

Plan On It

A Dutchess County Planning Federation eNewsletter



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From Flooding to Drought and Back Again *How Better Stormwater Management Can Help Us Handle the Swings of Extreme Weather*

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As with so much else in life, when it comes to water, too much of a good thing can be a bad thing. When things get dry and we start to hear the word “drought” on the news, people often wonder if our aquifers and wells are running low. Then when we get torrential flooding rains, people struggle to cope with too much water.

Data trends (and recent memory) suggest that we have been getting more heavy rainfalls, and that this pattern is only likely to continue. These events can be devastating. There are, of course, many possible planning responses to consider after a flood. One is simply to rebuild and hope it doesn't happen again. Another is to rebuild but with armoring and perhaps raised elevations. A third rarely explored option is to retreat or relocate if we recognize that an area is so prone to flooding that continual rebuilding is neither practical nor financially sensible.

It is the peak flood levels which usually cause the most damage. It's those final few inches or feet of flooding which are too high and cause currents that are too extreme. Hydrogeologists (people who study groundwater) can offer some advice on how thoughtful groundwater management can both help supply aquifers and limit damaging flood peaks. To be successful, our ideas to limit peak flood levels need to be implemented broadly, across the full collection area of our streams and rivers.

Jim Tierney, the Deputy Commissioner of the NYSDEC's Office of Water Resources, once said at a [Hudson River Watershed Alliance](#) conference that the best way to manage floodwaters is to: slow it down, spread it out, and soak it in. This is excellent advice. Think about it: if we can slow it down, spread it out, and soak it in, then flood water reaches the stream more gradually, more of it gets soaked up along the way, and the peak flows for each individual stream don't all converge in the downstream location at the same time.

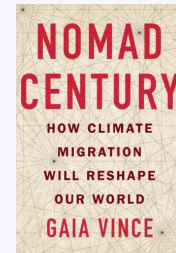
Planners' Picks

Ever wonder what your friendly county planners are reading? This feature shares interesting books, podcasts and more to spark your interest in the how's and why's of planning and placemaking.

— HEATHER'S BOOK REVIEW —

**Nomad Century:
How Climate
Migration Will
Reshape Our
World**

By Gaia Vince



Learn how migration throughout human history has played a key role in the success of our species, and how it may form the central axis of a survival strategy in the face of climate change. According to Vince, "Migration made us. This might be hard to see in the context of today's geopolitical identities and constraints, where it can feel like an aberration, but, viewed historically, it is our national identities and borders that are the anomaly." As the effects of climate change worsen and global demographic shifts play out, reacquainting ourselves with the myriad benefits of migration, not the least of which are economic, could be key to how we successfully navigate the uncharted climatological territory we find ourselves headed for, and in some places already in.

After laying out the dire climate-related circumstances many are already facing and the stark predictions for what lay ahead, Vince offers up an onslaught of ideas and examples for how we could and are working together on a global scale to address climate change. She outlines a path forward that leans heavily on innovation and cooperation.

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Post-storm flooding on Mansion Street in the City of Poughkeepsie.

The first two chapters are bleak, but by chapter 3 the book pulled me along. It's chock full of sometimes hard-to-face realities, but also of countless examples of human creativity and ingenuity. According to Vince, "Today we lack a coherent plan; we are simply experiencing our world heating up, and reacting to each new shock...with a new patch-up. We must take control of our future...We can build resilience into our social systems – and our ecosystems – to withstand the stresses and shocks of climate change and disasters. But we need to own our future."

It's hard to imagine the picture she paints is truly reality, but even if just a percentage of it is, we should understand the direction we're heading in and figure out how to plan for it.

NPR Interview:

['Nomad Century' delivers a message that's sharp and jolting about mankind's future](#)

Flooding aside, hydrogeologists also appreciate Jim Tierney's advice because slowing water down allows more to sink into the ground, which contributes to groundwater recharge that keeps our aquifers replenished and our wells supplied.

