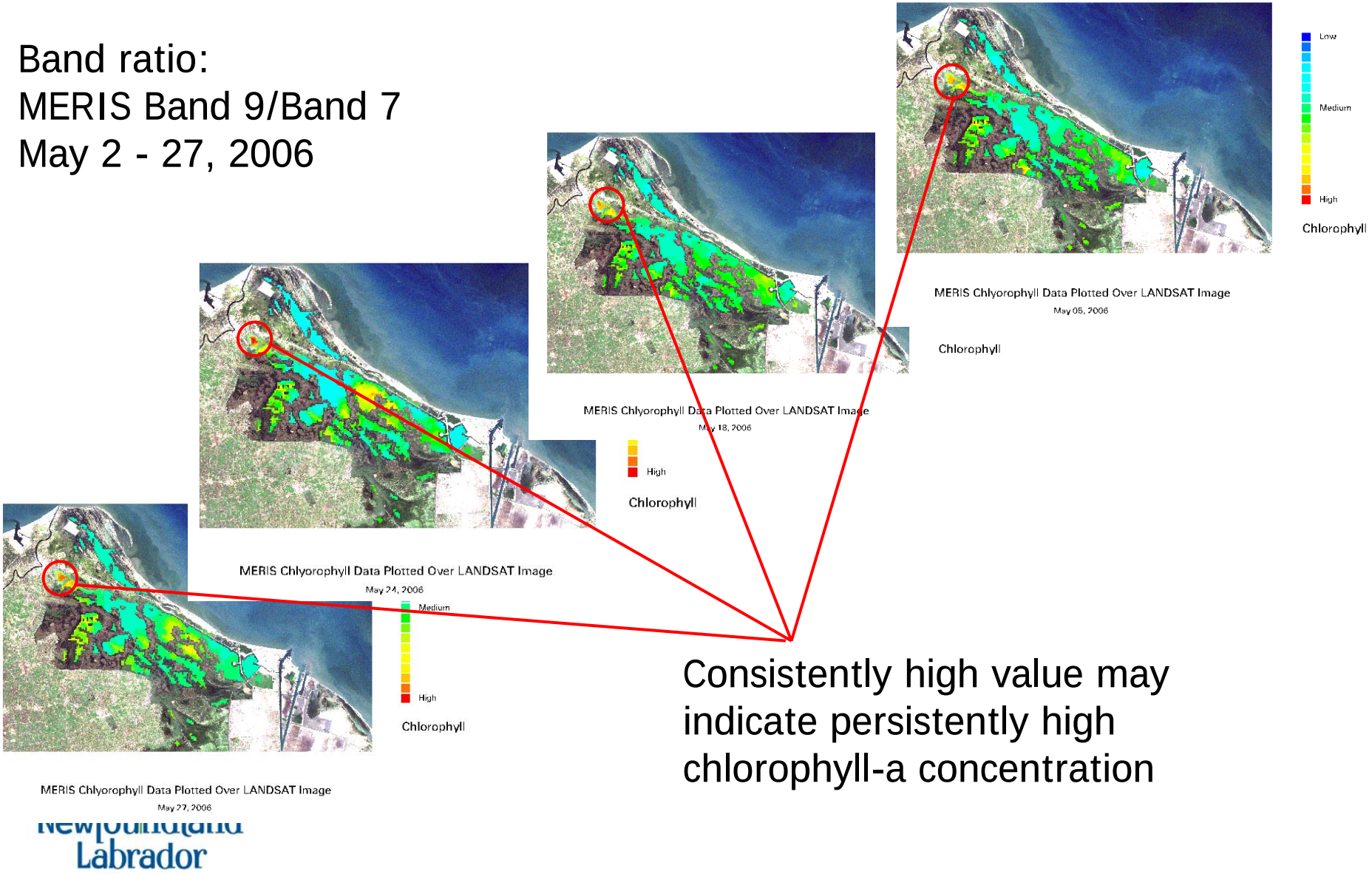
Relative Products - CHL

Band ratio:
MERIS Band 9/Band 7
May 2 - 27, 2006



Consistently high value may indicate persistently high chlorophyll-a concentration

