Opportunities to Enhance Conservation Implementation and Watershed Planning:
The Conservation Effects Assessment Project (CEAP)

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Original Goals of CEAP (2003)

• Quantify and establish the scientific understanding of the effects of conservation practices at the watershed scale, and

• Estimate conservation effects and benefits at regional and national scales

Duriancik, et al., 2008, JSWC Vol. 63, No. 6, pp.185A-197A.
Activities within CEAP

• Bibliographies and Literature Reviews

• National / Regional Assessments
  – Cropland
  – Grazing Lands
  – Wetlands
  – Wildlife

• Watershed Assessment Studies
Collaboration is key for CEAP

- **CEAP Steering Committee**
  - USDA Natural Resources Conservation Service
  - USDA Agricultural Research Service
  - USDA Cooperative State Research, Education, and Extension Service
  - USDA Farm Service Agency
  - USDA National Agricultural Library (ARS)
  - USDA Economic Research Service
  - U.S. Forest Service
  - U.S. Environmental Protection Agency
  - U.S. Geological Survey
  - Bureau of Land Management
  - National Oceanic and Atmospheric Administration

- **Other partners:** LGUs, SWCS, TNC, NatureServe, AFWA, ESA…
Partnerships in CEAP Watersheds

- ARS – 14 Benchmark Watersheds
- CSREES – 16 Competitive Grant Watersheds
  - Human dimensions, optimizations
- NRCS – 11 Special Emphasis Watersheds

- Land Grant Universities
- Other universities
- Producers
- Conservation groups
- Watershed councils
- NOAA, USGS, BLM, EPA
- State agencies
Goals of the Watershed Studies:

• Quantify the measurable effects of conservation practices at the watershed scale
  – in-depth, initially retrospective analyses

• Enhance understanding of conservation effects in the biophysical setting of a watershed
Key questions for watersheds:

- Effects of timing, location and suites of practices
- Interactions among practices
- Socio-economic factors that facilitate or impede implementation and maintenance
- Optimal suite and placement of conservation practices
Informing Local Conservation

• Long-term monitoring (10 to 30 years)
• Watershed scale conservation effects analyses
  – Provide a baseline on current effects & water resource condition
  – Identify vulnerabilities – locations, pathways
• Optimal implementation of practices
  – Placement, suite, cost
Choptank River, Maryland

- Combined satellite remote sensing, field data, and practice implementation data to determine cover crop N uptake across broader spatial scale.
  - Evaluated species and planting dates
Modeling Scenario Results: German Branch Subwatershed

- 40% cover crop usage provided little or no benefit for yearly N reduction in the watershed.

- 75% cover crop usage would be needed, based on modeled predictions, to achieve a significant reduction in N loading at the subwatershed outlet.
Cannonsville Reservoir/ Town Brook – A New York City Source Water Watershed

- Issues:
  - NY City water supply
  - Runoff generation
  - Manure application
  - Phosphorous

Photos: Cornell University
Hydrology Matters for Practice Implementation

Runoff location matters

Variable Source Areas concept included in practice installation decisions from early on

Slide courtesy of Tammo Steenhuis, Cornell University
Townbrook Subwatershed Modeling

So far, non-point source reductions from 2000-2004:
- 50% reduction in dissolved P
- 17% reduction in total P

BMP optimization can:
- Reduce P losses by an average of 60% over time
- Optimal: $24 kg^{-1} P_{removed yr^{-1}}$
- Basic: $34 kg^{-1} P_{removed yr^{-1}}$

Bryant, R.B., et al. 2008. JSWC 63 (6), 339-344
Image courtesy of Tammo Steenhuis, Cornell University
Jobos Bay, Puerto Rico

- South-Central Coast of PR
- Subtropical Dry Forest Zone
- Size - 10,210 ha (25,219 acres)
- Total Population – about 73,000 people
- Predominant Land Use – Agriculture
Goals for Jobos Bay CEAP SEW

- Effects of conservation practices on the delivery of water, nutrients and pesticides from agricultural lands
- Ecosystem response of near shore and coral reef coastal ecosystems
Salinas Silage Field – center-pivot irrigation – groundwater investigation

Riparian Area – south of Silage Field

JBNERR Mangrove Forest – transition to estuary – mangrove study – improvements to REMM
Objective: GIS-based analysis that utilizes geospatial data to assess impact of land based sources of pollution on shallow-water coral reef ecosystems.
NOAA Summit to Sea - Jobos Bay Results

Land Cover Summary

Pollutant Loads

Localized Pollutant Contributions

Benthic Habitat Summary
Sediment Contamination Assessment

- 40 sediment samples
- Analyzed for pesticides and metals of agricultural concern
Benthic Habitat and Living Marine Resource Monitoring

- Habitat Metrics
  - Five 1m² quadrat surveys
- Fish Census
  - 25x4m transect count
- Macro-invertebrate Census
  - Conch and lobster abundance
Considerations for Planning

• Implementation must address
  – primary concerns
  – flow paths, other vulnerabilities
  – to produce measurable benefits

• Lag times significant

• Watershed scale planning, focused implementation

• Address human dimensions

• Fit into agency processes and tools
CEAP: Translating science into practice for enhanced delivery of conservation programs.

From Maresch et al., 2008. JSWC. 63.6.198A
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