The Coastal Change Analysis Program (C-CAP)

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NOAA Coastal Services Center

Charleston, South Carolina

Mission: Linking People, Information, and Technology in the Coastal Zone

New Strategic Focus Areas
- Coastal Watersheds
- Coastal Hazards
- Integrated Ocean Observing System (IOOS)
Coastal Change Analysis Program

Coastal Land Cover and Land Change

What is C-CAP?

• Linkages between land change and the environment
• Satellite-based map products
• Standardized data and methods
• 5 year repeat mapping cycle
Coastal Change Analysis Program

Coastal Land Cover and Land Change

- Coordinated with multi-agency Multi-Resolution Land Characteristics (MRLC) consortium
- Contributing component of the National Land Cover Database (NLCD)
C-CAP Baseline

Vision: To provide the best possible national land cover data available to those that manage the nation’s coasts.

Goals/Objectives:

- Expeditiously complete national baseline
- Five-year update cycle
- Data available to the public
- State and regional advocacy
- Demonstrate the value of these data
- "Coastal" National Spatial Data Infrastructure
- Incorporate higher resolution solutions
A digital-map product line

- **Land cover: time 1**
  (~ current year)
- **Land cover: time 2**
  (~ 5-year retrospective)
- **Retrospective change**
  (time 1 - time 2 change)
- **Percent impervious**
- **Percent tree canopy**
- **Metadata**

C-CAP Land Cover Products
C-CAP Classification Scheme

**Developed**
- Developed, high intensity
- Developed, medium intensity
- Developed, low intensity
- Developed, open space

**Agricultural**
- Cultivated crops
- Pasture/hay

**Rangeland**
- Grassland/herbaceous
- Scrub/shrub

**Forest land**
- Deciduous forest
- Evergreen forest
- Mixed forest

**Barren land**
- Barren land
- Unconsolidated shore

**Water and submerged land**
- Open water
- Palustrine aquatic bed
- Estuarine aquatic bed

**Wetlands**
- Woody wetlands
  - Palustrine forested wetland
  - Palustrine scrub/shrub wetland
  - Estuarine forested wetland
  - Estuarine scrub/shrub wetland
- Herbaceous wetlands
  - Palustrine emergent wetland
  - Estuarine emergent wetland

**Perennial ice/snow**

**Tundra/Alaska only classes**
- Dwarf scrub*
- Sedge/herbaceous*
- Lichens*
- Moss*
C-CAP Land Cover Products

New York 2001 Land Cover Example

Jamestown

Conewango Creek
C-CAP Land Cover Products

New York Change Detection Example
C-CAP Land Cover Products

New York Change Analysis Example

1996 2001

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Trend Analysis - Suburban Development

Charleston, SC

A Small community
Trend Analysis - Suburban Development

Charleston, SC

A Small community
B Local airport
C Shipyard expansion
Trend Analysis - Suburban Development

Charleston, SC

A Small community
B Local airport
C Shipyard
D Residential golf course development

E Residential golf course development

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Trend Analysis - Suburban Development

Charleston, SC

A Small community
B Local airport
C Shipyard
D Residential golf course development
E Residential golf course development
F Residential development
G Lake and campground

1995
A Small community
B Local airport
C Shipyard expansion
D Residential golf course development
E Residential golf course development
F Residential development
G Lake and campground
H Land clearing for residential development
Data Uses

- Model input; decision support tools/systems
- Impervious surface estimates
- Regional planning and assessments
- Conservation site selection
- Habitat management
- Nonpoint source pollution assessment
- Habitat fragmentation analyses
- More ...

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Regional Remote Sensing

Remote Sensing is About Trade-offs!

Appropriate Uses
- Large-scale/regional applications
  - Watershed
  - County
  - State
- Resource inventories
- Population growth trends
- Habitat fragmentation studies

Limitations
- Jurisdictional wetlands legislation
  - 1 acre minimum mapping unit may overlook small, isolated wetlands or changes to wetlands
- Dock siting
- Parcel mapping
- Permitting
- Small-scale studies
Site Specific Remote Sensing

High Resolution Land Cover

• Long-term vision … and
• Concerns for Landsat
• Increasing commercially available, high resolution imagery and supporting data provide
• New opportunities to
  – Introduce new data streams
  – Introduce new approaches
  – Focus on coastal issues

• Challenges
  – Technology
  – Classification scheme
  – Geography
  – Funding
High vs. Moderate Resolution

High Resolution Land Cover

Study Area = 165 square miles

High Resolution Land Cover

Santa Cruz Prototype Project

Scale 1:15,000

Study Area = 165 square miles

- Impervious Surfaces
- Unmanaged Grassland
- Mixed Forest
- Forested Wetland
- Bare Land
- Emergent Wetland
- Scrub/Shrub
- Scrub/Shrub Wetland

$83,000

$505

$950

$575
Decision-Support Tools
Site Prioritization – Conservation

SC Marsh Islands Management
- Imagery from 1999 – identify bridges and marsh islands >1/8 acre
- Address development and preservation issues
- Flexible analysis to accommodate policy changes

ME Coastal Land Conservation
- Capacity-building within land trusts to create and implement local plans
- Provides lessons and strategies for other regions
- Multiple land trust partners
Decision Support Tools

Impervious Surface Analysis Tool (ISAT)

- Estimates impervious surface per analysis unit
- Data inputs
  - Uses land cover data
  - Impervious surface coefficients
- “What if?” scenarios
- Flexible user parameters
- Nonpoint Education for Municipal Officials (NEMO) partnership

NEMO water quality impacts classification:
- Green: < 10 percent IS
- Yellow: 10 to 25 percent IS
- Red: > 25 percent IS

Nonpoint-Source Pollution and Erosion Comparison Tool (N-SPECT)

- Examines the relationship between land cover, nonpoint source pollution, erosion, and water quality
- ArcGIS extension
- Partner-identified needs including runoff, nonpoint pollution, and erosion/sediments
Decision Support Tools

Integrated Coastal Management Tool

- Evaluates habitat related decisions
- Assesses habitat quality, connectivity, economic pressures
- “What if?” scenarios
  - Conservation
  - Mitigation
  - Development
- Flexible user parameters
- Uses existing land cover data (C-CAP or other)
- Part of the Lake St. Clair ecological characterization

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Decision Support Web Site

ALTERNATIVES FOR COASTAL DEVELOPMENT

Key Components:

- Maps of each scenario design
- Indicator comparisons across scenarios
- Three-dimensional views
- Project methodology
- Background information

www.csc.noaa.gov/alternatives

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Additional Information

www.csc.noaa.gov/landcover

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