

Early settlers drained marshy US landscape

- 19:00 17 January 2008
- NewScientist.com news service
- **Catherine Brahic**



A milldam on Pickering Creek in Chester County, Pennsylvania. The dam spans the entire valley, and is filled to the brim with sediment. (Image: Robert Walter and Dorothy Merritts)

Standard notions of the 'natural' eastern US landscape with its meandering ribbon-like streams may be misguided, suggests historical research.

In the US, a multibillion-dollar landscape restoration industry is guided by the almost intuitive notion that natural, gravel-bedded streams wander in single channels across the land. The industry seeks to recreate the "original" North American landscape of forested hills and meandering streams that carved their way down the valleys and out to sea.

This image of the natural landscape comes from studies of stream geometry carried out in the 1950s.

But now, Robert Walter and Dorothy Merritts of Franklin and Marshall College in Pennsylvania say those studies got it wrong, and the meandering streams are actually the result of early forms of land management imposed by the European settlers of the 17th century. The New World, they say, was a wetland.

The new study suggests that rather than rivers being confined to single, winding channels before 20th century industrialisation, they were collections of many small channels spreading across broad wetlands before European settlers dammed them in.

Thousands of mills

"One of first things the settlers did was to clear the forests for agriculture and build tens of thousands of dams to run their mills," says Walter.

Each dam extended from valley edge to valley edge and created a step in the landscape. Series of dams created large "staircases", which drained the marshland water out of the valleys.

At the same time as building the dams, the settlers were also clearing the tops of the hills for agriculture. This released soil which gathered in large deposits behind the dams.

Much later, in the late 19th century, oil and coal replaced hydropower and the mills and dams fell into disuse. As they began to crumble, the sediment they held back, the original, pre-settlement topsoil, began flowing down the valleys in streams that weaved from one breached dam to the next.

'Chocolate' rivers

The team's theory explains why decades of measures to reduce soil erosion from contemporary farmland have failed to reduce the amount of mud flowing down the streams.

"After every rainstorm, our creeks and streams run like chocolate milk," says Walter. The belief has been that the mud is dragged off eroded farmland and rushed down streams that were straightened and inflated by industrialisation.

But, Walter and Merritts say the sediment does not come from modern farms, but from those that capped the hills 300 years ago. Today, that mud still lines the ponds and streams, and every new storm simply dislodges it and moves it further downstream.

The researchers did not set out to redraw the image of pre-colonial North American landscapes. As they embarked on a field study with a group of undergraduate students, they expected to collect data on how farmlands were contributing to land erosion.

However, in the first stream they visited, they found layer upon layer of fine silt which suggested that the sediment was in fact quite old. They searched around and found a mill and a dam. Every new site they visited was the same.

Swampy meadows

The team verified their theory by dating the layers of silt. Historical maps and manufacturing data helped them identify the location of dams and mills, and confirm their widespread use in early colonial times.

Their analysis revealed that by 1840, there were more than 65,000 dams between South Carolina and Maine.

Although diaries from colonial times are rare – the settlers were too busy working and were farmers, not writers – a Swedish botanist named [Peter Kalm](#) visited the New World and in 1750 described a landscape of "swampy meadows".

Satellite imagery now reveals the wedges of sediment that were created by the dams as they levelled the landscape into giant staircases.

"The report by Walter and Merritts shows that it pays to do the painstaking work of historical sleuthing," says [David Montgomery](#) of the University of Washington in Seattle, US.

Journal reference: [Science](#) (vol. 319 p. 303)

[Add a comment](#)

What About Beaver Dams?

By Duncan

Fri Jan 18 13:04:08 GMT 2008

Having grown up in northern New England, it is very clear that beavers, once common, will dam up streams, often creating large empondments that are long lasting and trap sediments. The beaver dams are often very cleverly located and my guess is that an early settler would likely have taken advantage of large beaver dams as mill ponds (they had no bulldozers, dumptrucks or excavators). Was there really a change in stream character between beaver and man?

By Andrew

Fri Jan 18 15:39:46 GMT 2008

Good point about the beaver damns, they were once very widespread (and making a strong comeback thankfully) The tallest beaver dams I have seen have been rarely over a meter high. I imagine human made damns to power millwork would be significantly higher.

By Jeffrey L Hartranft

Fri Jan 18 15:51:15 GMT 2008

There is no doubt that beavers and beaver dams were ubiquitous in the North American landscape prior to settlement by Europeans. The main difference after settlement began, however, is that sediment loads increased significantly. Despite not having modern equipment, early settlers were very industrious dam builders, having brought the technology from Europe. Some dams built during Colonial times are still present across Pennsylvania's valleys. The Colonial era dams, much like modern dams, were significantly better engineered and constructed than those built by beavers. Yes, wholesale changes in stream character were the direct result of damming and increase sediment supply following settlement.

By Guillermo Phillips

Natural?

Fri Jan 18 13:13:46 GMT 2008

This story highlights that ideas about what constitute a 'natural' landscape, are often wrong. If 'natural' is to be held up as an ideal that's supposed to be 'best' for a particular environment, then we have to understand all the influences that humans have had on that landscape, before making decisions about how to manage it.