

OUR ENVIRONMENT

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Balanced growth vital

Uncoordinated development harms watersheds

By Jon D. Erickson
and Karin Limburg
For the Poughkeepsie Journal

Water flows downhill. Whether a raindrop hits a forest floor, farm pasture, front lawn, or freeway, gravity cannot be denied. However, the speed of the raindrop's journey — to stream or river, pond or lake, sea or ocean — is increasingly under the control of humankind. Where water once percolated through soil and babbled in brooks, today it surges across pavement, through culverts, and into muddied, rain-swollen streams.

In Dutchess County, the trend from agriculture to asphalt has been nearly as certain as gravity. Building permits for single-family homes averaged more than 1,000 per year at the turn of the century.

Whether built to support local employees, commuters, or weekend retreats, new households bring new income. New income creates more income, which creates more houses.

As economic growth proceeds one job, one house, one business at a time, resulting land use change consumes the very resource base upon which our economy is built. The tyranny of small decisions results.

Good for economy

Healthy watersheds provide services to the economy. They supply and purify water, provide wildlife and game habitat and diffuse and transport human wastes.

However, these services are rarely valued in our present economic system. The tyranny occurs as uncoordinated decisions of the economic system create an undesirable scale of change in the ecological system. Undesirable from whose perspective? Often from the

viewpoint of the original decision-makers.

A recent collaboration between ecologists, economists and watershed planners has attempted to connect the dots from economic growth, to land-use change, to watershed health in Dutchess.

Consider this case: 1,000 new jobs come to the semi-conductor industry. A countywide economic model we designed shows the potential for an addi-

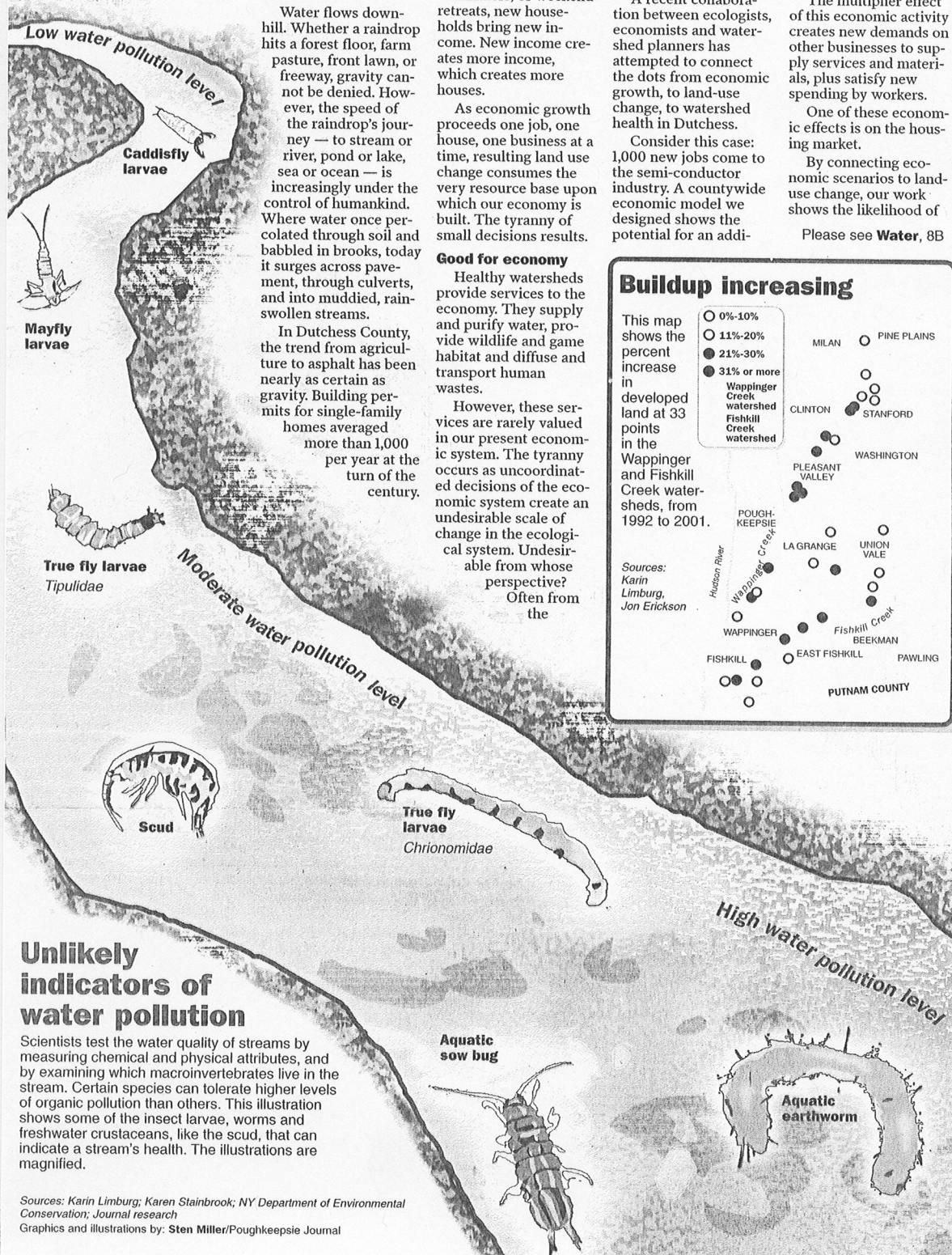
tional 1,000 jobs to be created.