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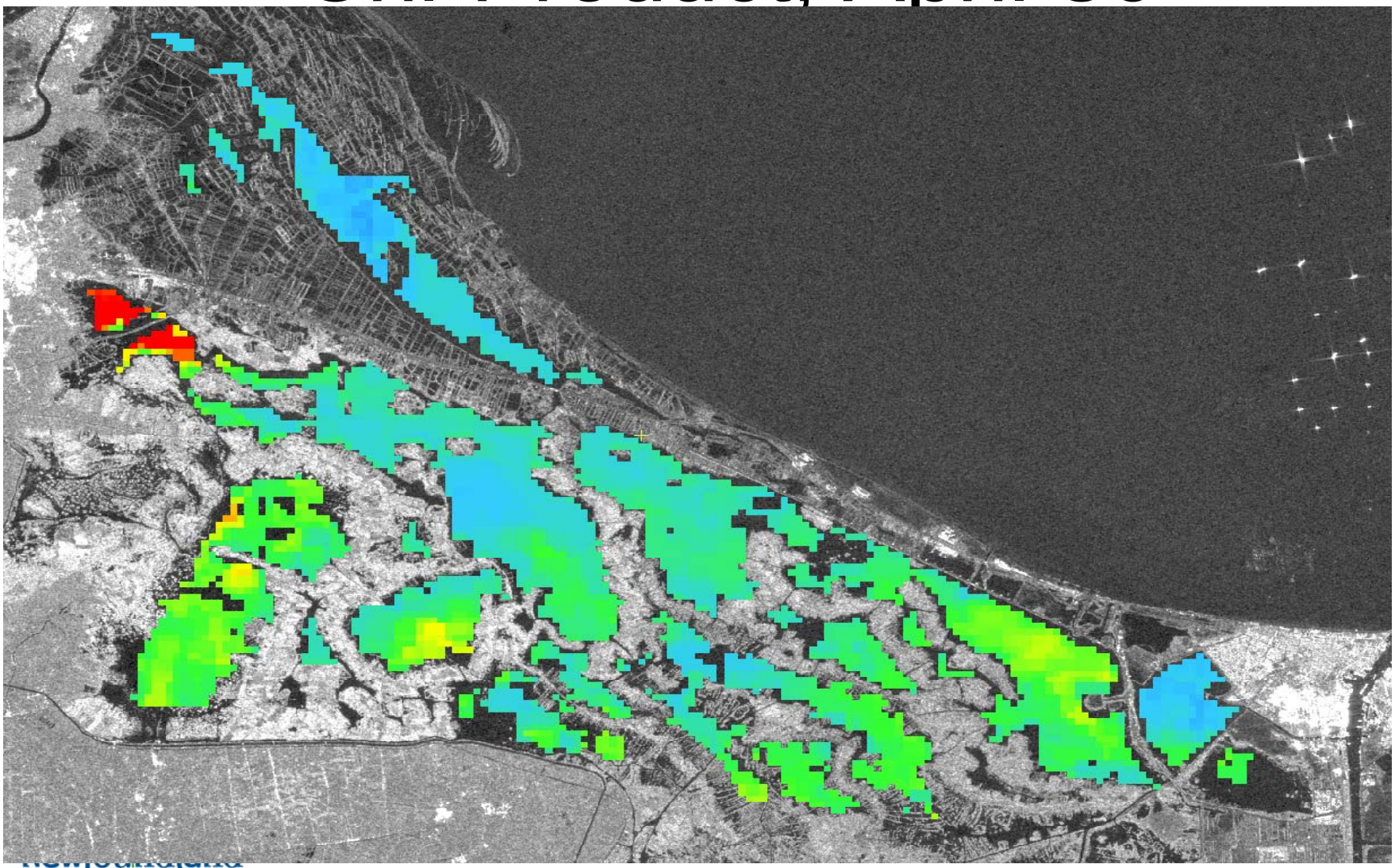
Chl-Product, April 30



