

The Benefits of Natural Flow Regimes

Stream structure—channel, riparian corridor, floodplain, transitional upland fringe

Equilibrium is the relationship of sediment size and discharge, stream flow and stream slope. The variation in hydrology is key to regulating biological productivity and diversity. Hydrology is affected by urbanization. The riparian corridor is on the edges of the stream channel. The floodplain is that part of adjacent land that floods at regular intervals, and the transitional upland fringe that part of the upland on the edge of the floodplain and adjacent land. The floodplain can be hydrologic (if it is inundated two thirds of the years.) and/or topographic (the land inundated at peak flooding). Floodplains can have a variety of terrace profiles. Floodplain landforms include: meander stroll, chute, oxbow, clay plug, oxbow lakes, natural levees, splays and back swamps.

The flood-pulse concept describes the relationship of living things to patterns of flooding.

Streamflow is the volume of water moving over a fixed point for a fixed interval. Most physical characteristics of the channel are influenced by the equilibrium and flow. **The channel form along the corridor changes as the stream moves through different longitudinal zones, and provides different habitats. Streams can be single or multiple.** Ephemeral streams flow after precipitation. Intermittent streams have seasonal flow patterns and perennial streams flow continuously. Sinuosity is less at the headwaters and greater as the river widens.

The river continuum concept describes the relationships across the watershed, floodplain and stream, from the headwaters to the mouth. Healthy ecosystems require some degree of disturbance—varying flow as well as other natural events. Amounts of sediment and organic matter, temperature, nutrient balance and the organisms in the water all affect the ecosystems.

Freshwater ecosystems are dynamic and require variation to maintain viability and resilience. Variability in flow influences the size and age structure of populations, the presence of rare and specialized species, the interactions of species with each other and ecosystem processes. The structure and functioning of aquatic ecosystems is regulated by flow rate and paths of rain, sediment and organic input, temperature, dissolved oxygen and light characteristics, nutrient and chemical conditions and the plant and animal assemblage. Light, oxygen and temperature vary along the water flow from headwaters to mouth. High variability in the plant and animal community provided redundancy for

ecosystem needs. Stress or simplification of the complexity can impair the sustainability of intact freshwater ecosystems.

Healthy freshwater ecosystems require variability in water flow which influences the size of populations, the presence of rare species and the interactions of species with each other and the environment. Water links upstream to downstream, streams channels to floodplains and riparian areas, and surface to ground water. Nutrient and chemical conditions reflect local climate, substrate composition, vegetation type and topography. We sustain aquatic ecosystems with naturally varying flows, adequate sediment and organic input, natural fluctuations in heat, light and clean water and naturally diverse plant communities. We need to recognize that the parts of the ecosystem are not isolated.

Humans alter the natural rates of sediment and organic supply with poor agricultural practice, logging, construction and dams.

Take away—Natural flow regimes have multiple ecosystem services and disrupting them often has unexpected consequences. The natural flow regimes also reflect the conditions in which the components of the ecosystem developed and can sustain themselves.