How To Slow it Down, Spread it Out, and Soak It In

There are many actions, small to large, which can help "slow it down and spread it out," so that flood water peaks are lower in a stream or river, and better able to recharge our aquifers. Here are just a few recommendations that can help:

New York State's Stormwater Regulations

All new major development projects require stormwater management planning. In general, these regulations seek to detain peak floodwater volumes, soak some of it in, and then release the detained water slowly to avoid a high peak flow. On a site-by-site basis, these stormwater regulations focus on exactly what is needed: slowing and soaking in floodwaters. Project applicants and planning board reviewers working with the NYSDEC regulations typically work hard to satisfy these objectives. These are well intentioned and are mostly doing a great job.

What We Can Do on Private Properties

- **Micro-grading in the lawn to include small gentle depressions.** My yard is not flat. Over time I have adjusted the grading in a few places in my lower areas to create a series of small, benched basins across the lawn. They are so subtle that most people can't discern them, and they are not disruptive to lawn mowing, but after a heavy rain they function as a series of small basins that each accumulate an inch or so of standing water which sinks in quickly after the rain event. Since we have our own water well, I am happy to recharge these extra gallons on our property, and I'm also happy that my micro-grading in some small way helps prevent some downstream flooding. Others with gently sloping properties could copy this idea.
- **Rain gardens.** We had a tree removed some years ago which was about 15 feet from our house. I had the stump pulled rather than leaving it. This yielded a big hole. I put rocks in the bottom which I covered with filter fabric and then a soil horizon with plantings. Our roof gutters are now directed to this rain garden. It accepts tremendous amounts of water that would otherwise flow over our driveway and away from our property. There are many ways to build rain gardens and lots of examples can be found online. Just be sure that rain

gardens and other infiltration practices aren't built adjacent to basements or other foundations prone to flooding. Typically, at least a ten-foot setback from foundations is recommended for a rain garden to make sure that intentionally recharged rainwater does not lead to wet basement conditions.



Example of gutters being directed into a nearby rain garden. Optimal rain garden locations vary property to property based on slopes, soils, and the height of the water table.

- **Limit impervious surfaces or at least detain runoff.** Paved or hard surfaces like roofs and asphalt driveways generate rapid stormwater flow. Where we can't pursue permeable alternatives, runoff should be directed to low spaces or rain gardens, to reduce downstream flooding.
- **Keep the wet places.** If there are places that accumulate water on a property and are away from structures or roadways, it is good to keep them! Don't grade them out, fill them, or drain them, particularly if you observe that they detain or store stormwater after rain events. These areas are probably helping prevent downstream flooding in some small way by allowing stormwater to slow down and soak in.

What Municipalities and Organizations Can Do

Municipalities and organizations can lead by example by implementing any of the suggestions above wherever possible on their own properties. Municipalities can also focus staff and development attention on stormwater management through Planning Board processes.

In 2008, a volunteer professional working team gathered in Dutchess County to create a series of [recommended practices for the management of streams and floodwaters](#). These recommendations were developed to address flooding threats in Dutchess County and remain relevant today. The report includes a sentence stating that "...retrofits and new construction should seek to maximize onsite infiltration and slow run-off..." directly echoing Jim Tierney's recommendation to slow stormwater down, spread it out, and soak it in! Many of the recommendations were directly intended to provide guidance to municipalities, and some of their key recommendations, along with a few additional ideas, are commented on here:

- **Upsize bridges and priority culverts:** Increase bridge spans and culvert sizes where debris blockages repeatedly occur during flood events. Where possible, ensure that such widened spans leave room for streams to naturally migrate in their beds without causing

damage to roads or bridges. Some of these corrective actions can also ensure fish connectivity in streams. Be aware, however, that many existing culverts currently provide beneficial temporary stormwater detention where they briefly slow and spread stormwater in harmless ways along our roadsides. Their backup of flows often lasts just a few hours or days following a storm event and helps limit downstream flooding even though not originally built to support this benefit. Over time our many existing culverts have become a widely distributed network of very effective detention structures that collectively help limit our current downstream peak flood levels. Upsizing every culvert without thought risks inadvertently increasing downstream peak flooding, and therefore, a culvert's ability to harmlessly pool water after major storm events should be taken into consideration when prioritizing a culvert management and replacement plan.



