Biodiversity in a Suburban Environment



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Introduction

In recent years, land development in suburban areas has been increasing at an astonishing rate. Throughout the country, wild areas are being cleared to make way for new residential and commercial developments. This trend is especially prevalent in the Puget Sound area. From 1990 to 1997, the population of King, Pierce, and Snohomish counties has grown by 12%, or 310,000 people. [9] By simply taking a walk on a hiking trail located near the edge of a new development or driving in the outskirts of formerly-rural town, such as North bend, one can see the effects of explosive growth.

Although growth usually has positive results on a region's local economy, it can have devastating results on the local environment. Most of the new developments in the Puget Sound area are pushing into the Cascade foothills region; an area with some of the most diverse flora and fauna in the country. [2] The construction of buildings and roads destroys important habitat for many species of plants and animals, reducing biodiversity. Carefully managing suburban growth, and implementing engineering solutions can help alleviate some of the problems associated with over developing a landscape.

Biodiversity and its Importance

The term "biodiversity" generally refers to the variety of wildlife found in a particular area. However, biodiversity means much more than the number of species living in an area. It is not so much about how many organisms are living in a region, but *which* organisms are living in an area. For example, when a foreign species is introduced to an area, the native ecosystem is upset, which can harm native flora and fauna, or even drive it to extinction. In this case, biodiversity on a global scale has been reduced. [8]

Arguably, biodiversity is important to maintain for a countless number of reasons. Nature is complex, and no matter how much we study it, we will never fully understand all of the processes of nature. [2] By preserving biodiversity, we insure that we are not destroying a part of nature that could prove to be beneficial to us.[8] In addition, a biodiverse environment is simply more pleasant to live in. The biodiversity of the Pacific Northwest is part of what makes it such a nice place to reside.

Effects on Waterways

Of all of the affects of urban development has on the environment, the one that most effects humans as well as wild and plant life is the changes to drainage basin hydrology. The roads, roofs and parking lots that accompany development whisk runoff directly to lakes and streams. Trees and shrubs no longer exist to collect and disperse precipitation and grading of the soil obliterates places where puddles would normally form.[3] Water that would normally seep into the ground will flow directly into a waterway. The result is that heavy rainfall can result in severe flooding in nearby and downstream waterways. [13]

This, in turn, causes erosion problems. Throughout the Puget Sound Region, damaging landslides are occurring with even a moderate amount of rainfall. [10] These slides are causing immense environmental damage, as well as causing a significant amount of property damage. [10]

In addition to creating more runoff, urban developments also tend to clear waterways of trees and other vegetation. The clearing of vegetation eliminates a source of food and exposes shaded areas that are valuable to aquatic life. The absence of vegetation also makes the adjacent soil unstable, compounding erosion problems.[3]



Figure 1: Complete removal of Streamside vegetation at McAleer creek in Lake Forest Park, WA

Due to the damaging effects of runoff form developed areas, King County, and several other counties, require that developers build devices to alleviate excessive storm runoff during heavy precipitation. The most widespread method of curbing runoff is the use of water-detention ponds and flood-control structures. [13] However, current standards mandate that the detention ponds be designed to accommodate two times the 10-year flood, as recorded before development. [6]. Due to the increased flooding due to



Figure 2: Flood control structure in Shoreline, WA. Note the lines on the far wing wall, which indicate that the structure is frequently overtopped.

developments, these structures are frequently overtopped. [3] Also, while detention ponds do decrease peak flows, they do so by increasing the duration of a flood, which causes additional erosion.

The combined effect of increased runoff and the presence of various pollutants in storm runoff can have drastic consequences on aquatic life. Pollutants can change the pH of a waterway and nutrients reduce the amount of dissolved oxygen available to aquatic animals. Floods destroy vital habitat and cause sediment accumulation in streams and lakes. [13] The result is a loss of biodiversity in one of the most biodiverse and fragile part of the ecosystem.

Habitat Loss

Many people consider logging to be the most serious threat to wildlife habitat. While logging does have drastic consequences to many species, such as the spotted owl [12], it does not cause nearly the amount of damage that suburban development causes. A tract of land that has been logged and replanted will generally be habitable to most of the native species within a decade. In developed areas, the native flora and fauna will never have a chance to recover. Also, logging activities are generally less concentrated than construction activities, meaning that there will be an unaffected tract of land adjacent to a logged tract. Currently, there are 20 species of plants classified as "endangered," "threatened," or "sensitive" that make their home in the Puget Sound Lowlands. [12] Human occupation of habitat is the single most important factor in overall species endangerment. [5]

Recent studies have shown that dead logs and snags serve a vital role for more that 80 species of birds, mammals, reptiles, and amphibians in Washington State. [4] In suburban developments, dead plant material is hauled away, even in greenbelts designed specifically to provide habitat for displaced species.



Figure 3: Greenbelt in Shoreline, WA. Note the lack of underbrush and dead plant material.

Roads are especially harmful to most types of animals. A single road can become an impenetrable barrier to migration and feeding patterns of the local fauna. [8] Besides the obvious danger of animals becoming roadkill, a road leaves animals vulnerable to predators. Many animals will simply not go near a road because of the noise and exposure. [1]

In suburban areas, displaced animals are forced to interact with humans, often with deadly results. Even within the Seattle City limits, it is not unusual to have pets attacked or eaten by coyotes. Conversely, suburban environments bring species that are desirable to humans and are purposely introduced, such as ornamental trees and shrubs. The only species that can survive within developed areas are those which are able to adapt to the human landscape; pigeons and dandelions are good examples. While exotic species may appear attractive to humans, they do not represent the biodiverse ecosystem that once existed there. [8]

What can be done?

The responsibility of finding solutions to the problems of suburban development lies in the hands of engineers and politicians alike. Building better flood control structures would reduce the damaging effects of excessive runoff. Underpasses and culverts would help wildlife negotiate roads and highways. Encouraging the use of native species for landscaping purposes, and educating citizens about their new role in a sensitive ecosystem would also help to preserve biodiversity.

However, developers would be reluctant to implement these expensive solutions unless they were required by law. Therefore, improved regulations regarding allowable land-use practices would need to be instated and enforced. Specifically, regulations requiring continuous green belts, runoff abatement, encouragement of native species, and preserving vegetation near streams would help maintain biodiversity within a developed area.

Uncertainty

While biologists unanimously agree that excessive development reduces biodiversity significantly, there is disagreement over how much development is considered excessive. Some would argue whether preserving biodiversity is important at all. There are uncertainties about what regulations the government can constitutionally enforce. The US and state constitutions specifically prohibit the government from preventing businesses from starting or expanding. [7] As people become more aware of the importance and fragility of biodiversity, laws like the Endangered Species Act will be passed. The debate boils down to this: What is preserving biodiversity worth and what are we willing to sacrifice to preserve it.

Conclusions

Nature is a very complex process, one that we will never fully understand. We depend on nature for our very survival; therefore, it is in our best interests to preserve nature and its variety of life. It has been proven that destroying one part of nature can have drastic consequences on other parts of nature, such as the effects of increased runoff. By studying the impacts development has on the different aspects of nature, and using that knowledge in urban planning, we can minimize our impacts on biodiversity. By maintaining biodiversity on a local and global scale, we will improve the quality of life for all species, including humans.

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