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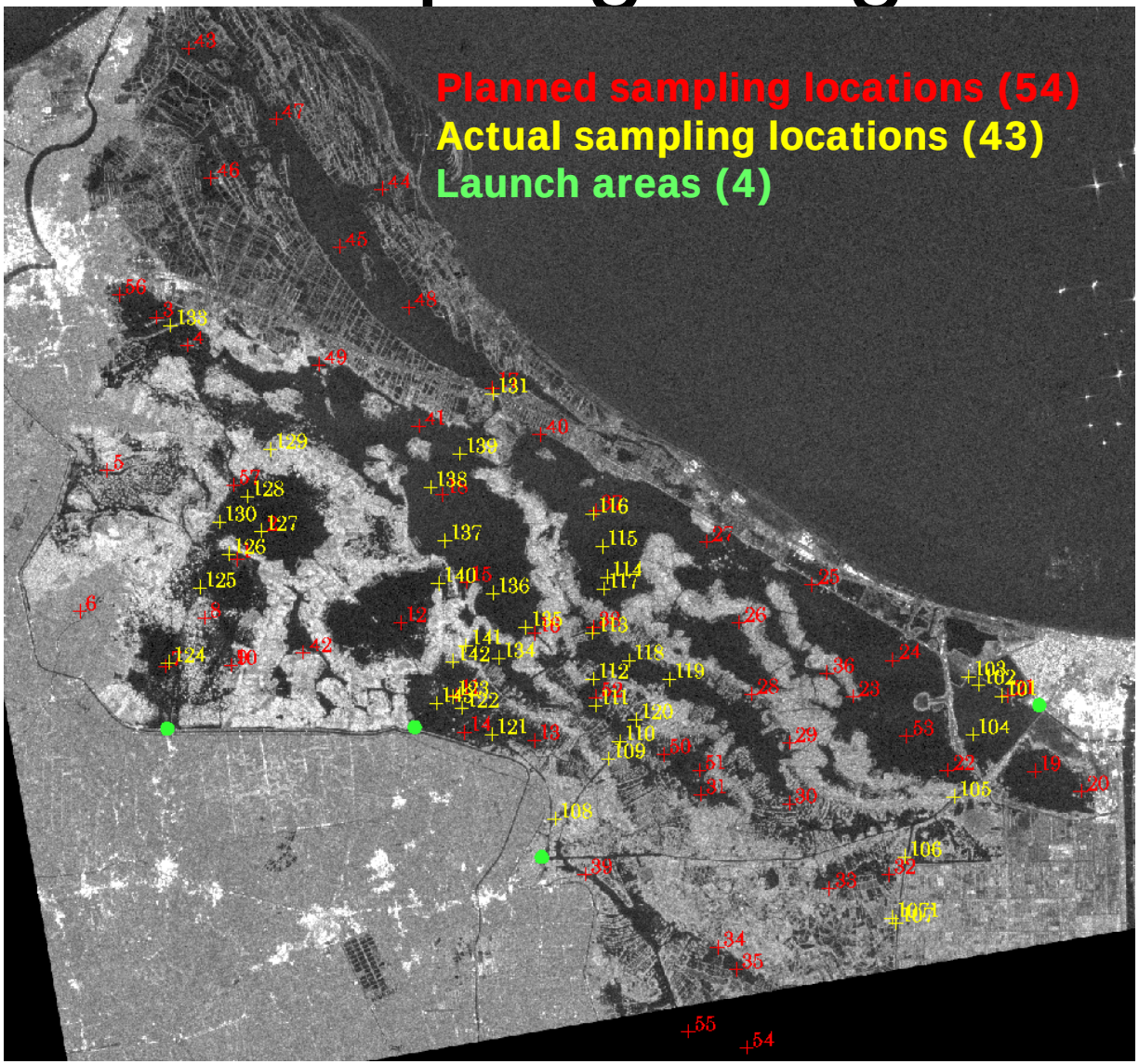
Field Sampling Program



