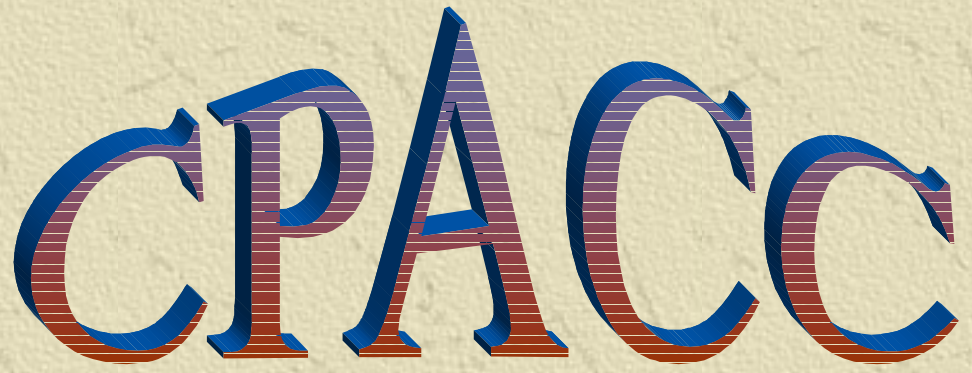


Caribbean Planning for Adaptation to Global Climate Change

Component 5: Coral Reef Monitoring for Climate Change Impacts

Planning and Technical Review Workshop

May 21-25, 2001

Kingston, Jamaica

Overall Objectives

To support Caribbean countries, following a regional approach, in preparing to cope with the adverse effects of global climate change, particularly sea level rise, in coastal and marine areas through vulnerability assessment, adaptation planning, and capacity building linked to adaptation planning

Project Organization

- CARICOMP
- PAC
- UWICED
- RPIU
- NICU
- RAC
- UNEP
- UNDP
- CMS

Participating Countries

- Antigua and Barbuda
- The Bahamas
- Barbados
- Belize
- Dominica
- Jamaica
- Grenada
- Guyana
- St Kitts and Nevis
- Saint Lucia
- St Vincent and the Grenadines
- Trinidad and Tobago

Components of CPACC - Regional

- C1 Sea Level/Climate Monitoring
- C2 Database and Information Systems
- C3 Inventory Coastal Resources & Use
- C4 Policy Framework for Coastal and Marine Management

Components of CPACC – Pilot

- C5 Coral Reef Monitoring
- C6 Coastal Vulnerability & Risk Assessment
- C7 Economic Valuation of Resources
- C8 Formulation of Economic/Regulatory Proposals
- C9 Greenhouse Gases Inventory

Component 5:

Coral Reef Monitoring for Climate Change Impacts

Coral Reefs: Functions and Services

- Directly and indirectly support commercial and subsistence fisheries
- Support aesthetic and recreational activities
- Reduce coastal erosion by functioning as a self-repairing natural breakwater.
- Produce the carbonate sediments that form the white-sand beaches around which the regions' tourism product has been developed.
- Provides critical habitat for endangered marine animals.

Global Climate Change and the impact on coral reefs

- Climate Stress
  - Sea level rise
  - CO2 changes
  - Temperature changes
  - Sedimentation
  - Freshwater
- Other Impacts
  - UV light
  - Nutrients
  - Turbidity
  - Visible light
  - Current/Storm change
  - Resource use
  - Toxins

The overall objective of C5

- Determine most appropriate methodology for recognizing impacts of climate change on coral reefs
- Establish and maintain monitoring sites in The Bahamas, Belize and Jamaica
- Ensure that coral reef monitoring continues beyond the life of the CPACC project.
- Strengthen existing institutions (public, private, and NGO) in coral reef monitoring.
- Increase public awareness about the importance of coral reefs and the potential impacts of climate change.
- Ensure benefits and lessons learnt are transferred to the other CPACC countries.

