Exploring Approaches to Managing Landslide Risks

So what's the problem?

University of Pittsburgh

University Club, Ballroom B

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Organizing Committee:

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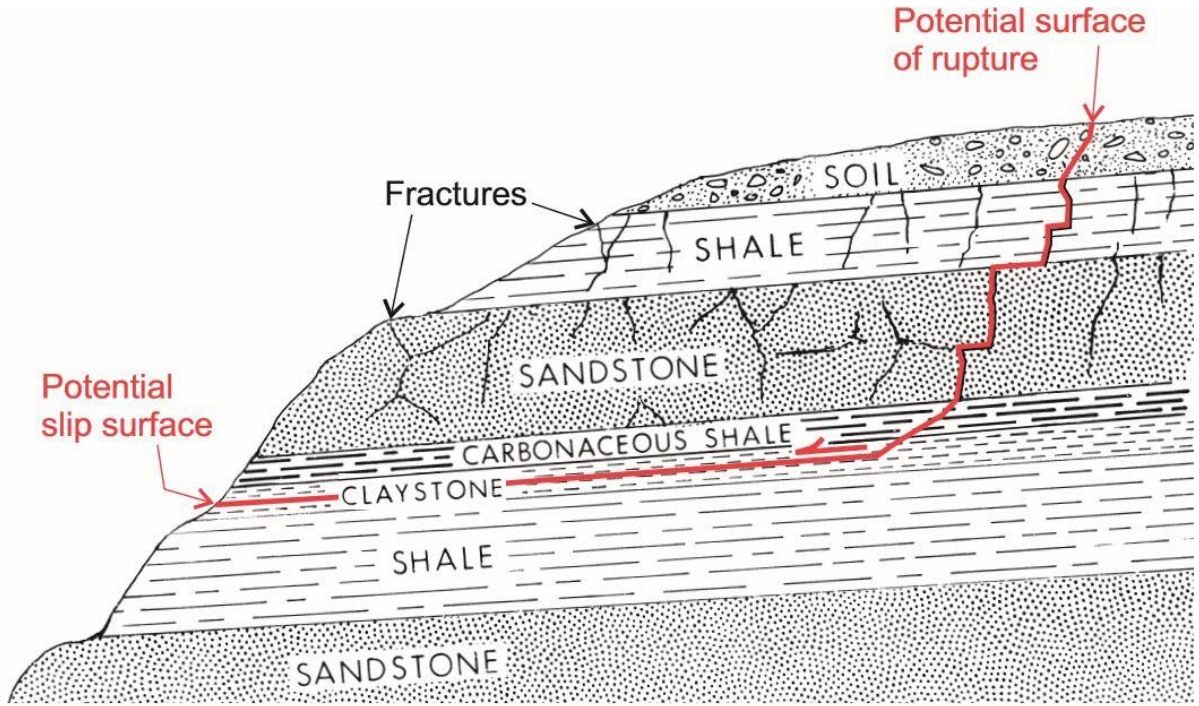
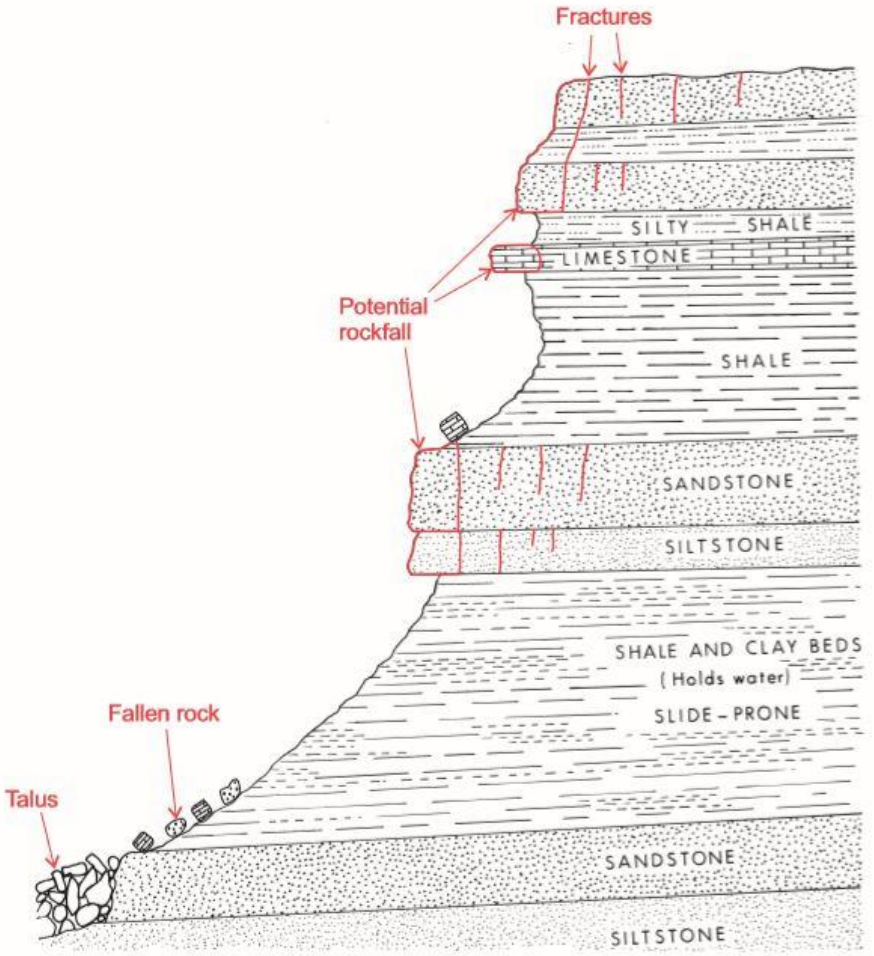
1) Southwestern PA is a land of relief, covered with slopes, many at their angle of repose

