

The background of the slide is a faded photograph of a wide river in Guyana. On the right bank, there is a boat with a blue and white hull. In the background, there are several buildings, some with signs, and lush green trees. The water is calm, reflecting the sky and the surrounding environment.

Addressing Land-based Sources of Marine Pollution, the Case of the Demerara River Watershed, Guyana

Arwen L. Edsall
NOAA/NOS International Program Office

OneNOAA Seminar
October 1st, 2008

Land-Based Sources of Marine Pollution

- 50% of the world's population lives within a few hundred miles of the coast
- 70 - 80% of marine pollution is from land-based sources and activities, not vessels
- Includes both point and nonpoint source pollution



Land-Based Sources of Marine Pollution

- Environmental Degradation
 - Kills fish and wildlife/alters food web
 - Eutrophication and sedimentation
 - Other Effects
- Human Health Risk
 - Drinking water sources serve as pathway for pollutants
 - Contaminated fish and shellfish
 - Swimming in pollutants



Integrated Effort

- Cross-sectoral
- Transboundary (spatial)
- Intergovernmental and inter-agency
- Science and management



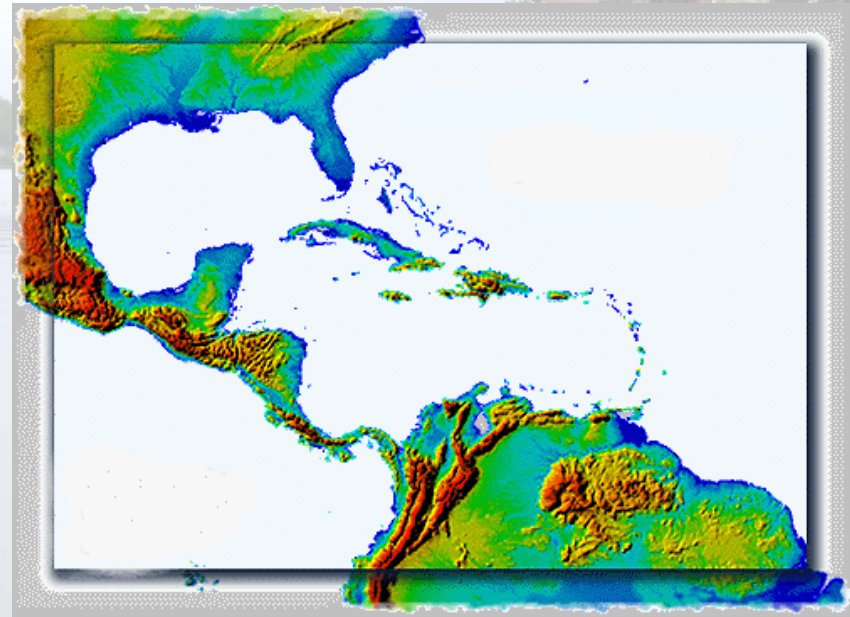
The Global Programme of Action

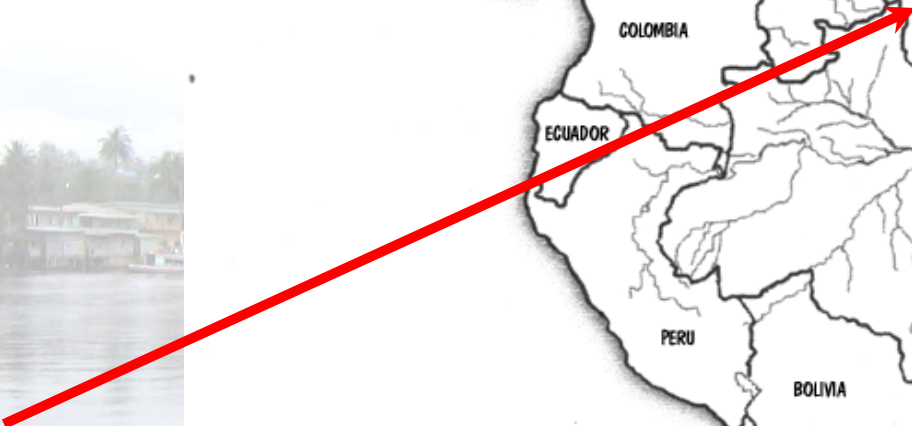
- International, non-binding guidelines
- Prevent, reduce, control and/or eliminate marine pollution
- Implemented through a National Program of Action (NPA)



Caribbean: LBS Protocol

- Legally binding
- Regional cooperation and monitoring
- Public participation
- Annexes - specific compliance standards for pollutants and management practices