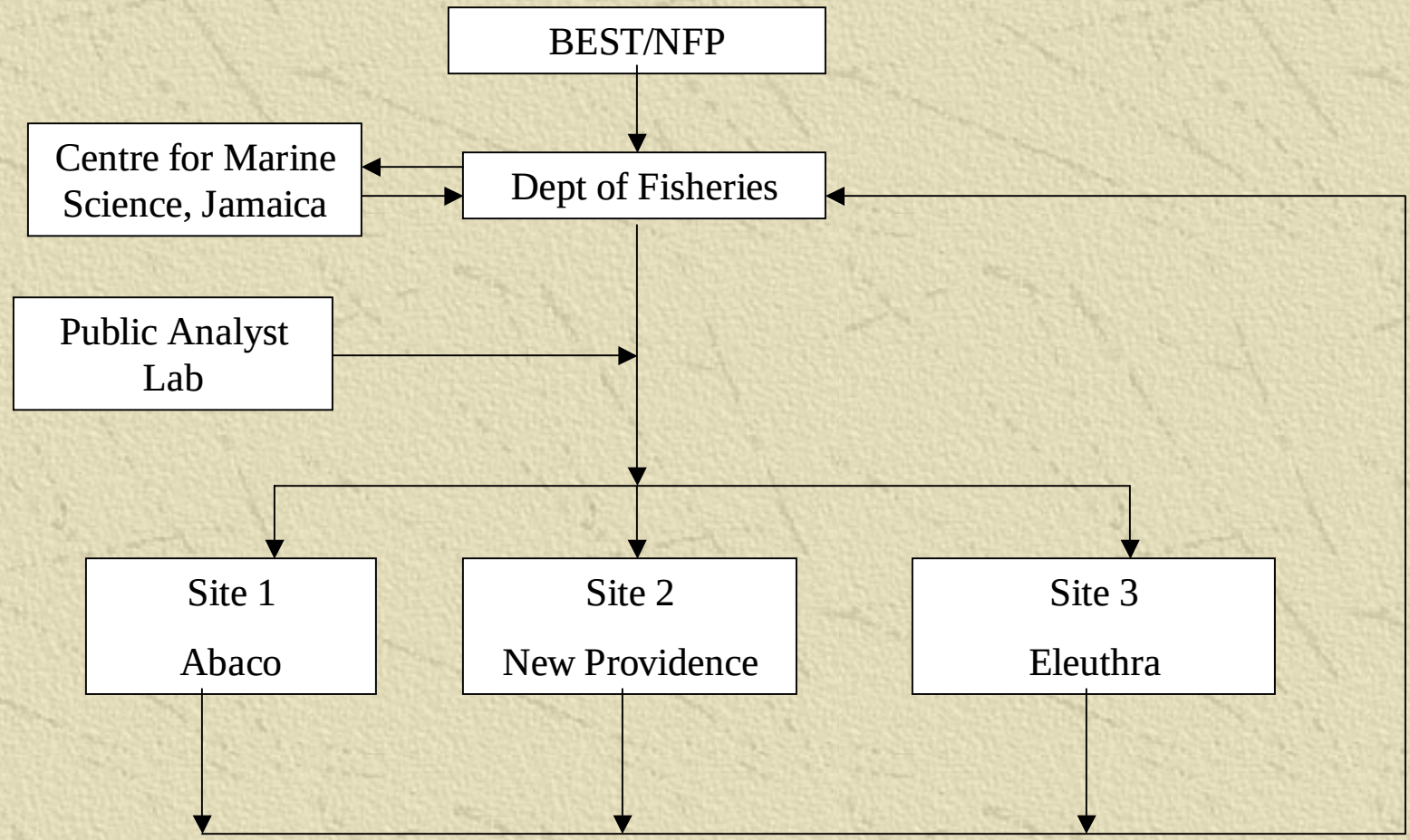
Other Benefits

- Establish a baseline for long-term data collection
- Immediate use of the data
  - ✓ Coastal resources management
  - ✓ Environmental Impact Assessments
  - ✓ Decision making tool