Wikipedia - The Unami word Monongahela means "falling banks", in reference to the geological instability of the river's banks

2) The strata cropping out within these slopes contains a high percentage of weak claystone and shales that weathered into colluvial, unstable soil





Figures from “Landslides in Pennsylvania”, by Delano and Wilshusen, 2001

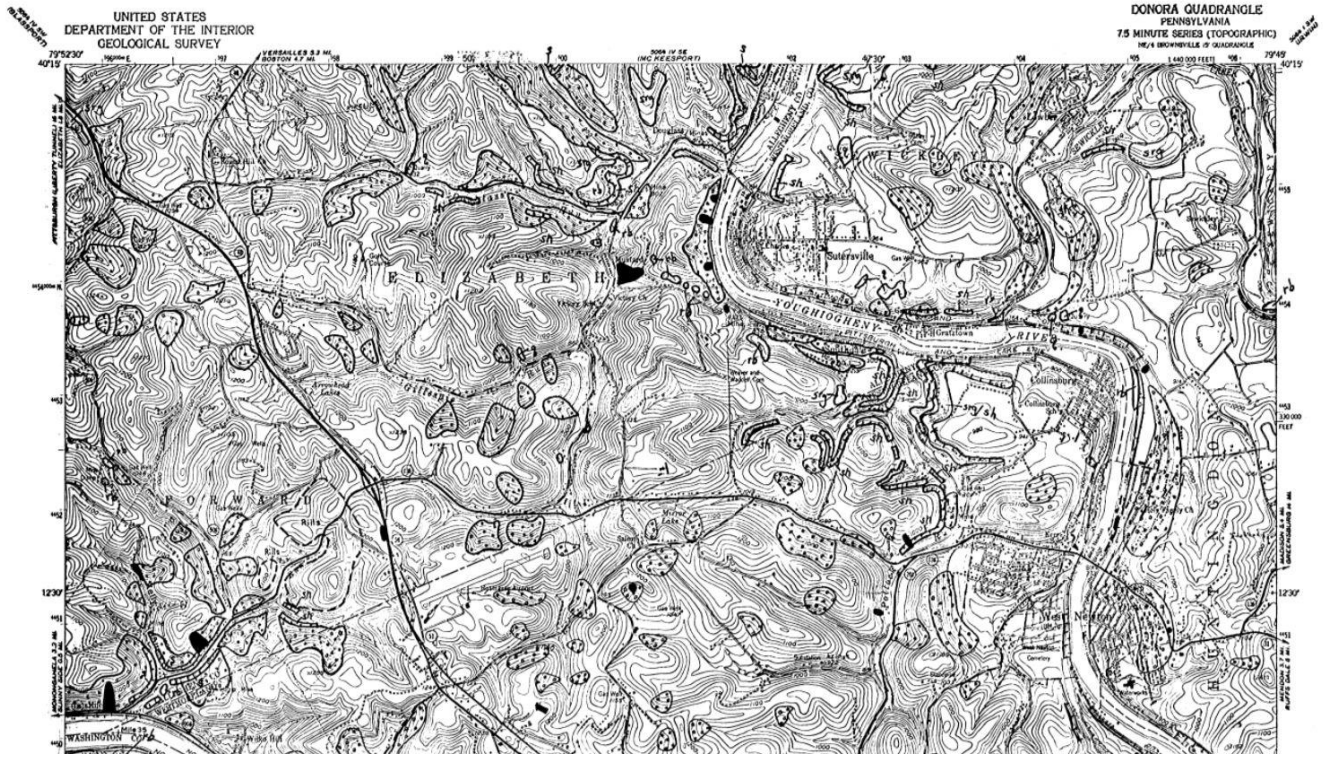
3) Very diverse forms of landslide

