National Environment and Planning Agency

# WATER QUALITY MONITORING PROGRAMME

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**Pollution Monitoring and Assessment Branch**
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***Managing and protecting Jamaica's land, wood and water***

# Objectives and Structure of Presentation:

- Present Background and Objectives of Water Quality Monitoring Programme
- Define water quality and rationale for monitoring
- Water quality parameters
- Highlight NEPA ‘s role in water quality monitoring
- Outline current initiatives

# BACKGROUND

- Jamaica is an archipelagic nation in the northwestern Caribbean Sea at Longitude 77° 22’ W and Latitude 18° 15’N which is 145 km South of Cuba, 850 km South of Miami and 161 km West of Haiti.

- At 235 km long and between 32 and 82 km wide, the island is the third largest in the Caribbean. There are also small islands (called Cays) and banks associated with the mainland.

- The land to sea ratio is 1:24 or 10,991:263,784 $km^2$

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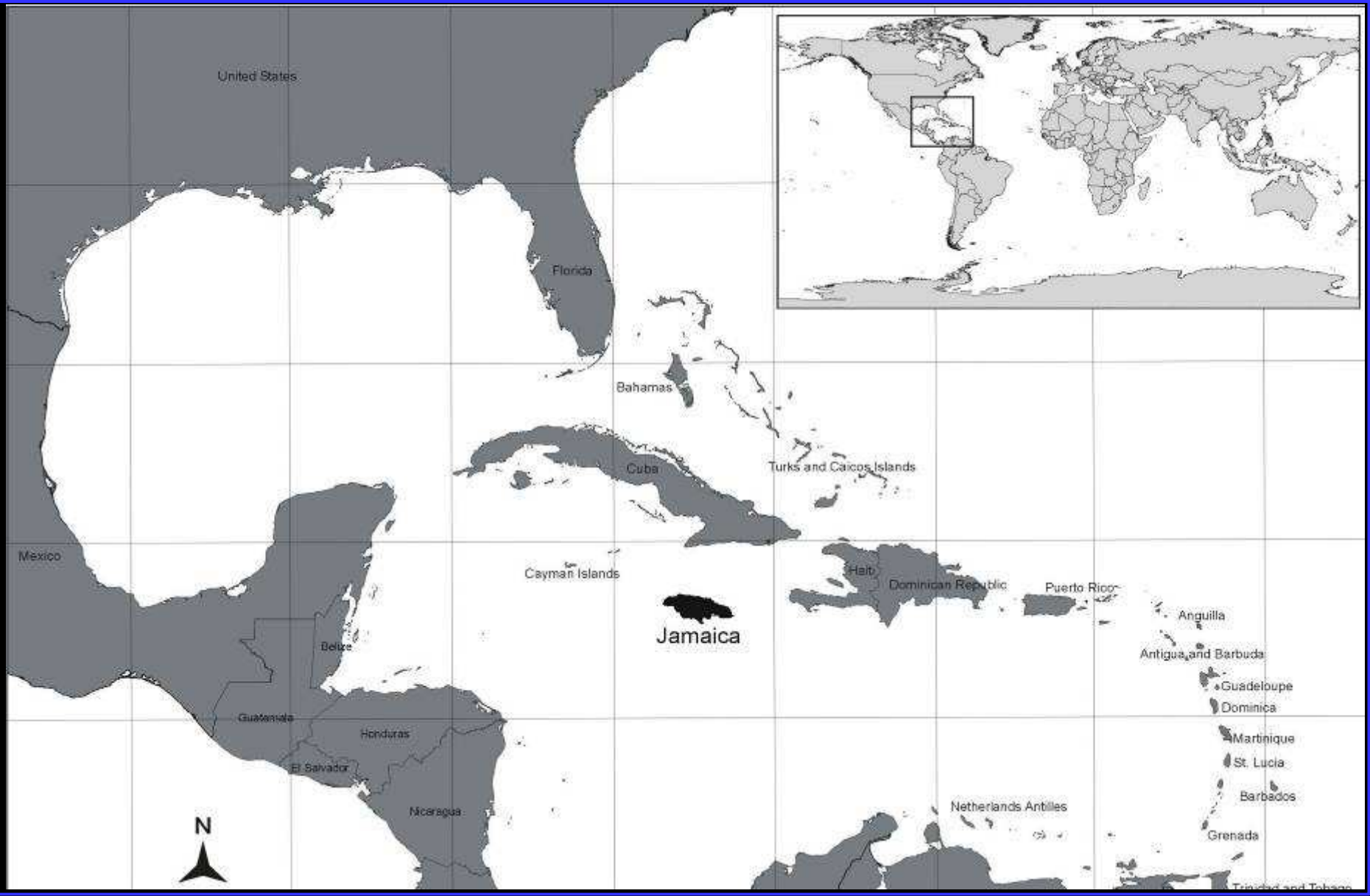
# Jamaica


