

## Land-Use Change and Water Quality: Delaware's Current Status and Major Challenges

John Mackenzie, College of Agriculture & Natural Resources, University of Delaware

One area of my research program at UD involves tracking land-use/land cover (LULC) changes in Delaware. There are LULC maps for Delaware from 1984, 1992, 1997, and draft maps for 2002 that are widely distributed around the state. A sequencing of these shows development that looks like a case of the measles. (Mike Mahaffie and Wendy Scott have done recent change analyses such as this.)

Originally, Delaware was just forest and marsh. It was mostly cleared for agriculture over a period of 150 years or so, although there was re-growth of forest in areas with poor soils, drainage or terrain. Agriculture remains Delaware's dominant land use, with about twice as much land in agriculture as in forest. Although the public perception is that development mostly displaces agriculture, the reality is somewhat different (Table 1). Development in Delaware since the 1970's has actually displaced more forest than agriculture. This has some important implications for water quality.

Table 1: Forest and Agricultural Land Conversions in Delaware

	1974	1984	1992	1997
FOREST acres	391,694	364,798	219,632	207,620
Percent change		-6.87%	*	-5.47%
AGRICULTURE acres	596,000	589,000	557,087	538,803
Percent change		-1.17%	-5.42%	-3.28%

\*re-categorization of forested wetlands between 1984 and 1992

Land protection provides a range of environmental quality benefits. Politically, the most important of these is congestion control: people are sensitive to the visual quality of the landscape, and are quick to associate new development with overcrowded roads, schools, etc. Unfortunately, the effects of development on other environmental amenities such as wildlife habitat quality and water quality are not quite as obvious, and thus have less influence on land-use planning decisions.

Delaware has instituted various policies to protect various types of open space, focusing particularly on farmland and prime habitat areas, and has committed substantial public funds to its Ag Land Preservation program and Open Space acquisitions. The Nature Conservancy and other private conservation groups have also protected substantial areas of open space from development. Although Delaware now has a higher proportion of its farmland under preservation easements than any other state, we're not doing quite as well protecting other land uses such as forest that provide as good or better water quality benefits. Acre for acre, we get more water quality benefits from forest than from farmland.

Our water quality issues are complicated by the fact that we draw our water from a combination of streams and relatively shallow aquifers, and the interrelationships between these are not widely understood. Our land-use officials have been slow to address the effects of increasing impervious surface cover on water quality, stream flow patterns and groundwater recharge. We have made good progress on cleaning up point sources over the last few decades because these are relatively easy to gauge; but we are still ill-equipped to manage non-point sources.

It doesn't help that we're in a period of regulatory retrenchment. The federal courts have determined that the interstate commerce clause of the US Constitution doesn't extend to federal protection of isolated wetlands, so Delaware will probably have to pick up additional regulatory responsibilities for these. The current Bush administration is strongly committed to easing the economic burden of environmental regulations on agriculture and industry. Regional efforts to reduce agricultural runoff seem to have lost momentum. TMDL's are in the slow lane. If "more study is needed," let's line up the funding and do the research. If not, let's do the best we can with our current knowledge base.