Bed or Traction Load Encyclopedia Article

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Bed or Traction Load

Bed load, sometimes referred to as traction load, is the material that is transported by sliding, rolling, and saltating (skipping) along the bed of a stream. Particles comprising bed load can range in size from **sand** to boulders. The movement of bed load is responsible for **bedforms** that change in time and space along a stream bed.

Particles along a stream bed begin to move when the shear stress exerted by the flowing **water** exceeds a critical value. The critical shear stress depends on a combination of the particle diameter, the slope of the stream channel, the difference between the density of individual particles and that of water (particle buoyancy), and the degree to which the particles are packed together. As a result, particles of different mineralogical composition and size will have different critical shear stresses. Heavy **minerals** such as gold can be concentrated in stream beds because gold nuggets or flakes are left behind while lighter particles move around them. Likewise, small particles may move while large particles of the same mineral or **rock** type are left in place. Water density is proportional to the **suspended load** being carried. Muddy water high in suspended sediment will therefore increase the particle buoyancy and thereby reduce the critical shear stress required to move particles of a given size and composition.

The shear stress exerted by the flowing water, which is proportional to both water depth and stream channel slope, also controls the movement of bed load. Large or heavy particles that have high critical shear stress values may move as bed load when the water is unusually deep during infrequent **floods** and remain stationary between those times.

Once a particle begins to move, the current above the bed may be strong enough to lift it off the bed and into the flowing water. When the entire weight of a particle is borne by water instead of other particles beneath it, that particle ceases to be part of the bed load and becomes part of the suspended load. Conversely, if the current slows a particle may fall out of suspension and become part of the bed load. The distinction between bed load and suspended load in a stream can therefore change continuously through time.

See Also

Erosion; Rivers; Saltation; Sedimentation; Stream Valleys, Channels, and Floodplains