Types of Landslides in Pennsylvania (Delano and Wilshusen, 2001)

Type of movement		Type of material		
		Bedrock	Engineering soil	
			Coarse-grained	Fine-grained
Fall		Rockfall		
Slide	Translational	Rockslide	Debris slide	
	Rotational	Rock slump	Slump	
Flow	Rapid	Rock creep	Debris avalanche	Mudflow
			Debris flow	Earthflow
	Slow		Talus creep	Soil creep

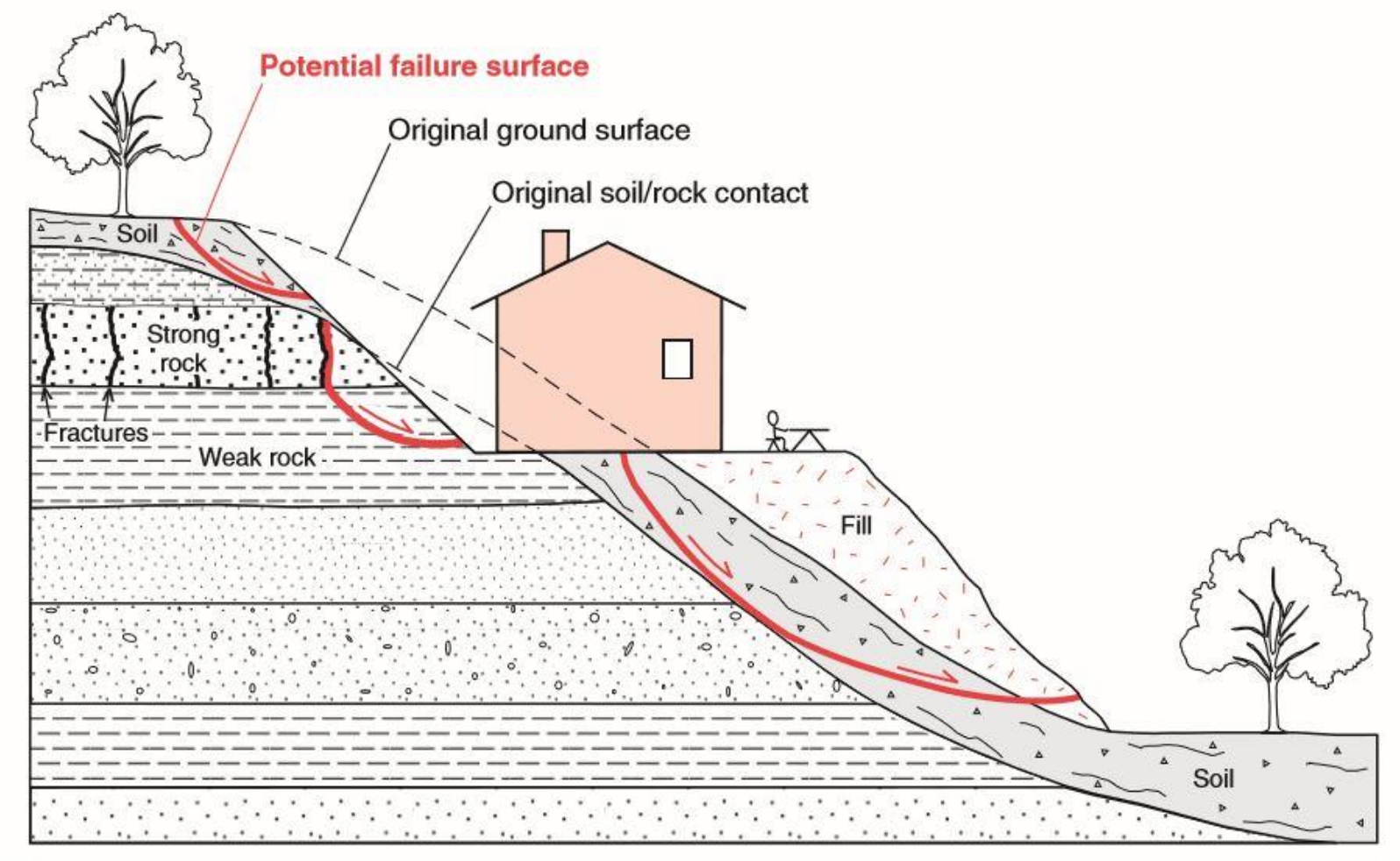
4) The last glacial episode in our region helped to produce landslides.

