

“Assessing the Impacts of Land Use Change on Hard Clam Aquaculture”

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Mr. Strickler reviewed his thesis project, entitled, “A GIS-based Watershed Model to Map Use Conflicts and Inform Policymakers.” The problem he studied was shellfish aquaculture, which depends on good water quality, versus coastal development and, by inference, increased nutrient pollution in those same areas.

Mr. Strickler gave some background on the aquaculture in Virginia, as follows:

- Eastern oyster and hard clam are the primary species harvested
- Clam growers grossed \$27 million in sales during 2005
- Temperature and salinity requirements needed for growth present physical and spatial constraints; also environmental concerns.
- W/Q is very important for healthy animals; serious sickness presents real risk
- Bacterial standards have been established for fecal coliform levels

The location of the study area was Old Plantation Creek on lower Eastern Shore, bayside. The area has long been characterized by large farms, but this watershed is now changing to residential use, with a new 3000-unit housing develop featuring 2 golf courses. With the build-out planned, significant changes will occur along the shorelines as well as the Route 13 corridor.

What does this mean and how do we use the information? His methodology:

- The target pollutant is fecal coliform bacteria (the indicator)
- Used GIS: to map land uses and shellfish leases
- Built a watershed loading model, to estimate bacterial loading
 - Spatially explicit; precipitation driven, delivery ratio (hydro features)
- Built a water quality model to predict bacterial concentrations
- Built an economic model to determine impacts of closures

He applies the watershed model in a predictive fashion; useful for planning over the long term.

Other features of the model:

- Reviewed inputs and outputs
- Delineated sub watersheds, linked to creek bottom; can simulate events and observe data
- Delineated closed areas: present and future; upper creek closed, middle with new land use scenario - 151 acres of bottom land condemned (all leased for shellfish growing)

With such water quality declines, growing waters are condemned – what does it mean?

- Loss of \$24 - \$49 million to the economy: based on input-output economics model (Kirkley)
- Direct, indirect and induced impacts
- Annual industry sales: \$7.5 mill to close to \$17 mill out of industry
- Reopening: realize a gain of \$1-2.25 million

Knowing that nonpoint source pollution leads to significant economic losses, he raised rhetorical questions, such as:

Should we address it?

- Consider that this “loss” competes with contributions from home builders and others to the economy

How do we address it? Ideas:

- Recognize the jurisdictional complexity of this issue; identify policy gaps; eliminate market failure. Here are a few possible responses:
 - Local level: mandate pet waste disposal and septic pump-out
 - Offer builders proffers for environmental protection
 - State level: let localities limit impervious surfaces
 - Hold locals accountable
 - Improve balance between public/private uses
 - Federal level: Employ predictive modeling
 - Step up a “total maximum daily loads” (TMDL) implementation schedule