Water Off, Hikers On: A Short Course in Sustainable Trail Design

From the October 2018 issue of *The Trek*

There are times when you can learn to do something right by initially doing it wrong. And then there are times when you think you're doing something right, but you're actually doing it wrong, and therefore you don't learn a thing. This second sentence may best describe folks who design, construct, and maintain hiking trails in the Northeast. Well, it's high time to tell them, for the sake of everyone, that they're doing it wrong.

My first trails job was in White Mountain National Forest in 2001, and during the decade that followed I designed and built trails, and taught others how to do so, in the Northeast and the South. During that time I also hiked and mountain biked hundreds of miles of trails in the American West. They say it's all about location, location, location, and this is true when it comes to how trails are designed and built. You see, as I came to learn, trail builders of the Northeast consistently break the five rules of sustainable design and construction.

Rules of Sustainable Design and Construction

1. Average trail grade does not exceed ten percent
2. Trail grade does not exceed half the angle of the slope it's built into
3. All spongy organic material is removed to expose durable mineral soil
4. No water bars are used – employ grade reversals (the trail countlessly alternates between running uphill and downhill for short stretches)
5. Trail possesses a ten percent outslope (the trail tilts towards its downhill edge)

When trail builders don't follow these rules, they invariably end up subscribing to a seven-step process that results in forcing trails up and down steep slopes, which leaves hikers careering down trails so eroded that these pathways resemble streambeds with trail markers. In addition to providing users with an unenjoyable trail experience, this process in turn breaks the two-fold goal of trails, which is to keep water off and keep hikers on. This seven-step process is flawed and costly.

Steps of Northeast Design and Construction

1. Clear a corridor straight uphill through the forest
2. Wait a few years for the trail to turn to mud and then erode
3. "Harden" the trail by installing features such as rock steps
4. Install water bars to help guide water off the trail
5. Notice that erosion has not been stopped
6. Install more hardened features and water bars
7. Keep cleaning displaced sediment out of ineffective water bars and blame hikers for the degradation of trails

I take personal issue with step No. 7 because I'm a hiker who has grown frustrated and tired of people blaming me, my fellow hikers, and "overuse" for the disgraceful condition of Northeast trails. I assure you we're innocent. The three forces that degrade trails are erosion, displacement, and compaction. Hikers cannot commit the first force, and they commit the other two at negligible levels.

The only thing on Earth that erodes trails is *erosion*, a force that can only be sourced from snowmelt and precipitation. *Displacement* is the act of moving soil, the worst-case scenario being moving it off the trail. Two examples of high-displacement sources are ATVs and downhill mountain bikes, which have aggressive knobby tires that grip and fling soil. The treads on hikers' boots can't displace much, and since many hikers now wear trail runners, human-powered displacement is even further reduced. *Compaction* is the tamping down of soil. Once a trail is packed down to a level lower than the forest floor that hems its two sides, water can't get off it, and it becomes a drainage. A high-compaction source is a horse, which on average weighs 1,200 pounds but whose weight is dispersed by two square feet worth of hooves hammering the trail. Your average hiker, with pack, is only about 200 pounds, and this weight is dispersed by a square foot worth of soles gently contacting the trail. Someone who's apt to blame hikers for compaction sets aside time in their day to demonstrate a lack of mathematical comprehension. They'll say something like, "But if ten 200-pound hikers walk down a trail, that's one ton of force compacting the soil." No. It's not. It's ten separate applications of 200 pounds.

What You Need to Build a Sustainable Trail

1. Clinometer for measuring the grade of your proposed trail
2. Chainsaw for clearing a corridor
3. Aggressive cutting and digging tools for removing roots and stumps
4. Digging tools for removing organic material
5. Rock bars for moving rocks out of the way
6. Coal bags for transporting material
7. Sledgehammer for bashing pointy rocks or making durable fill
8. Loppers for snipping remaining small roots and stumps
9. Digital level for measuring outslope
10. Leaf rakes and gravel rakes for giving the trail a smooth finish

It's usually not best to conclude facts with an inquiry, yet I can't help but conclude this short course in sustainable design and construction with a fair question. That is, if you're a Northeast trail builder, who knows that unsustainable trails provide lousy user experiences and are expensive or outright impossible to maintain, and that sustainable trails provide outstanding user experiences and require minimal maintenance, why are you still thinking about building your next trail straight uphill?