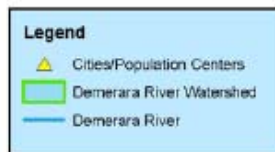
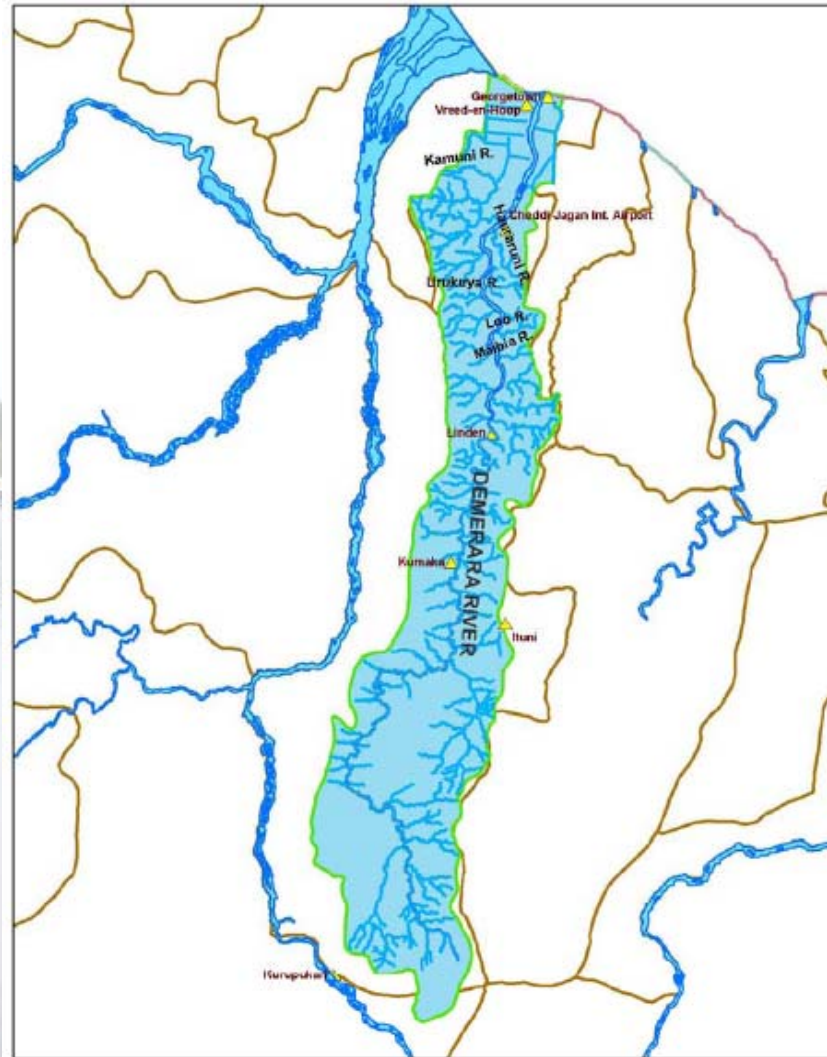
Guyana

- Population = 769,000
- Postcolonial and post dictatorship
- Most important economic activities in coastal zone are agriculture and fisheries
- Demerara River passes through the capital, Georgetown



Map Source: CIA World Factbook, 2008

Demerara River Watershed



Sources of Pollution in the Demerara

- Mining
 - Gold, Bauxite, Precious Metals, Sand
- Sewage Disposal
- Solid Waste Disposal
- Agriculture and Farming
 - Poultry, Pigs, Cattle, Other Livestock
 - Rice, Sugar, Edible Oil, and Other Crops
- Forestry and Forest Products
- Seafood processing and Aquaculture
- Beverage Distilleries



Water Safety Plan and National Program of Action (WSP/NPA)

- Partnership:

- Guyanese Ministry of Health (MOH)
- Guyanese Environmental Protection Agency (EPA)
- U.S. National Oceanic and Atmospheric Administration (NOAA)
- U.S. Geological Survey (USGS)
- U.S. Centers for Disease Control (CDC)
- Pan American Health Organization (PAHO)
- Caribbean Environmental Health Institute (CEHI)



WSP/NPA

- Pilot Project Focused on Municipality of Linden
- Goals:
 - Undertake a joint NPA and WSP for the Municipality of Linden and the surrounding watershed
 - Undertake a pre and post health survey to demonstrate any potential health impacts
 - Assist executing agencies in the implementation of the recommendations of the WSP



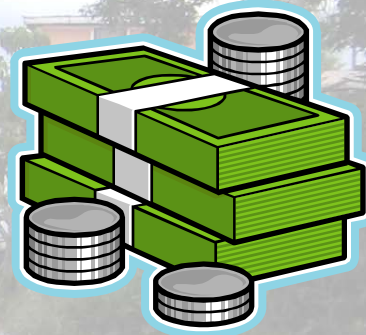
Methods

- 20 in-depth, face-to-face qualitative interviews were conducted with professionals involved with the WSP/NPA
- Three Question Categories:
 - Pollution Priorities
 - Organizations and Public Interactions
 - Issues with Integration
- Text was coded using a grounded theory, open coding technique, and sorted into themed categories



Selected Results

- Efforts to address pollution - too early to tell and/or is a side activity for some organizations
- Many constraints - Financing is the most for sustaining an integrated effort in this watershed
- Lack of information and understanding about pollutants and their effects, within the organizations and the public
- No shared view an integrated effort, but “integration” is viewed as important by all respondents
- The project is using a very narrow definition of stakeholder



Perceived Sources of Pollution

| Source | # of Respondents |
|-----------------------------------|------------------|
| 1. Unspecified Mining | 13 |
| 2. Bauxite Mining | 10 |
| 3. Agriculture and Farming | 7 |
| 4. Sewage | 7 |
| 5. Waste Disposal | 7 |
| 6. Shipping/Boats | 6 |
| 7. Weather/Natural Occurrence | 6 |
| 8. Forestry - timber removal | 5 |
| 9. Gold Mining | 5 |
| 10. Anthropogenic Activities | 2 |
| 11. Demerara Distilleries Limited | 2 |
| 12. Development/Roads | 2 |
| 13. General Non-point Sources | 1 |
| 14. Household Disposal of Oil | 1 |
| 15. Poultry Processing | 1 |
| 16. Poultry Production – rearing | 1 |
| 17. Seafood Processing | 1 |

Recommendations

- Education and outreach efforts within organizations and long-term plan for the public
- Expansion of stakeholders involved using list of 32 additional entities identified by my thesis
- Technical assistance mechanisms; training instead of money; and joint funding pool for donors
- Focus on addressing mining issues
- Data collection and long-term joint monitoring program - costs and expertise shared by both health and environmental agencies within Guyana

Special Thanks Too:

- NOAA Educational Partnership Program and NOAA/NOS International Program Office



- University of Washington, School of Marine Affairs:

Dr. Edward Miles and Dr. Thomas Leschine