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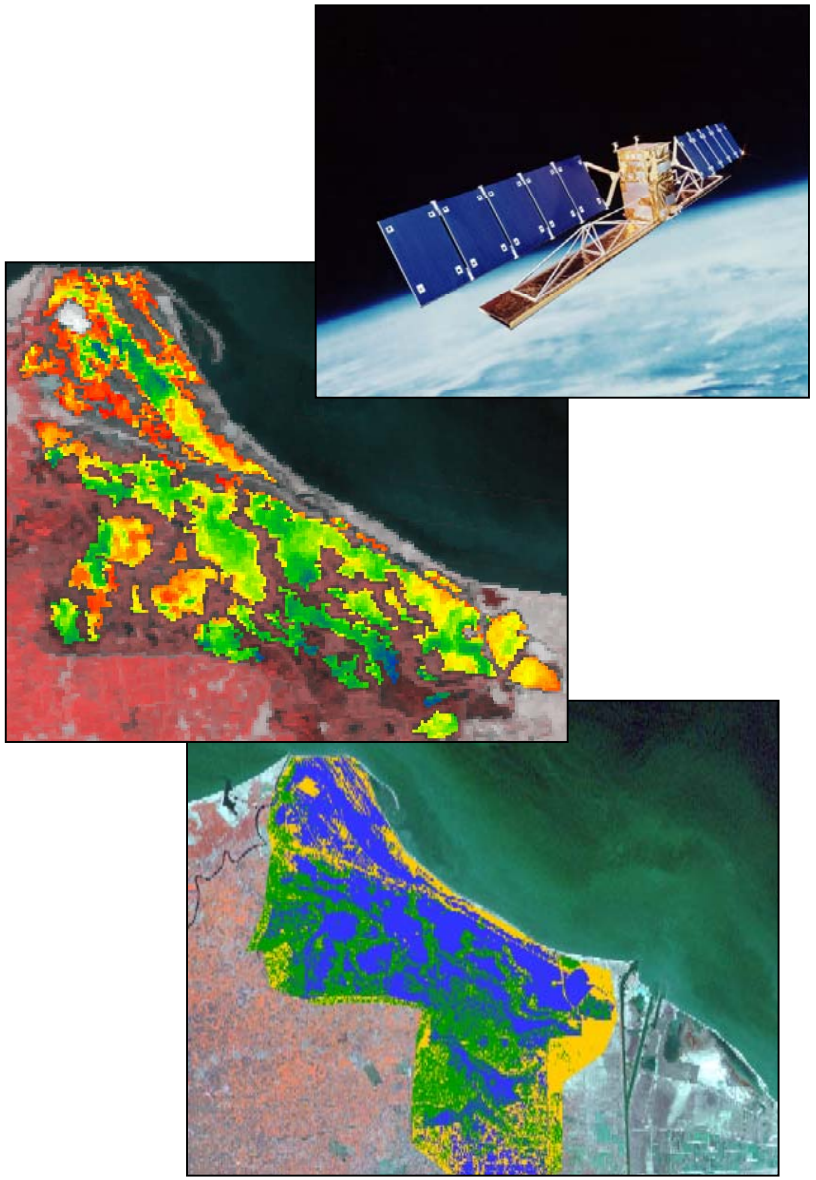
Project Contribution

- Systematic measurement of water quality over large areas
- Spatio-temporal variability of water quality
- Information on surface cover conditions and change
- Identification of critical areas (pristine/impaired) and trends
- Integration with in-situ data



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Path Forward

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Path Forward

- Integration of RTWQ monitoring with remote sensing
- Expansion of services to other water bodies