United States
Florida
Bahamas
Cuba
Turks and Caicos Islands
Mexico
Cayman Islands
Haiti
Dominican Republic
Puerto Rico
Jamaica
Anguilla
Antigua and Barbuda
Guadeloupe
Dominica
Martinique
St. Lucia
Barbados
Grenada
Belize
Guatemala
Honduras
El Salvador
Nicaragua
Netherlands Antilles
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# Programme Background and Objectives

The Agency routinely monitors surface, coastal and marine waters across Jamaica. This programme was implemented to:

- Partially fulfil its mandate to effectively manage Jamaica's physical resources to ensure protection, conservation, proper administration and development and optimal use of the Island's water resources and

- Assess the data collected to identify trends in changes in water quality

# Programme Background and Objectives

The programme has two major components:

- Intensive monitoring: sensitive ecosystems and areas affected by negative anthropogenic activities

- Routine monitoring

# Programme Background and Objectives

Efforts are being made to improve monitoring based on perceived risk to the environment; taking into account, ecosystem sensitivity, current and projected land use and the requirements under international obligations, e.g. Cartagena Convention.

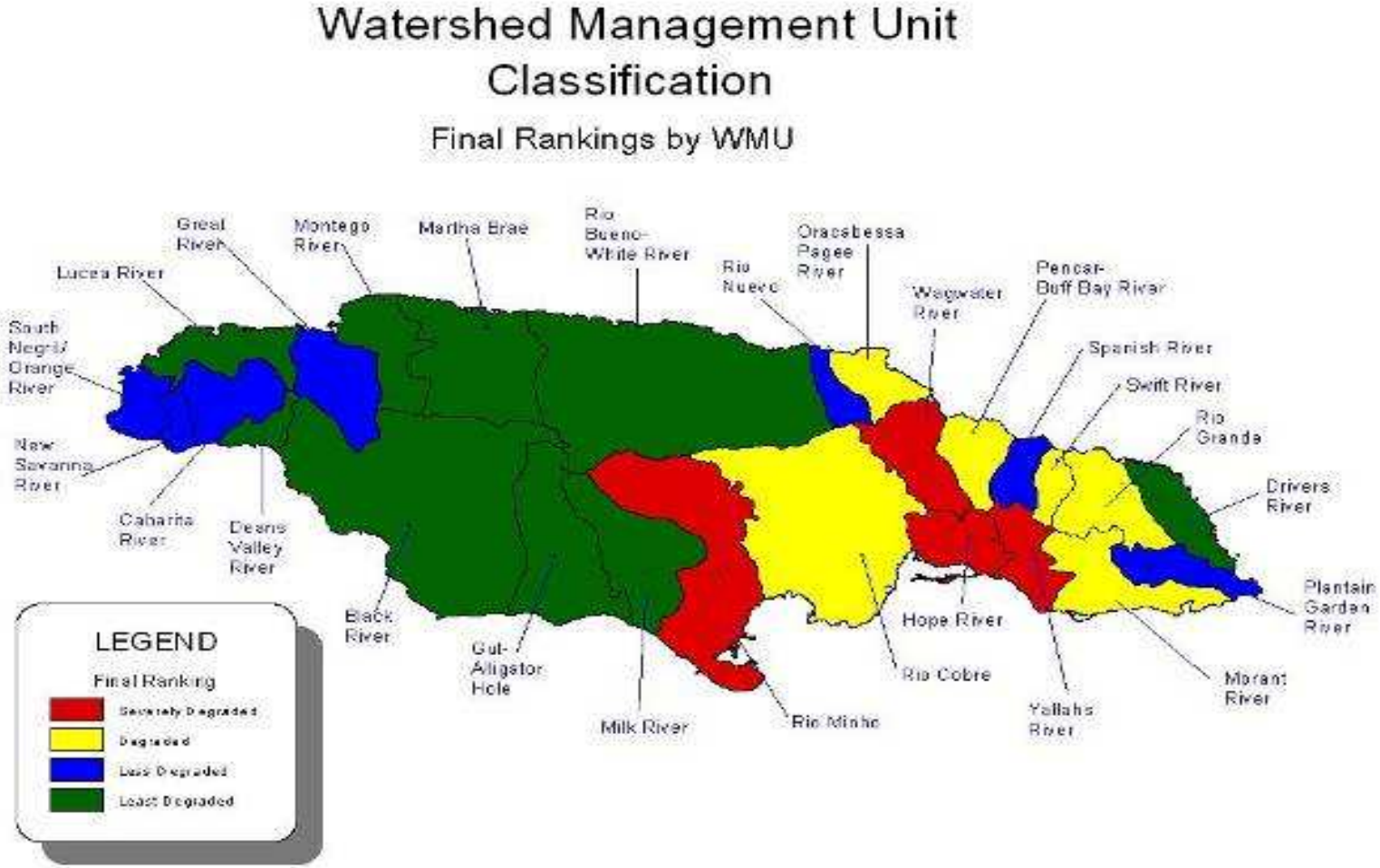
# Programme Background and Objectives

- The programme has been revised to facilitate an integrated, collaborative and multi-agency approach to water resource management.
- Incorporates relevant government and non-government stakeholders, private individuals and the wider public.
- Fosters comprehensive monitoring, data collection and assimilation activities in fulfilling the programme's objectives:

# Objectives

- Define the state of the Nation's Water
- Protect human health and sensitive biological resources
- Initiate actions to prevent, reduce and control pollution sources from land and ocean based activities, and