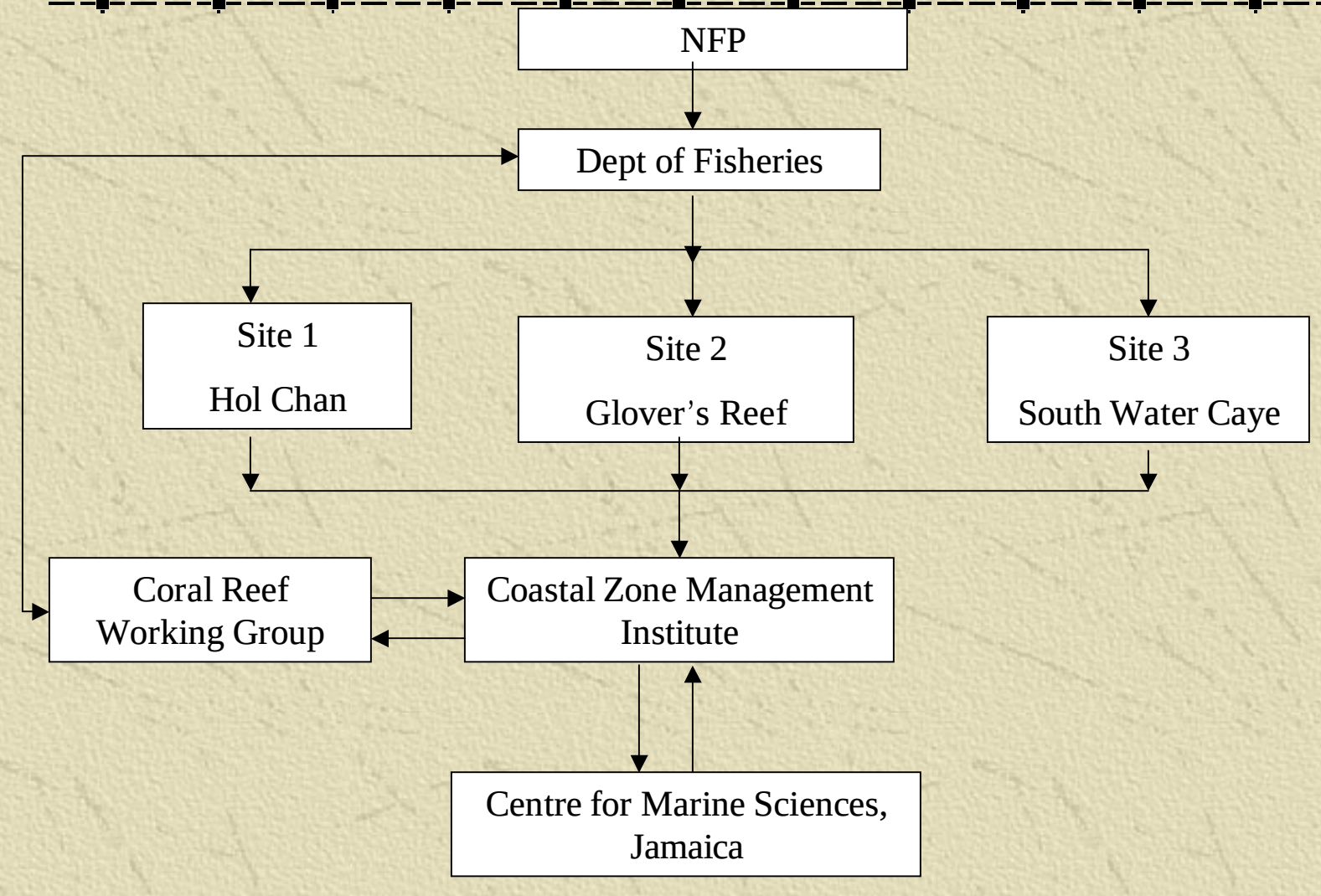
Component 5: Update

- Pilot Component Selection (1997)
- Sub-regional workshop (1998)
- Institutional Assessment Mission (1998)

