

Dynamics of an Urban Stream Ecosystem

Urban development may have significant impacts on stream ecosystems that are often obvious to the casual observer.



Hydrology: Urban development alters the movement of water through a watershed. Impervious surfaces (e.g., roads, parking lots, buildings) restrict the infiltration of precipitation into groundwater and the construction of artificial drainage systems (e.g., storm drains) quickly move runoff to the stream. Rapid runoff and high stream-flow increase the power or energy of the water flowing in the stream, which can deepen or widen stream channels and cause streambank erosion.



Water chemistry: Urban development may increase the inputs of complex chemical mixtures typically found in runoff from impervious surfaces, industrial and suburban areas. These mixtures may include pesticides, nutrients, and hydrocarbons that are known to have deleterious biological effects.



Physical habitat: Urban development can lead to removal of vegetation near a stream, which increases the amount of light reaching the stream and increases the water temperature. Streamflow modification associated with urban development drives changes in stream habitat, including excessive flow velocities that erode the streambanks and scour the streambed.



fathead minnow

common carp

Native fish communities generally become less diverse with increased urban development. Common carp (a non-native species) prefer large bodies of slow or standing water and soft sediment. The fathead minnow is tolerant of turbid, low-oxygen water.



Cladophora

blue-green algae

Algae that are tolerant of pollution may increase in abundance with increased urban development. Diatom algae tend to decrease, and non-diatom algae tend to increase, with urbanization. Some non-diatom algae, such as blue-green algae (also known as Cyanobacteria) or the green algae *Cladophora*, may increase in abundance to nuisance levels in the sunlight- and nutrient-rich conditions of many urban streams – appearing as long woolly strands or green ‘paint’ on the surface of the water and rocks.



leech

isopod

Macroinvertebrates that are sensitive to pollution may be lost as a watershed becomes urbanized. More-tolerant organisms – such as leeches and isopods – may increase in abundance. Leeches are most common in warm, protected shallows where there is little disturbance from currents. Isopods are tolerant of relatively low dissolved oxygen levels.

Illustration by Frank Ippolito