- Manage existing and planned land and water uses in such a way that it is ensured that the quality of water remains appropriate for the Nation's vision.

# Revised Programme Approach Guided by Watershed Prioritization

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# WATER QUALITY: WHY DO WE MONITOR IT?

Because:

Water is a multi-use resource

To detect changes in natural systems to provide the basis for their proper management to safeguard:

- Public health
- Critical Ecosystems

## Monitoring objectives are supported by National Biodiversity Strategy and Action Plan (NBSAP)

Goal 1: Conserve biodiversity by reduction of pollutants in freshwater and marine environments

## Monitoring objectives are also supported by Vision 2030

## National Development Plan

Goal 4: “Jamaica has a Healthy Natural Environment”

# What is water quality and what do we measure?

❖ **Water quality**: a measure of the suitability of water for a particular use based on selected physical, chemical, and biological characteristics.


**Chemical Parameters measured:**

- ✓ **Nitrate/Total N**
- ✓ **Phosphate/Total P**
- ✓ **Faecal Coliform**
- ✓ **Dissolved Oxygen**
- ✓ **Biochemical Oxygen Demand**
- ✓ **pH**

**Physical parameters include:**

- ✓ **Suspended Solids**
- ✓ **Temperature**
- ✓ **Turbidity**

# Importance of parameters measured:

- Nitrate - When present in excess in water the result is eutrophication
- Phosphate - When present in excess in water the result is eutrophication
- Faecal Coliform – Colonies indicate the presence of faeces
- Dissolved Oxygen - Dissolved Oxygen is essential for life; level is a pollution indicator
- Biochemical Oxygen Demand – Degrading organic matter consumes oxygen; level is a pollution indicator
- pH – Measure of acidity and alkalinity
- Temperature – Determinant of rates of reaction; organisms function optimally within a narrow temperature range