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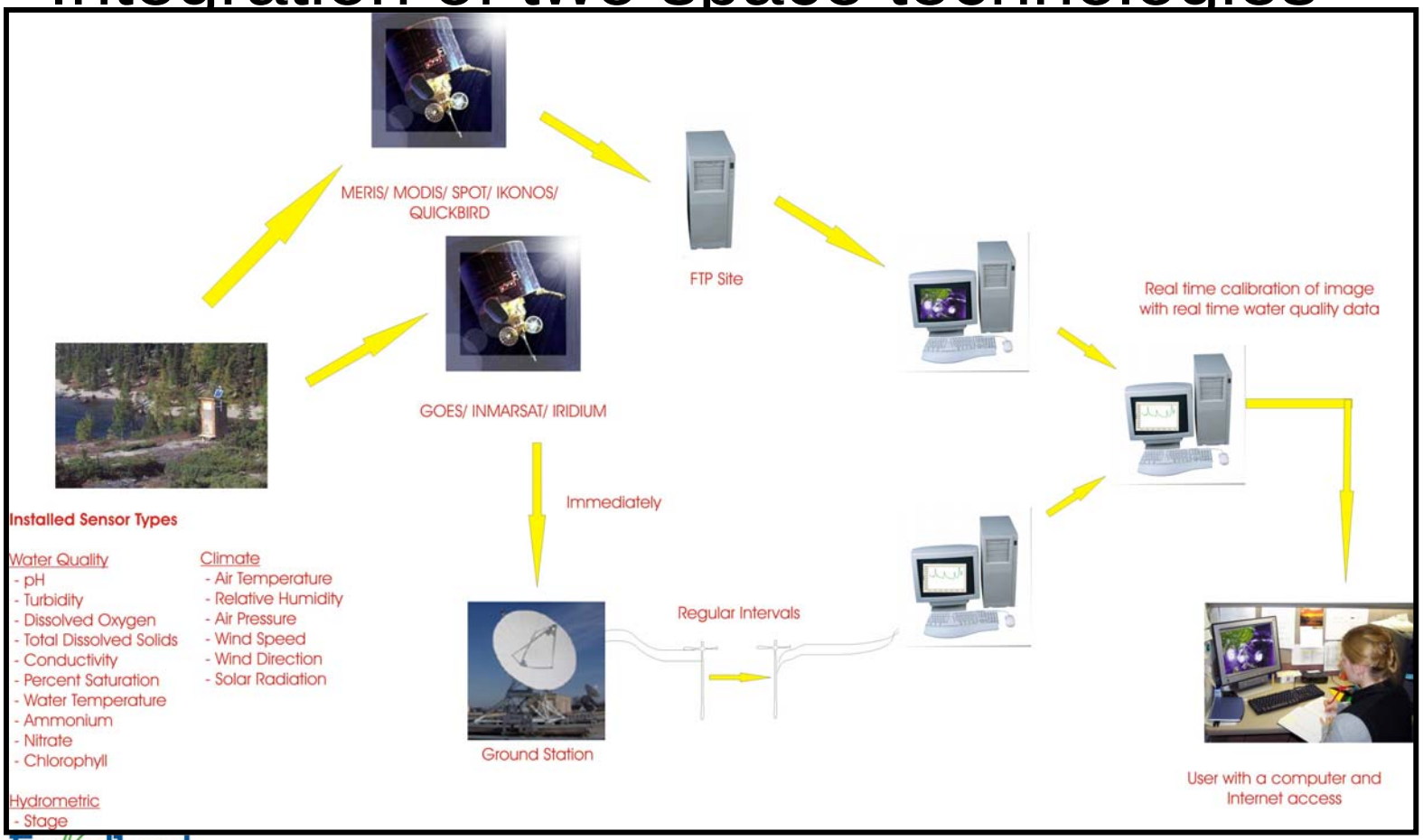
RTWQ Monitoring for RS Calibration

- Integration of two space technologies



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Expansion To Other Water Bodies