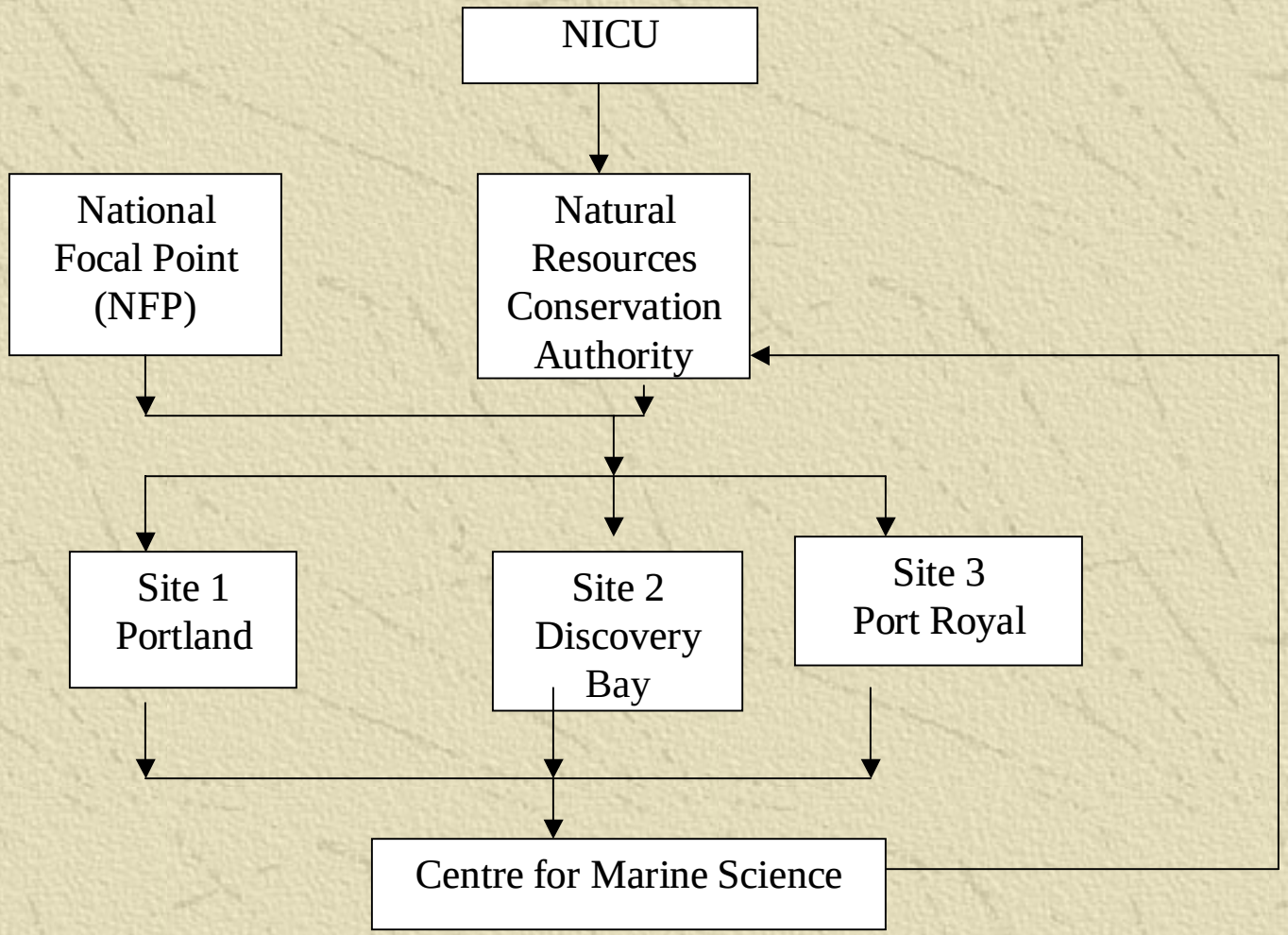
Institutional Arrangements: The Bahamas



Institutional Arrangements: Belize



Institutional Arrangements: Jamaica



Component 5: Update

- Equipment Purchase and delivery (1999)
- Training Workshop (1999)
- Coral Reef Monitoring (1999 – 2000)
- Planning and Technical Review Workshop (2001)