# Map of NEPA's 301 water quality monitoring sites


**Legend**

**Watersheds**

**NAME**

- Black River
- Cabarita River
- Deans Valley River
- Drivers River
- Great River
- Gut - Alligator Hole
- Hope River
- Lucea River
- Martha Brae
- Milk River
- Montego River
- Morant River
- New Savannah River
- Oracabessa Pagee River
- Pencar - Buff Bay River
- Plantain Garden River
- Rio Bueno - White River
- Rio Cobbe
- Rio Grande
- Rio Minho
- Rio Nuevo
- South Negril - Orange River
- Spanish River
- Swift River
- Wagwater River
- Yallahs River

**Monitoring Sites**

**Freshwater/Marine**

- Freshwater
- Marine

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# Sampling and Data Analysis:

- The branch conducts sampling weekly. Resulting in each sample station being monitored twice per year.
- All monitoring stations are geo-referenced.
- Water Quality Database used to store data.
- Field duplicates (1 for every 10 samples) collected at the same location, at the same time in order to estimate sampling and laboratory analysis precision.
- Field Blanks (distilled water) are a measure of the impact of field condition on analytical results.
- Field data sheets are completed for each sample site.

# Sampling and Data Analysis:

- Chain of Custody form: the number of samples submitted, the type of sample, sample storage conditions and the sample custodian.
- Analyses performed in accordance with standard procedures outlined from the Standard Methods for the Examination of Water and Wastewater, 21st Edition.
- Blank sample is distilled water. Treated like any of the samples and used to calculate the contribution by/correction for chemical reagents.
- Instrument calibration - solutions of specified concentrations used to calibrate an instrument or meter before analysis.
- Quality control charts are completed within two standard deviations representative of a 95% confidence interval.

# NEPA PMA Branch officers monitoring:

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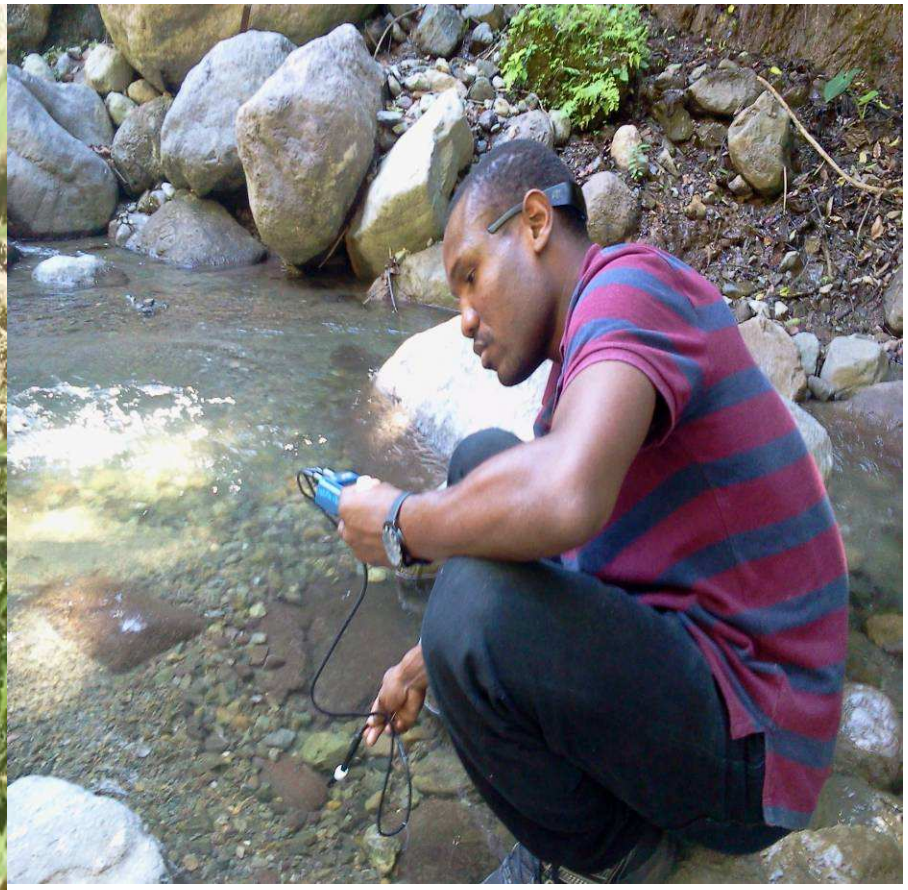
# In Situ analyses:



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# Pollution Impacts:


Sewage in Old Harbour Bay

Sugar Cane Industry: Vinasse / dunder – Rio Minho

# Piggery in Rio Cobre WMU

## National Ambient Water Quality Standards

| Parameter | Coastal Guideline | Freshwater Guideline | Unit |
|---|---|---|---|
| Nitrate ($NO_3$) | 0.0443 – 0.359 | 0.1 – 7.5 | **mg/L** |
| Phosphate ($PO_4$) | 0.001 – 0.055 | 0.01 – 0.80 | **mg/L** |
| pH | 8.0 – 8.4 | 7.0 – 8.4 | |
| Biochemical Oxygen Demand | 0.57 – 1.16 | 0.8 – 1.70 | **mg/L** |
| Faecal Coliform | <2 – 13 | | **MPN/ 100mls** |
| Total Dissolved Solids | | 120 – 300 | **mg/L** |

# CURRENT AND ONGOING INITIATIVES

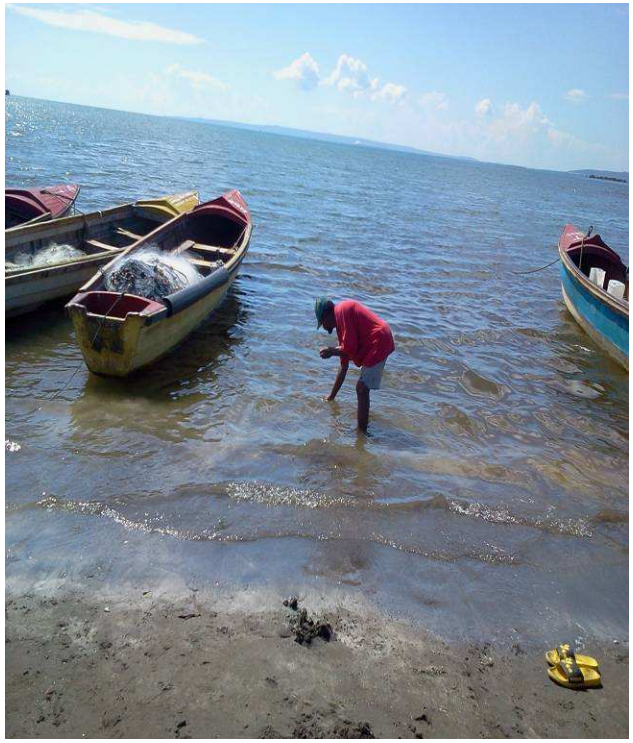
- River Basin pollutant flow simulation models
- National Water Quality Profile
- First Responder Programme

# CURRENT AND ONGOING INITIATIVES

- First Responder Programme (2009-Present: Implemented in Black River WMU, P-PRPA, PBPA and Rio Cobre WMU)
- River Basin pollutant flow simulation model (In progress - Completed for Black River)
- National Water Quality Profile (In progress)
- Renewal of Water Quality Management MOU – Completion pending one (1) signatory's review