The last glacial episode in our region helped to produce landslides. These old/ancient landslide areas are recognized by their extensive hummock ground caused by earthflow and earth and rock slumps. They often lack clear evidence of active sliding. Relatively stable in natural, undisturbed state, old landslides can be re-activated by excavations, surcharge loading, or changes in groundwater and surface water conditions.



Portions of the Donora quadrangle landslides and related features map (Pomeroy and Davies, 1979)

5) Civil works (Roads, buildings, etc.) cover the surface, disturbing the slopes and altering water drainage patterns



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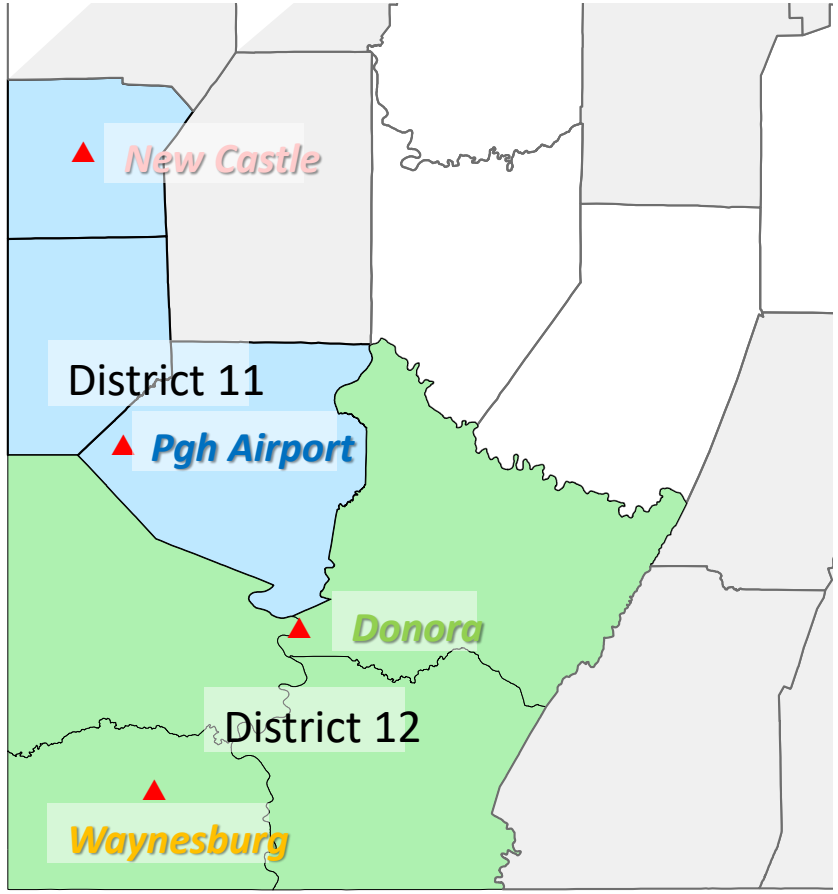
6) Oil and gas drilling as well as mining operations can disturb slope stability

