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Geology

* River Base Level
  + Base Level
    - The lowest point to which a river can erode (where it ends)
* Sediment and Mineral Load in a River
  + Rivers carry water and sediment
  + Higher energy (higher gradient) sections carry larger particles
  + Bed Load (large particles on the bottom)
  + Suspended load (small particles in the water)
    - clay
  + Dissolved load (minerals in the water
    - carbonate, sulfate, bicarbonate, Ca, Na
* River velocity
  + Discharge is the volume of water moving by a location (cross section) over a time
  + Cubic feet per second
  + Q = width x depth x velocity
  + If q stays the same and width or depth decrease, the velocity must increase
* Urbanization
  + More roofs, pavement means less infiltration and more run off
  + floods are a function of rain-fall and run-off - urbanization changes this
  + Storm water runoff systems designed to handle the extra flow
  + Las Vegas in bottom of a basin, urbanization makes things worse
* 100 Year Flood
  + A flood that has a 1% chance of ocuring every year
* Coastal Hazards and Coastal Processes
  + Us has 93,000 miles of coast line
  + 75% of us population lives in coastal states
  + Atlantic and Gulf coasts have wide continental margins with wide beaches and sandy barrier islands.
  + West coasts are narrower, steeper and rocky
  + Mississippi carries huge volumes of sediment into the gulf and this is distributed by coastal processes.
* Coastal processes
  + Waves
    - caused by the wind
  + Friction between faster wind and slower water transfers energy
  + Greater wind = bigger waves
  + Wind duration = more energy
  + Distance wind blows across the surface - fetch - big fetch = big waves
* Beaches
  + Long shore drift - caused by waves striking beach at an angle, part of energy directed along- not straight into beach
  + Up and down washing also causes sand to migrate
  + Jetty used to manage sand
* Rip Currents
  + Currents related to waves and water running off the beach
  + Current direction out to sea
  + Stronger than most swimmers
  + Swim parallel to shore and away from current
* Coastal Erosion
  + Philosophy
    - continue to build in hazardous coastal areas and construct walls etc., to prevent erosion - typical development - protect the property
    - Avoid inappropriate development. Beaches belong to everyone, not just those with lots of money, development is expendable
    - State of Hawaii adopted second option, all beaches public no one can deny access to beach