Environmental Planning for Communities

A Guide to the Environmental Visioning Process Utilizing a Geographic Information System (GIS)
Example Case Studies

- Monroe County, PA, Poconos
- Camp Pendleton area, CA
- Muddy Creek, Benton County, OR
- Willamette basin, OR
- Iowa agricultural watersheds
- Mojave desert CA
- Blackberry Creek, Kane County, IL,
- Chico Creek, Kitsap County, WA
Case Study: Iowa Agricultural Watersheds

• Small watersheds in intensive agricultural areas in Iowa
• Leveraged data from earlier studies
• Project activities at universities in Oregon, Iowa, Michigan, Minnesota
Study Region

• U.S. Cornbelt, nearly all land in private ownership, agricultural land use
• Serious concerns over degradation in water quality, soil erosion, native biodiversity, human quality of life
• Precedent and potential for influence of agricultural policy on land use
Land Use Changes to Reduce Soil Erosion

- Alternative agricultural practices
- Expand use of best management practices
- Conservation Reserve Program
Land Use Changes to Reduce Stream Pollution

- Riparian buffers
- Upland filter strips
- Alternative agricultural practices
- Alternative crops or commodities
- Nutrient detention wetlands, engineered features
Land Use Changes to Maintain Biodiversity

- Set-aside reserves
- Use of native species in plantings (roadsides, farmsteads, etc.)
- Restoration of wetlands
- Habitat connections
Land Use Changes to Keep Families on Land

- Extensive livestock farming (instead of confined feeding operations)
- Diversification of operations
- Non-farm homes, biodiversity farmsteads
Evaluating Land Use Alternatives

• Biodiversity
  – Statistics of change in habitat for all non-fish vertebrate species, plus butterflies
  – Spatially explicit population models for all mammals, plus 4 amphibian species
  – Plant community model for plant biodiversity
Evaluating Land Use Alternatives

• Water quality
  – Spatially-distributed water quality model for nutrients and sediment

• Human dimensions
  – Spatially explicit model of economic impacts (EPIC)
  – Farmer interviews and farm planning
Futures for Buck Creek

Production

Water Quality

Biodiversity

Pre-settlement

Habitat Classes
- Row Crops
- Strip Intercropping
- Perennial Herbaceous Cover
- Woodland/Woody Cover
- Water/Wetland
- Urban/Residential/Roads
Futures for Walnut Creek

Production

Biodiversity

Water Quality

Pre-settlement

Habitat Classes:
- Row Crops
- Strip Intercropping
- Perennial Herbaceous Cover
- Woodland/Woody Cover
- Water/Wetland
- Urban/Residential/Roads
Changes in Habitat

Buck Creek

Walnut Creek
Changes in All Endpoints

Buck Creek

1. Water Discharge
2. Sediment Export
3. Nitrogen Export
4. Farm Income
5. Farmer Preference
6. Plant Habitat
7. Butterfly Habitat
8. Vertebrate Habitat
9. Mammal Populations
10. Amphibians

Walnut Creek

Percent Change

1  2  3  4  5  6  7  8  9  10

Endpoint

Production
Water Quality
Biodiversity
Bibliography: web sites

Monroe County, Pennsylvania:
  http://www.gsd.harvard.edu/depts/larchdep/research/monroe/

Camp Pendleton, Southern California:
  http://www.gsd.harvard.edu/studios/brc/brc.html

Muddy Creek, Oregon:
  http://ise.uoregon.edu/Muddy/Muddy_abstract.html

Willamette Basin, Oregon:
  http://oregonstate.edu/dept/pnw-erc/

Agricultural Watersheds, Iowa:
  http://bufo.geo.orst.edu/tc/firma/ip/

Kane County, Illinois:
  http://www.co.kane.il.us/kcstorm/blackberry/
Bibliography: selected articles


