Pollutant sources
  • local to global

Transport mechanisms
  • atmospheric deposition
  • surface runoff
  • groundwater
Surface runoff

Comprehensive “ridge to reef” monitoring and research
• Watershed stream gaging and monitoring
• Vegetation/grazing factors
• Erosion vulnerability
• Sediment flux
• Contaminants and nutrient influx
• Effects on coral ecosystem

Sites: Molokai; Hanalei Bay, Kauai; Samoa
High-Resolution Benthic Habitat Mapping
(Lidar, satellite, aerial, towed UW camera, and scuba surveys)
Ridge to Reef – Understanding land-sea linkages
Molokaʻi reef health

CRAMP monitoring sites

Weather stations

Wave Gauges

Underwater cameras

ReefProbe

Rotating sediment traps

Remote cameras
Ground-water discharge

- Geochemical and geophysical techniques to map and quantify groundwater discharge
- Physical processes driving interaction of groundwater and surface water
  - identify chemical constituents of groundwater
  - quantify nutrients, trace metals and contaminant loading
- Transport pathways

Sites: Florida Keys; Biscayne Bay; Maunalua Bay & Kona, Hawaii; Palmyra Island, Samoa
Atmospheric deposition

- identification and quantification of metals, nutrients, chemical contaminants and microorganisms transported globally and regionally to downwind coral reef ecosystems
- processes & pathways
- toxicity and ecosystem effects
- laboratory model organism development

Sites: US Virgin Islands, Trinidad/Tobago, Cape Verde, Hawaii, NW Hawaiian Islands
On the Reef

- reef metabolism
- ocean acidification effects
- genetics-environment
- resilience factors
- histopathology
- ecotoxicology
- reef contaminant levels
- optical indicators of stress
- longterm monitoring - coral disease, declines
Linked Problems

- Local to global influences
- Watershed degradation
- Polluted surface/groundwater
- Erosion & loss of habitat
- Coastal sedimentation
- Alien species
- Reef degradation
- Species at-risk
- Fisheries collapse
- Loss of ecosystem services
Primary USGS Contacts

- Mike Field (mfield@usgs.gov)
- Ginger Garrison (ginger_garrison@usgs.gov)
- Gary Brewer (gbrewer@usgs.gov)
- Colleen Charles (colleen_charles@usgs.gov)