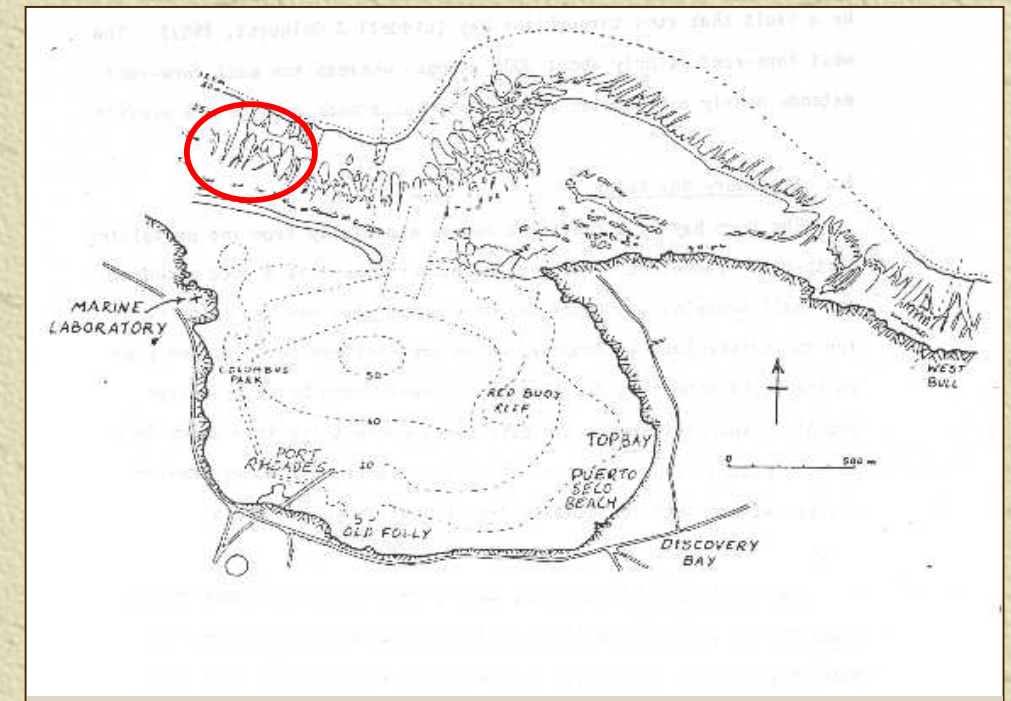
C5 Programme Design

- Site Selection
  - ✓ Three monitoring areas per country representing pristine, mildly impacted and heavily impacted conditions
- Monitoring
  - ✓ Digital technology used to provide permanent photographic records
  - ✓ Permits QA/QC and re-analysis
  - ✓ Reduces time in the water
  - ✓ Data collection not dependent on coral reef experts.

C5 Programme Design

- Data Processing
  - ✓ Automatic capture of unique images
  - ✓ Generation of random dots
- Data Analysis
  - ✓ Enter data in spread sheets using established category codes
  - ✓ Generate summary tables of percentage cover data

Design: Site Selection



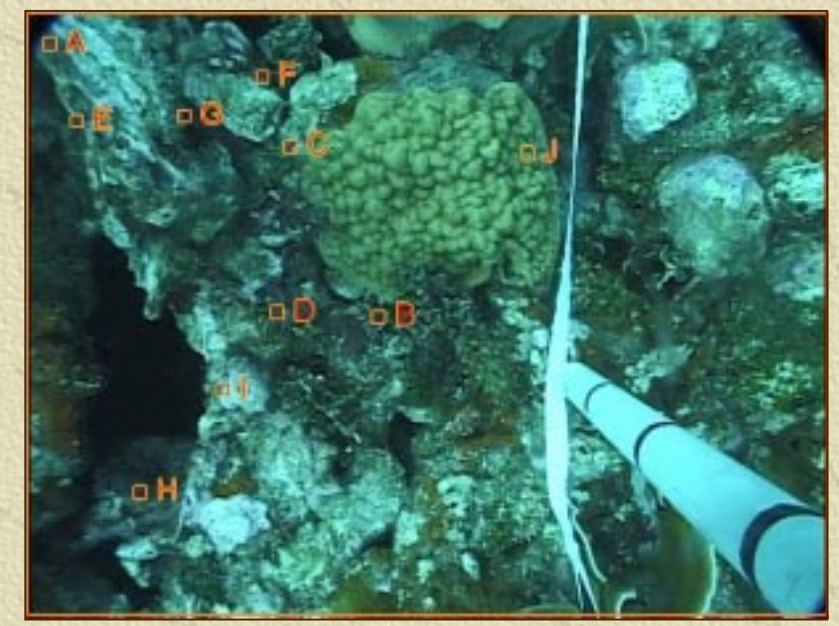
Discovery Bay, Jamaica. Mildly impacted reef conditions