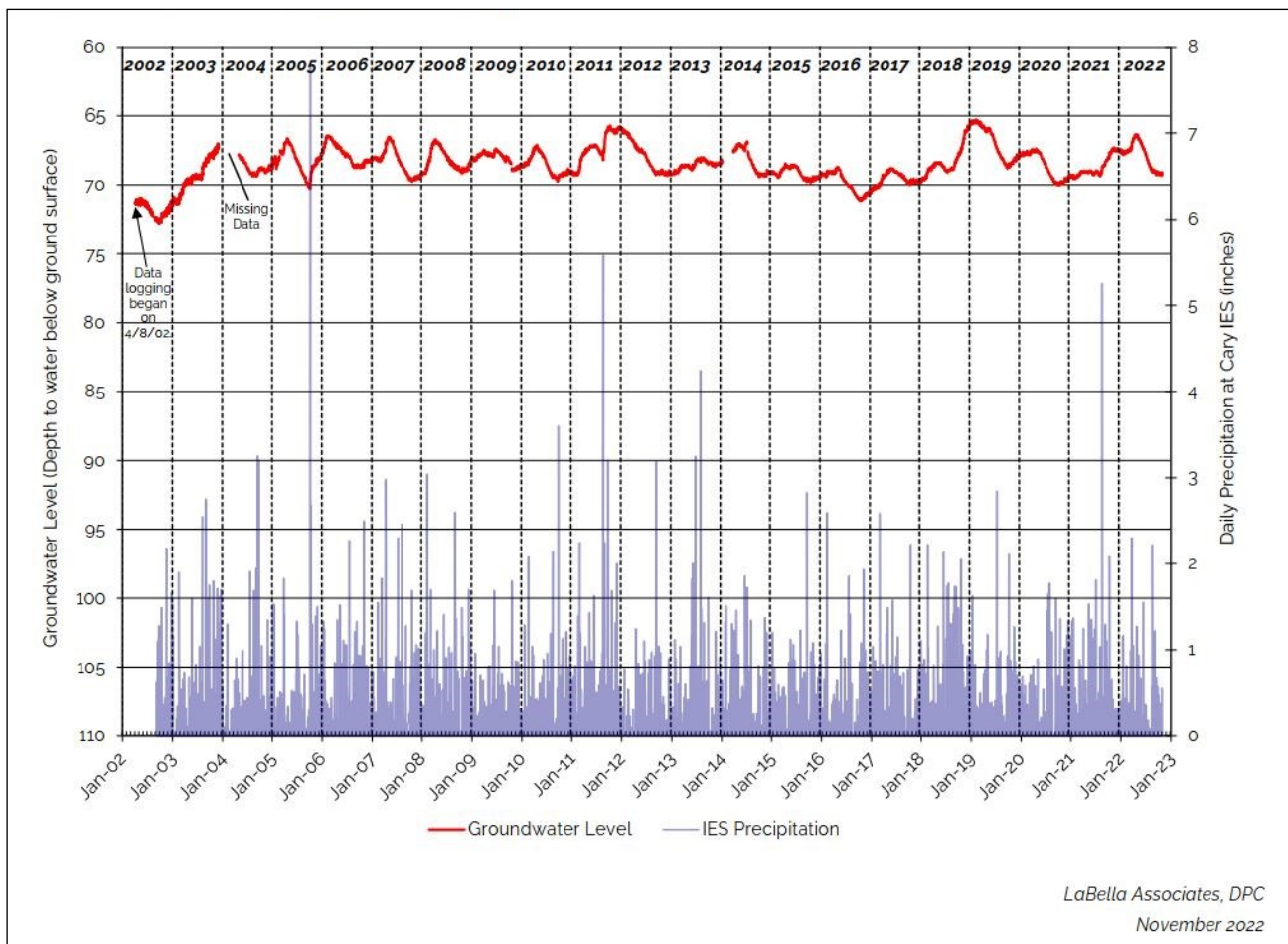
A medium-sized culvert temporarily slowing water down due to backup of flows.

