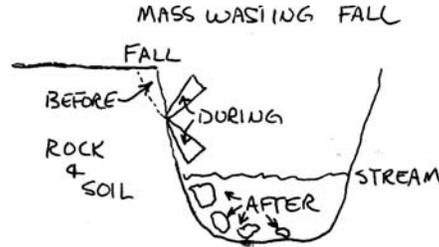


## Mass Wasting and Streams

Overview: I will explain my understanding of mass wasting and streams and how they are connected.

Definition: Mass wasting is the movement, caused by gravity and/or water, of bedrock, rock, debris or soil in bulk downslope.

Mass wasting: Mass wasting is movement of a mass down hill and can take place as a flow, slide or fall. Gravity is the main driving force and is combined with water, which acts as the loosening agent. Basically material from above is loosened by water to the point where gravity takes over and pulls it away. Pore water pressure usually plays an important role. It is the increase in water pressure in the pore spaces within the rock that causes the rock to weaken and particles to act buoyantly, helping them to move downslope. Water weighs ~8 pounds per gallon and is incompressible, helping the process along. How far the rock material travels down hill depends on the content, size and viscosity of the mass, and the slope in which it is traveling. It can be as little as a few feet, like a slide or creep, or if it ends up in a stream, it can travel hundreds of miles before it reaches its final resting spot.

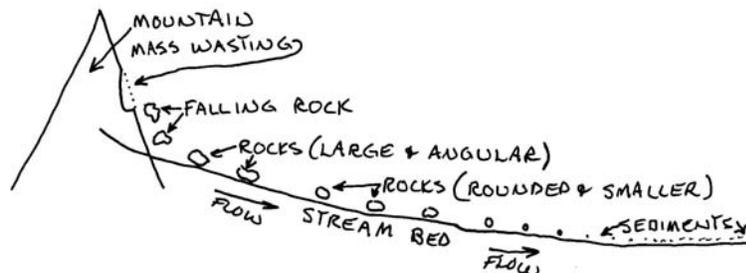


Types: There are three types of mass wasting: 1) Flows: Flows are very liquid like and descend down slopes at a fast rate of speed. Flows usually contain debris like sediments, ash, soils and vegetation. An example of a flow would be the massive mud, ash, debris and even houses that flowed down the valleys and streams after Mt. St. Helens erupted. 2) Slumps/Slides are movement of a relatively coherent descending mass along one or more well-defined surfaces. The Dorrington slide is a good example of a slide. 3) Falls are when the material free falls away from a cliff. This is going on in Yosemite Nation Park quite often because of the sheer cliffs that were cut away by the glaciers.

Definition of a Stream: A stream is a moving body of water, confined in a channel and running down hill under the influence of gravity.

Streams occur when snow melts, it rains, or water just comes out of the ground as a spring. Wherever it comes from gravity collects it in a low spot and runs it down hill. As long as it is flowing, a stream can be a trickle, or as big as the Missouri river. Stream velocity is the key factor in erosion, transportation, and deposition. Velocity is controlled by several factors: grade in which it is traversing; the shape of the channel; and roughness of the terrain (i.e. bottom of the streambed). The higher the stream is, as in the mountains, the steeper the gradient tends to be, however, the water doesn't always run faster. As you get down stream, like the delta, the stream flattens out, but the roughness changes since the grain size is smaller, and tends to run (counter intuitively) faster. Streams transport rock and other material from the higher areas to the lowlands. The material usually starts out large and angular shaped. As the rocks tumble down stream they erode in to smaller rocks and more rounded and eventually turn into fine sediments by the time they lowlands.

Connections & Significance: Mass wasting produces the rock materials and is carried to the streams by gravity. Once in the material is in the stream, gravity is aided by water to further transport the material down stream. As the stream transports the material downhill, the process of erosion affects the rock material. The rocks are pounding, rolling, grinding and falling their way down stream. They continue to break up into smaller and then smaller pieces. Once the velocity of the stream is not great enough to transport the material gravity will then completely take over and deposit the material. The deposits of rock are larger in size at the higher elevation and continue to get smaller till they reach the lowlands. By the time they reach the ocean they are silt size. At this point the sediments can keep traveling till they reach an ocean trench where they can be recycled into magma. The magma can resurface to form new mountains and the whole process starts all over again. Both contribute hazards to property and life. Landslides cost \$1-2 billion dollars per year in the U.S. annually and between 25 and 50 deaths per year. Flooding costs roughly 50-125 deaths per year and \$2.5 billion per year in damages. These numbers alone warrant continued research into these two areas of earth science.



Conclusion: In general, mass wasting is the process whereby earth materials move downslope due to the force of gravity. Other factors such as water and rock strength can play a role. Types of mass wasting include: 1) falls; 2) slumps/slides; and 3) flows. They are generally considered to be hillslope processes under the realm of geomorphology and are important to study in order to limit their hazards. Streams are bodies of water moving in channels (large and small). They are considered part of the hydrologic cycle and are important to study in order to understand flooding hazards, water supply budgets, pollution pathways, and watershed and ecosystem health. Hillslopes input sediment into streams systems and the streams carry the sediment downward, depositing it along their lengths in river, beach, and coastal systems.