

# RAN Fact Sheet

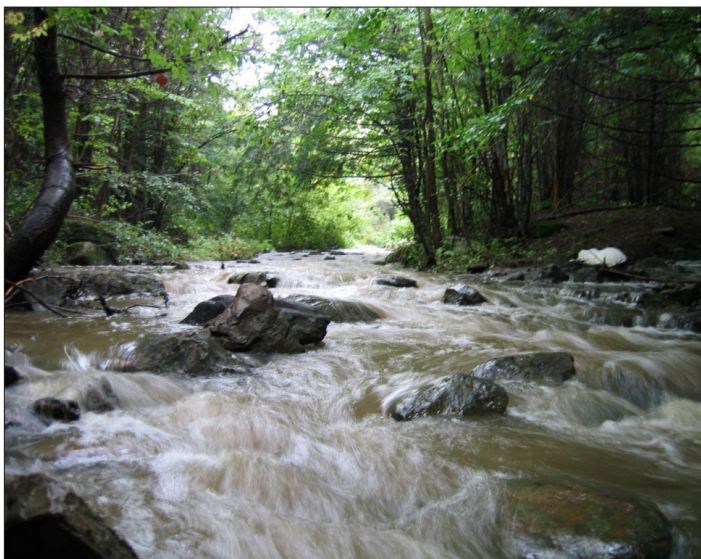
## Redesigning the American Neighborhood



## Stream Power

Evan Fitzgerald

In the hydrologic cycle, falling rain represents a huge transfer of energy from the sky to the ground. Sometimes the energy released during a rainfall is especially large, as during a thunderstorm on a muggy summer day. In a natural landscape, intact soils and vegetation act as buffers for this energy as water enters surface and ground waters on its path over and through land to the ocean. Have you ever wondered how much energy is released by rainfall as it moves from the sky to the earth or through streams and rivers? How about the energy released when rainfall runs off impervious surfaces, like roads and rooftops, directly into streams?



*Potash Brook in South Burlington, Vermont during one of the largest two stream flows of the year*

Engineers and scientists have studied and quantified this phenomenon for decades; indeed, many of us know that the potential energy of rivers can be stored behind dams to produce electricity. Yet, there are few analogies to common uses of energy that provide a sense of how much energy is transferred in this process. The RAN team tackled this problem in 2006 and quantified the amount of *excess* energy produced when rainfall runs off impervious surfaces directly into a stream, rather than following the buffered, natural course through soils and vegetation.

They found that in a moderately urbanized watershed such as Potash Brook in South Burlington, Vermont, the largest two stream flows of the year

produce enough *excess* energy within a half-mile of the stream channel to power a large bulldozer for 16 hours or two full workdays. The resulting damage from this excess energy can be seen in urban watersheds nationwide—widening of the channel, bank erosion, sediment plumes in downstream lakes and rivers—not unlike the damage from a bulldozer tearing through the stream!



*Downcutting of stream banks from heavy flows in lower Allen Brook, South Burlington, Vermont*

It is difficult for many homeowners to imagine how runoff from their small driveway or rooftop could adversely affect a nearby stream. However, the cumulative effect of our dispersed urban areas within a watershed can produce dramatic, “earth-moving” changes in our precious streams through the short-circuiting of the natural hydrologic cycle. Let’s work together to keep the *bulldozers* out of our streams!

### For more information, contact

RAN Project  
320 Aiken Center  
The Rubenstein School  
of Environment and Natural Resources  
The University of Vermont  
Burlington VT 05405

802-656-2691  
[breck.bowden@uvm.edu](mailto:breck.bowden@uvm.edu)

Or visit  
[www.uvm.edu/~ran/ran/](http://www.uvm.edu/~ran/ran/)