The multiplier effect of this economic activity creates new demands on other businesses to supply services and materials, plus satisfy new spending by workers.

One of these economic effects is on the housing market.

By connecting economic scenarios to land-use change, our work shows the likelihood of

Please see **Water**, 8B

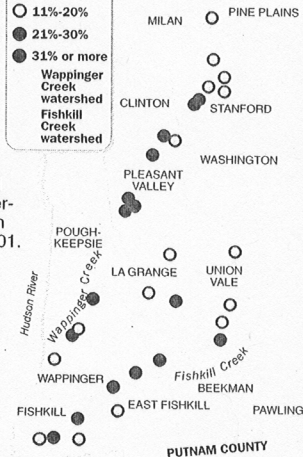


Buildup increasing

This map shows the percent increase in developed land at 33 points in the Wappinger and Fishkill Creek watersheds, from 1992 to 2001.

- 0%-10%
- 11%-20%
- 21%-30%
- 31% or more

Sources:
Karin Limburg,
Jon Erickson



Unlikely indicators of water pollution

Scientists test the water quality of streams by measuring chemical and physical attributes, and by examining which macroinvertebrates live in the stream. Certain species can tolerate higher levels of organic pollution than others. This illustration shows some of the insect larvae, worms and freshwater crustaceans, like the scud, that can indicate a stream's health. The illustrations are magnified.

Sources: Karin Limburg; Karen Stainbrook; NY Department of Environmental Conservation; Journal research
Graphics and illustrations by: Sten Miller/Poughkeepsie Journal

Water: Pollution hurts nature, economy alike

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currently vacant, farm or forested parcels changing to residential use.

The Wappinger Creek watershed, for instance, has more than 4,500 tax parcels that can accommodate residential development. Under economic and population growth patterns of the 1990s, more than 20 percent of these parcels would be candidates for development over the current decade.

More houses equals more impervious surfaces — the catch-all term used to describe the compacted, paved, or roof-topped areas fragmenting the landscape.

Economy, watershed linked

To complete the chain that links the economy to land-use to watershed health, we compared urbanization to measurements of water quality. We did this by measuring chemical, physical and biological indicators, including fish and aquatic insects, in streams at 33 locations in the Wappinger and Fishkill Creek watersheds.

To analyze the results, each river system was delineated on digital maps into smaller basins that collect rain and bring it to the creeks.

Using satellite imagery from 1992 and 2001, in each of 33 basins land in forest and farm was shown to give way to suburbanization. Decline in forest cover is as high as 40 percent in some basins, with increase in suburbanization as high as 50 percent.

By correlating these development patterns with stream health, a few general conclusions emerge:

■ First, environmental degradation of both river systems is occurring.

■ Second, degradation as measured by water chemistry closely follows land use intensity. Increasing urban and suburban land use matches decreasing water quality.

■ Third, the health of fish and insects is less sensitive to development intensity.

However, there are marked differences between the general health of the two river systems. Overall, the Fishkill Creek scored lower, while the Wappinger Creek

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is showing increasing signs of stress. However, the Fishkill Creek did show signs of improvement when compared to a similar survey conducted in that creek in the 1980s, perhaps due to better controls on industrial and sewage treatment plant pollution.

No one dreams of polluted waters, failing schools, congested roads, or longer commutes, yet the tyranny of small decisions can result in each. If given the opportunity to vote on a future that required a redirection of near-term decisions, a community of these same individuals may have decided on a different path.

Of course, hindsight is 20-20. But steps toward avoiding undesirable outcomes can come from stressing the joint future of communities bound by water, by valuing the future on par with the present, and by realizing the intricate connectivity of economy, society and environment.

Toward this end, this research is assisting the ongoing efforts of the Dutchess County Environmental Management Council and the Wappinger Creek Watershed Intermunicipal Council to strike balance between economic, social, and environmental goals of watershed communities.

Through integrating the lenses of economics, ecology and planning, an informed, democratic decision-making process can help communities get out from under the tyranny.

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