- Lakes

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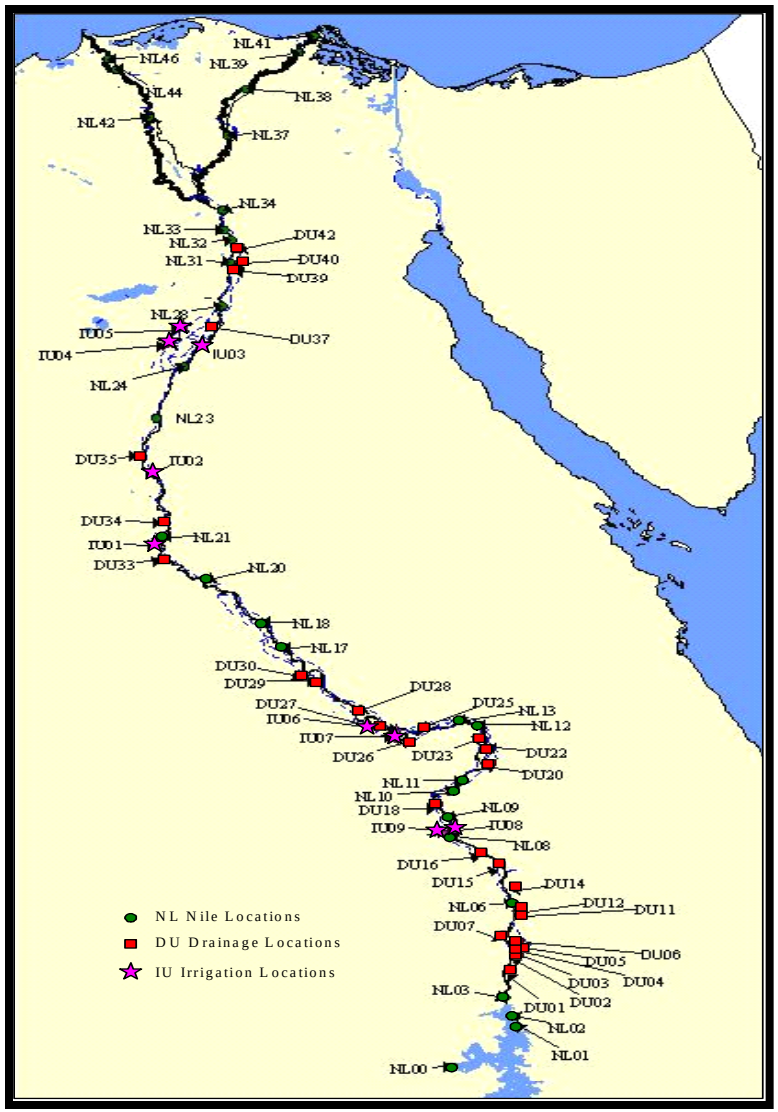
Expansion To Other Water Bodies

- River Nile and its two branches



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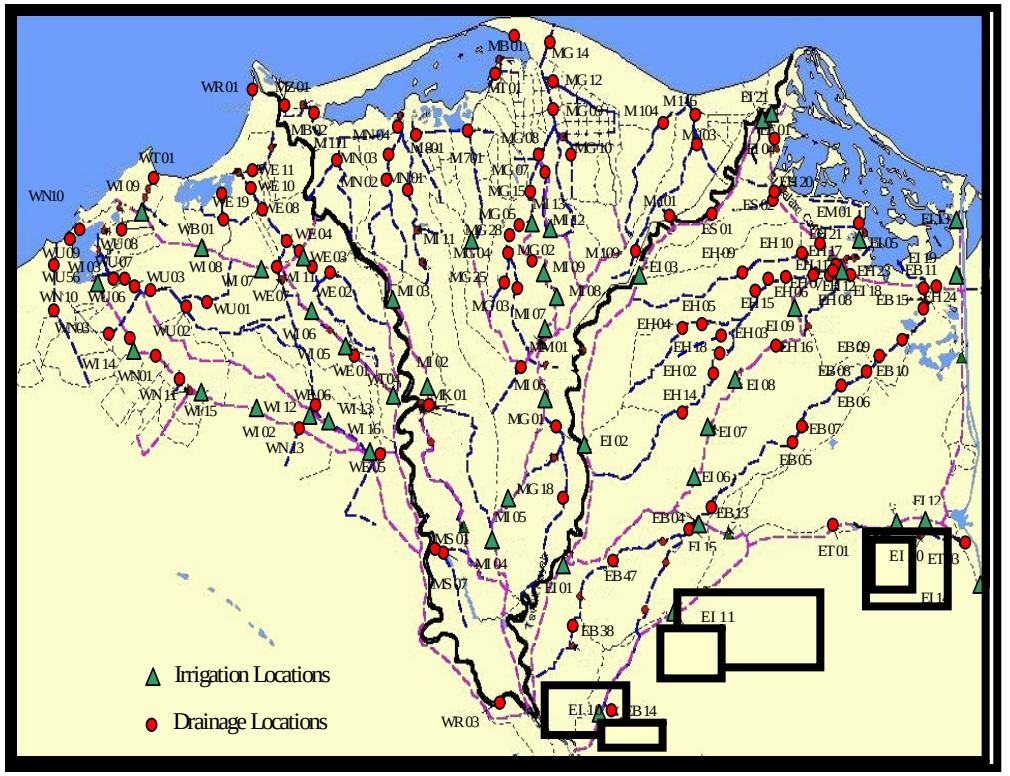
Expansion To Other Water Bodies