- Three target habitat per country
- 20 transects per monitoring site (each 20m long)

Design: Monitoring

- Digital video camera
- Tape marking 20m transect line
- 40cm wand to fix distance from the substrate.

Design: Data Processing



- Approximately 50 unique images from each transect
- 10 random generated per image

Design: Data Analysis

- Data entry into spreadsheet using established category codes
- Generation of summary tables

Substrate Category Codes

Hard Coral	Branching corals	BRAN
	Massive corals	MASS
	Encrusting corals	ENCO
	Foliaceous corals	FOLI
	Milleporines	MILL
	Coral juvenile	CORJ
Soft Coral	Gorgonians	GORG
	Encrusting gorgonians	ENGR
	Anemones	ANEM
	Corallimorpharians	CMOR
	Zoanthids	ZAON
Sponges	Erect sponges	ERSP
	Encrusting sponge	ENSP
	Encrusting calcareous a	EALG

Algae	Turf algae	TALG
	Fleshy algae	FALG
	Calcareous a	CALG
Non-Living	Bare Boulder	BOUL
	Bare Rock	ROCK
	Rubble	RUBB
	Sand	SAND
	Recently dea	DCOR
	Dead coral w	DCAL
Misc.	Unknow n	UNKN
	Other	OTHR
	Tape	TAPE
	Wand	WAND