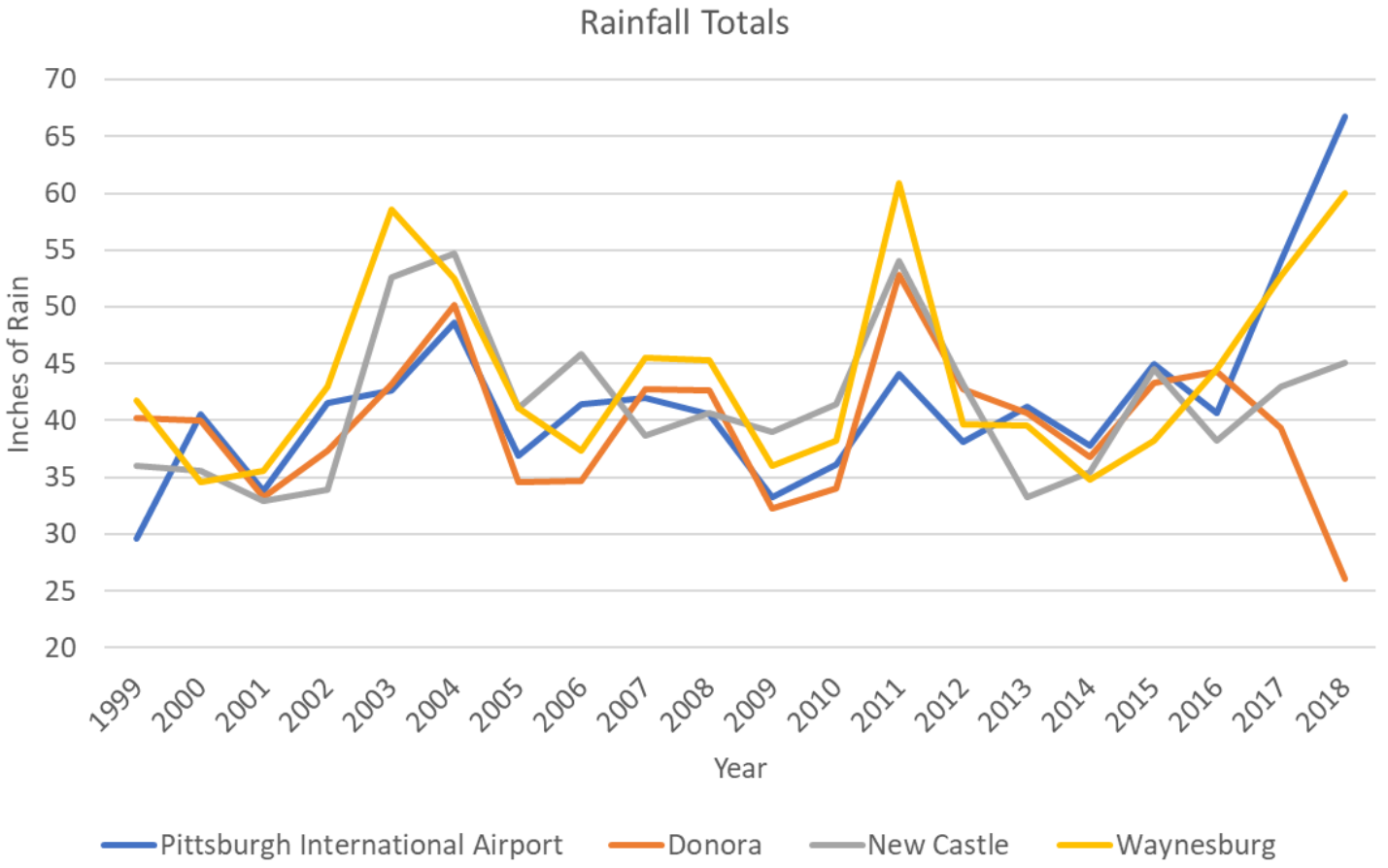
Post-Gazette article by Anya Litvak and Laura Legere, 5 August 2019

- With hundreds of well pads and thousands of miles of pipelines newly added to the ground in PA, the industry's development disturbs the surface and eliminates some trees and vegetation that would otherwise absorb rainfall. Then the rain, in turn, floods culverts, soaks the ground and moves soil without regard for what pipelines may be relying on its support.
- Last year, three newly laid pipelines snapped under pressure from landslides in Pennsylvania, West Virginia and Ohio — causing explosions, evacuations and millions of dollars in damage…

Landslide over the Cumberland Mine after longwall mining, Greene County, 2005

7) Recently, there has been an increase in precipitation (big rain events)





Objective

1) Respond to IRISE Stakeholder concerns
2) Provide a venue for landslide practitioners to learn more about current and future landslide detection and remediation methods and techniques
3) Highlight new research activities and capabilities
4) Investigate methods to manage landslide risk
5) Explore sources for funding critical efforts.