- **Mow versus scour:** Roadside drainage should be configured to allow for regular mowing rather than scoured ditches, both to slow groundwater flow and to capture sediments. Roadside drainage should ideally then distribute stormwater to infiltration basins, detention ponds or constructed wetlands so water can slow before entering streams.
- **Avoid unnecessary clearing:** Channel clearing and removal of woody debris and gravel from streams should be avoided. Attempting to direct natural stream activity is typically futile and is also significantly disruptive to fisheries and natural vegetation communities. Wood removal at sites posing an imminent threat to critical infrastructure should of course still be considered on a case-by-case basis.
- **Leave floodplains alone:** Floodplain areas should be kept undeveloped and naturally vegetated, ensuring that floodwater overflow areas remain accessible when water needs extra space.
- **Attain FEMA eligibility:** Communities are encouraged to participate in local and regional planning, ensuring eligibility for FEMA support including leveraged buyout funding for repeatedly flooded properties. Buyout programs are sometimes the wisest planning strategy where growth has placed development in flooding's way.
- **Expand temporary water storage:** Explore opportunities to expand temporary stormwater detention on restored or existing wetlands and existing or expanded floodplains.

- **Watch out for salt:** Direct winter’s salty road runoff quickly towards streams where it will eventually reach the Hudson River which is itself naturally saline just south of Dutchess County. If wells are located near roads, salt can end up in the groundwater that supplies those wells, where it cannot be easily treated. If it doesn’t end up in our drinking water or the Hudson, the salty groundwater just ends up seeping into wetlands and streams later in the season, which is also problematic.

A Few More Thoughts from Hydrogeologists

LaBella Associates has helped Dutchess County develop and maintain an aquifer water level monitoring program since 2001. It is hopefully reassuring to share that the data show that year-over-year, our Dutchess County aquifers remain full of groundwater, replenished reliably by our annual precipitation of approximately 40 inches per year. Our aquifers are recharged principally during the non-growing season (autumn to spring) when vegetation and evaporation do not intercept and consume most of the precipitation. During summer, our groundwater levels decline naturally as this water seeps slowly into wetlands and streams, is used by plants, and is withdrawn by our wells. This cycle repeats itself quite reliably every year, with small variations annually as we receive more or less rainfall.



Annual groundwater level and precipitation data (2002-2022) obtained from the Vanderbilt Mansion monitoring station, as part of the Dutchess County Groundwater Management Program.

But heavy rainfalls that drop several inches in a short period of time cause runoff that flows directly into streams, which typically does not recharge groundwater very much. Only by slowing stormwater down and allowing it to soak into the ground can such rainfall result in more recharge. The many recommendations reviewed in this article to delay stormwater flow and reduce downstream flooding are almost all also beneficial to groundwater recharge and aquifer resilience. Long slow rainfalls benefit aquifer recharge far more than heavy and short cloudbursts. Slowing stormwater down and spreading it out helps it soak in as if the rainfall were slow and long.

In conclusion, for those who wonder about the condition of our aquifers, we can offer a word of reassurance. Dutchess County's groundwater monitoring program confirms that our aquifers are in good shape and are replenished annually by recurring rainfalls and snowmelt. There are, of course, some local areas where aquifers are over tapped, but on a regional level our groundwater resource is resilient. As we think about storms and experience increasingly heavy rain events and flood damage, there are a wide range of protective and planning strategies which can be adopted at various levels, whether by the private property owner, the commercial developer, or local municipalities and organizations. These practices can collectively help cope with significant stormwater challenges while also helping to ensure that we responsibly maintain our precious groundwater resources.

Resilient Ways Forward Transportation Planning for our Changing Climate

The [Dutchess County Transportation Council](#) is in the midst of completing a Climate Vulnerability Assessment of the county's [transportation system](#) – which includes roads and bridges, buses and trains, sidewalks, rail trails, and other key assets, and includes state, regional, county, and local facilities alike. The Climate Vulnerability Assessment, titled *Resilient Ways Forward*, will identify locations where our transportation system is most vulnerable to the impacts of climate change, such as flooding, extreme temperatures, and wind. It will also recommend ways to adapt to or reduce the adverse impacts of climate change on our system. A final report will be ready next spring, but in the meantime, the DCTC has released two interim reports:

- [Climate Change Summary Report](#)
- [Phase 1-System Level Assessment](#)

More Information

[Create a Rain Garden](#)

[Hudson River Watershed Alliance](#)

[NYS DEC Stormwater Resources](#)

[NYS DEC Stormwater Interactive Map](#)

[Recommendations for Stream & Flood Management in Dutchess County](#)

[Resilient Ways Forward](#)

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This newsletter was developed by the Dutchess County Department of Planning and Development, in conjunction with the Dutchess County Planning Federation.

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