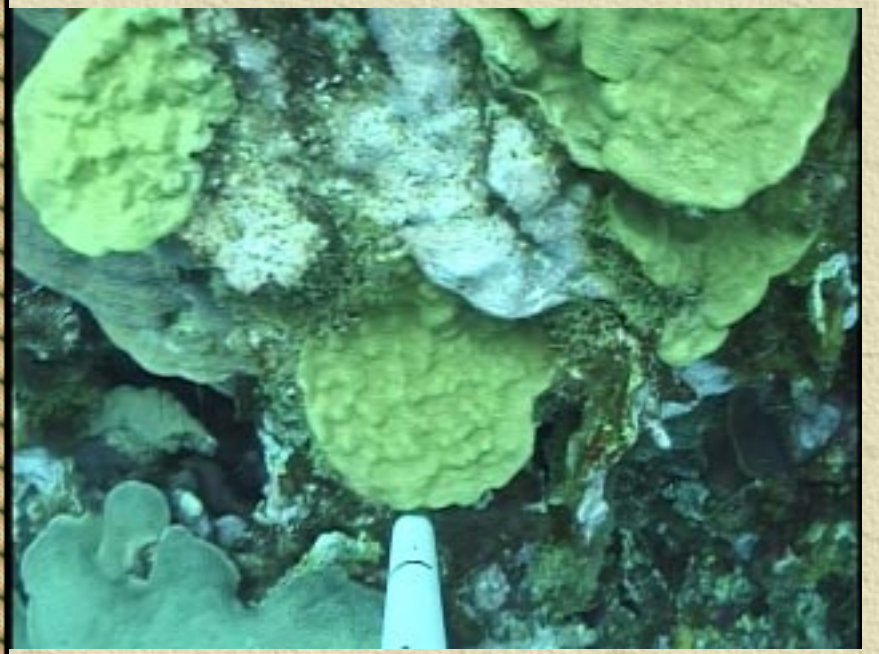
Summary of Results

Results Summary Chart		
CATEGORY	# POINTS	PERCENT
CORAL	**31**	**5.2**
SOFT CORALS	**2**	**0.3**
SPONGES	**0**	**0.0**
RECENTLY DEAD CORAL	**15**	**2.5**
OTHER ALGAE	**329**	**55.4**
OTHER, LIVE	**3**	**0.5**
DEAD CORAL WITH ALGAE	**114**	**19.2**
CALCAREOUS ALGAE	**5**	**0.8**
SAND, PAV, RUB	**91**	**15.3**
UNKNOWNS	**4**	**0.7**
TAPE + WAND + SHADOW	**56**	
BLEACHED CORAL, % OF CORAL		**0.0**
DISEASED CORALS, % OF CORALS		**0.0**
TOTALS	650	100

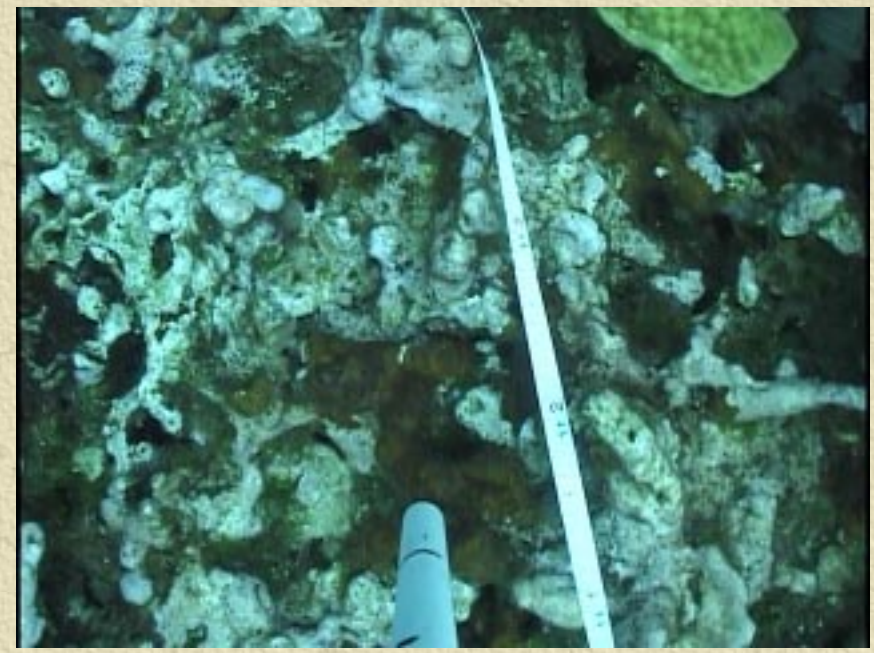
Actual reef may look like this

Images representing different levels of coral cover

- High percentage live coral cover



- Low percentage live coral cover



Future of Component 5

- Expansion to the 8 CARICOM countries in the Eastern Caribbean
  - ✓ Antigua and Barbuda
  - ✓ Barbados
  - ✓ Dominica
  - ✓ Grenada
  - ✓ St Kitts and Nevis
  - ✓ St Lucia
  - ✓ St Vincent and the Grenadines
  - ✓ Trinidad and Tobago

Future of Component 5

- Possible expansion to non-CARICOM countries who have expressed interest in CPACC
  - ✓ San Andres Island, Columbia
  - ✓ Turks and Caicos Islands
  - ✓ Dutch, French and other British territories

Future of Component 5

- Establish collaborative relationships with
  - Cuba
  - Dominican Republic
  - Haiti
  - Surinam

Future of Component 5

- Establish collaborative relationship with NOAA
  - ✓ Satellite imagery to map and classify coral reefs
  - ✓ Meteorological and oceanographic monitoring stations to support coral reef research.

Future of Component 5

- Conduct **economic valuation** of coral reefs and develop a strategy for incorporating this information into the decision making process
- Establish a network of **volunteers** to observe and monitor coral bleaching across the Caribbean and supply temperature and UV radiation data.

Future of Component 5

- Strengthen relationship with CMS and CERMES to provide technical support to the CPACC project and countries involved in coral reef monitoring.

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