

Assignment 1: ISCI 360

Group 7

March 22, 2018

Our model is inspired by our Week 5 Guest Lecturer, Daniel Roehr, and the reading “DRainscape to Create Green Cities.” Through Daniel Roehr’s lecture, it was established that the city of Vancouver has a major issue with our lack of green infrastructure. Green infrastructure functions to reduce and regulate the amount of runoff that accumulates in local streams and rivers. Runoff is the movement of water and any contaminants it may contain across the surface of soil. This occurs when irrigation, rain, or snow melt adds water to a soil surface at a rate that is faster than it can naturally enter the soil. This runoff poses serious issues to the area of Greater Vancouver. As Vancouver is a rain-heavy city, stormwater runoff is a real issue that impacts societal, economic, and environmental aspects of our city.

Why is runoff a problem? Runoff often picks up debris, chemicals, dirt, and other pollutants on its route, proceeding to flow into a stormwater sewer system or directly into our coastal waters. When this runoff is polluted, it results in adverse effects on our environment, aquatic system, land animals, and people. For instance, when the runoff enters our coastal waters, it carries sediment along with it. This sediment clouds our coastal water, hindering the growth of sea life. When this runoff contains excessive amount of nutrients, algae blooms proliferate and thrive. These algae blooms compete with the marine life for the oxygen needed for survival. Furthermore, litter and waste often accompany stormwater runoff into oceans and rivers. This debris can choke, suffocate, and seriously harm aquatic life. When our aquatic life is polluted with chemical and debris, the fish and sea creatures becomes ill. This directly affects land animals and people when these diseased fish are consumed.

This issue of stormwater runoff is seriously detrimental from environmental, societal, and economic perspectives. The model that we have created will help to present these issues along with the feedback loops that they create.

1. The issue of unregulated runoff from a societal perspective:

When stormwater runoff is left unregulated, it can flow into rivers and ocean systems at an alarmingly fast rate. This can result in flooding. Floods can be devastating, affecting our society in a variety of ways. Side effects such as property damage to homes and neighborhoods often result in displacement of individuals from their homes are a few of many consequences of floods. Powerful floods can wipe out crops and livestock, leaving farms in ruins. At times, floods can result in fatalities. All of these consequences can be traumatic for all individuals who are impacted by floods. It is clear that stormwater runoff poses a great issue to society. In our InsightMaker, you can see the amount of drinking water is impacted through this issue of improper stormwater runoff mitigation. Under Inflow & Outflow Trends b/w Rivers and Groundwater/Aquifers,” it is shown how groundwater increases and then plateaus. This reflects how our drinking water is not infinite, and how we will eventually run out of drinking water if this issue persists.

2. The issue of unregulated runoff from an economic perspective:

Stormwater runoff can pose serious economic issues. When excess stormwater runoff causes floods, the result is often extreme water damage. Homes are left in ruins, buildings can be in shambles, and roads can be rendered unsafe. This damage can be extremely expensive to repair, and areas that suffer from frequent flooding will discourage the government from offering investments and aid. Furthermore, properties that have suffered multiple accounts of water damage and waterlogged road systems will decrease in property value. When runoff erodes soil from farms, the prosperity of the crops is lowered along with the profit. Through this, it is clear that runoff can have devastating consequences on our economy. This can be seen in our InsightMaker under “Economic Trends.” Here, we can see that property value plummets due to the devastating consequences of improper stormwater runoff mitigation. Years after the plummet, however, we can see the slow increase of property value. This slow increase is due new investments being made in the property in the areas affected by the floods once again.

3. The issue of unregulated runoff from an environmental perspective:

Stormwater runoff creates a multitude of issues for our environment. Poorly regulated runoff due to impervious surfaces along with the resulting Urban Heated Island effect results in a higher instance of flooding due to excessive storm-water runoff as well as snowmelt . Runoff water also carries contaminants such as chemicals from agriculturally grown crops, pesticides, and nutrients too. When this contaminated runoff enters streams and rivers, our aquatic life becomes exposed to these hazards, which typically result in detrimental after-effects. The biodiversity of our marine ecosystem can be greatly impacted by this pollution with possible risk of extinctions of smaller organism populations. In our InsightMaker, under “Inflow & Outflow Trends b/w Rivers and Groundwater/Aquifers,” the water released into rivers, volume of water in a river, and volume of water in ground all increase and then steadily plateau. This is due to the fact that groundwater is not infinite in supply, and as this issue of poor mitigation of stormwater persists, we will run out of our supply of groundwater. Furthermore, under “Trends for Green Homes effect on UHI effect and Snowmelt/Snowpacks,” we can see that the snowpacks are decreasing due to the increase in temperature.

It is clear that the issue of poorly regulated stormwater runoff can result in disastrous consequences. This creates issues that are detrimental from societal, environmental, and economic aspects. Greater Vancouver’s lack of green infrastructure contributes greatly to this issue. Our model will demonstrate how this issue of unregulated runoff in Vancouver negatively impacts our society, economy, and our environment.