- **Major Irrigation Canals**
- **Major Drains**



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Closing Thoughts

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Closing Thoughts

- Egypt will have access to the “state of art” technology for water monitoring
  - Remote sensing
  - RTWQ Monitoring
- Environmental Security
- Capacity Building
- Integrated Water Resources Management
- Trans boundary governance

www.gov.nl.ca/env

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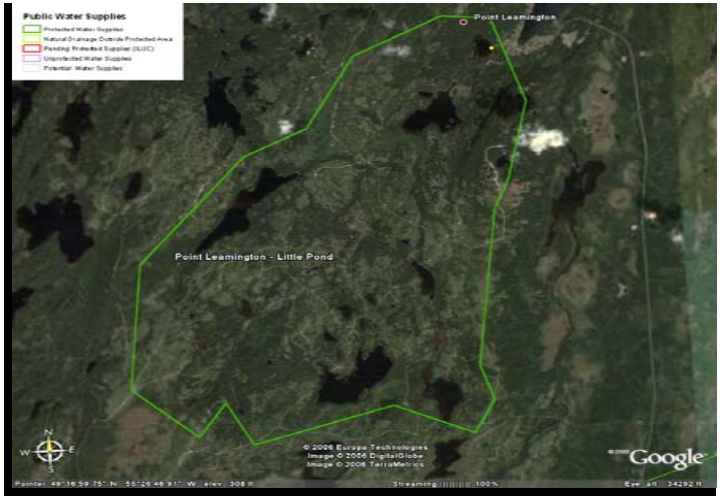

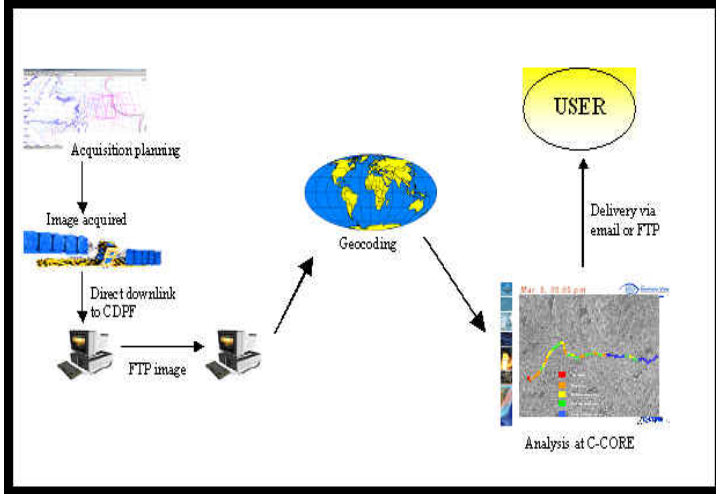

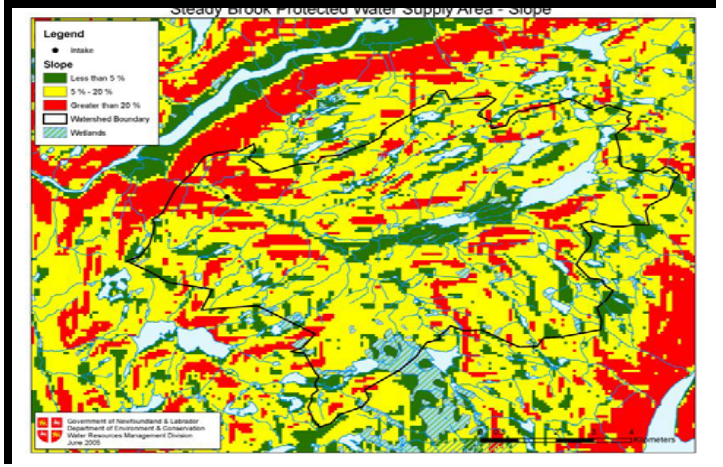

THANK YOU

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