# First Responders





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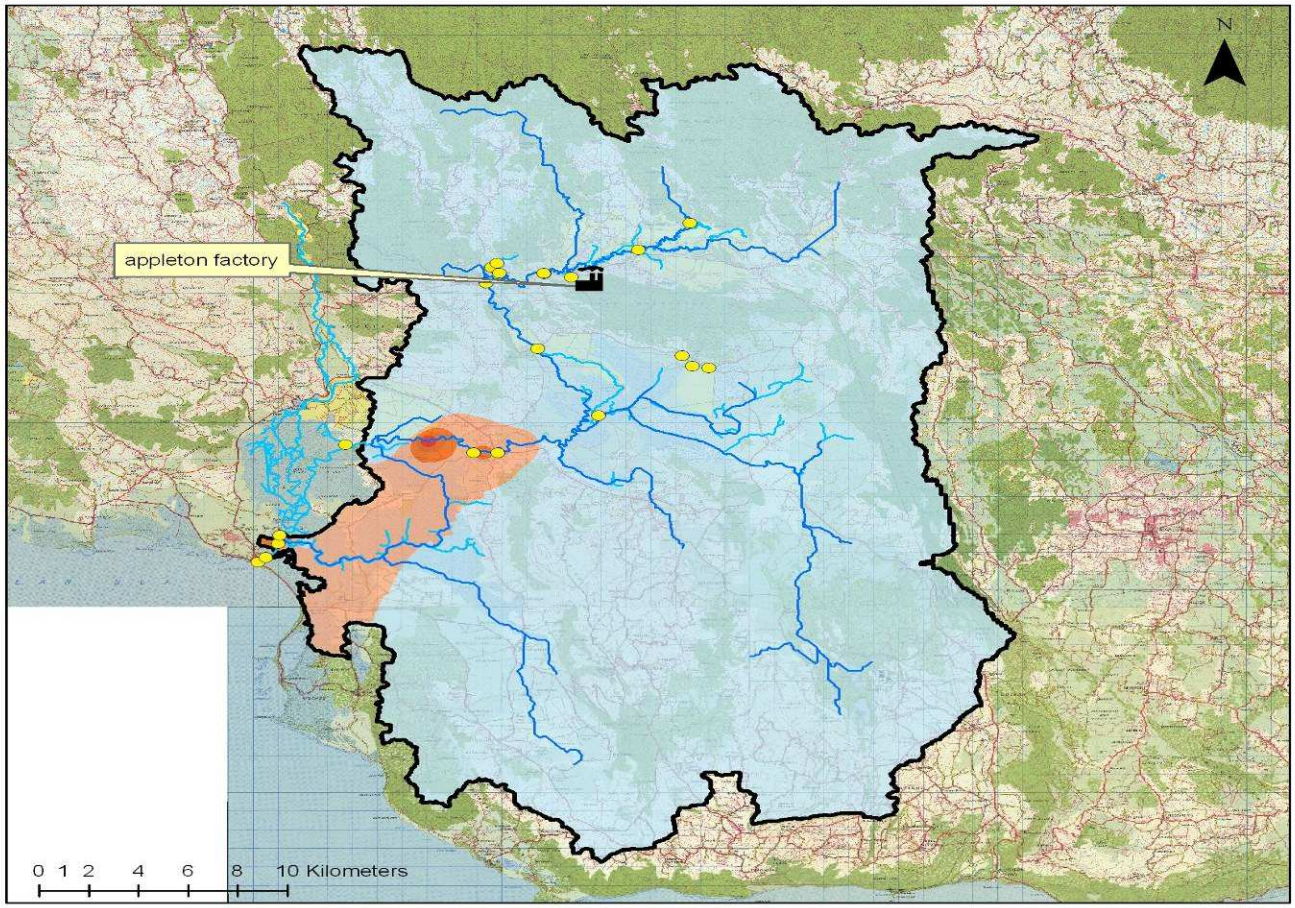
# Simulated NO3 Concentration Plume
# Black River Basin




**Legend**

- Point Sources
- Major River (generated)
- Other River
- Black River Basin Boundary (generated)

**Simulated NO3 (mg/l)**

- < or = 7.5 (Accepted Level)
- 7.6 - 10
- 10 - 12
- 12 - 14
- 14 - 16
- 16 - 18
- > 18

Projection: Lambert Conformal Conic
Grid: JAD 2001
Spheroid; WGS 1984
Linear Unit: Metres

Created June 2011

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Water Resources Authority

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# THE END

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# THANK YOU FOR YOUR ATTENTION

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