Flood paper essay sample

[Environment](), [Water]()

A flood is an overflow of water that submerges land which is normally dry.[1] The European Union (EU) Floods Directive defines a flood as a covering by water of land not normally covered by water.[2] In the sense of " flowing water", the word may also be applied to the inflow of thetide. Flooding may occur as an overflow of water from water bodies, such as a river or lake, in which the water overtops or breaks levees, resulting in some of that water escaping its usual boundaries,[3] or it may occur due to an accumulation of rainwater on saturated ground in an areal flood. While the size of a lake or other body of water will vary with seasonal changes in precipitation and snow melt, these changes in size are unlikely to be considered significant unless they flood property or drown domestic animals.

Floods can also occur in rivers when the flow rate exceeds the capacity of the river channel, particularly at bends or meanders in the waterway. Floods often cause damage to homes and businesses if they are in the natural flood plains of rivers. While riverine flood damage can be eliminated by moving away from rivers and other bodies of water, people have traditionally lived and worked by rivers because the land is usually flat and fertile and because rivers provide easy travel and access to commerce and industry. Some floods develop slowly, while others such as flash floods, can develop in just a few minutes and without visible signs of rain. Additionally, floods can be local, impacting a neighbourhood or community, or very large, affecting entire river basins. ——————————————————-

Etymology[edit source | editbeta]

The word “ flood” comes from the Old English flod, a word common to Germanic languages (compare German Flut, Dutch vloed from the same root as is seen in flow, float; also compare with Latin fluctus, flumen). Deluge myths aremythical stories of a great flood sent by a deity or deities to destroy civilization as an act of divine retribution, and they are featured in the mythology of many cultures. ———————————————————-

Principal types and causes[edit source | editbeta]

Areal (rainfall related)[edit source | editbeta]

Floods can happen on flat or low-lying areas when the ground is saturated and water either cannot run off or cannot run off quickly enough to stop accumulating. This may be followed by a river flood as water moves away from the floodplain into local rivers and streams. Floods can also occur if water falls on an impermeable surface, such as concrete, paving or frozen ground, and cannot rapidly dissipate into the ground. Localised heavy rain from a series of storms moving over the same area can cause areal flash flooding when the rate of rainfall exceeds the drainage capacity of the area. When this occurs on tilled fields, it can result in a muddy floodwhere sediments are picked up by run off and carried as suspended matter or bed load. Riverine[edit source | editbeta]

River flows may rise to floods levels at different rates, from a few minutes to several weeks, depending on the type of river and the source of the increased flow. Slow rising floods most commonly occur in large rivers with large catchment areas. The increase in flow may be the result of sustained rainfall, rapid snow melt, monsoons, ortropical cyclones. Localised flooding may be caused or exacerbated by drainage obstructions such as landslides, ice, or debris.

Rapid flooding events, including flash floods, more often occur on smaller rivers, rivers with steep valleys or rivers that flow for much of their length over impermeable terrain. The cause may be localised convective precipitation(intense thunderstorms) or sudden release from an upstream impoundment created behind a dam, landslide, or glacier. Dam-building beavers can flood low-lying urban and ruralareas, occasionally causing some damage. Estuarine and coastal[edit source | editbeta]

Flooding in estuaries is commonly caused by a combination of sea tidal surges caused by winds and lowbarometric pressure, and they may be exacerbated by high upstream river flow. Coastal areas may be flooded by storm events at sea, resulting in waves over-topping defences or in severe cases by tsunami or tropical cyclones. A storm surge, from either a tropical cyclone or an extratropical cyclone, falls within this category.
Catastrophic[edit source | editbeta]

Catastrophic flooding is usually associated with major infrastructure failures such as the collapse of adam, but they may also be caused by damage sustained in an earthquake or volcanic eruption. Seeoutburst flood.
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Effects[edit source | editbeta]

Primary effects[edit source | editbeta]

The primary effects of flooding include loss of life, damage to buildings and other structures, including bridges, sewerage systems, roadways, and canals. Infrastructure damage also frequently damages power transmission and sometimes power generation, which then has knock-on effects caused by the loss of power. This includes loss of drinking water treatment and water supply, which may result in loss of drinking water or severe water contamination. It may also cause the loss of sewage disposal facilities.

Lack of clean water combined with human sewage in the flood waters raises the risk of waterborne diseases, which can include typhoid, giardia, cryptosporidium, cholera and many other diseases depending upon the location of the flood. Damage to roads and transport infrastructure may make it difficult to mobilise aid to those affected or to provide emergency health treatment. Flood waters typically inundate farm land, making the land unworkable and preventing crops from being planted or harvested, which can lead to shortages of food both for humans and farm animals. Entire harvests for a country can be lost in extreme flood circumstances. Some tree species may not survive prolonged flooding of their root systems [4] Secondary and long-term effects[edit source | editbeta]

Economic hardship due to a temporary decline in tourism, rebuilding costs, or food shortages leading to price increases is a common after-effect of severe flooding. The impact on those affected may cause psychological damage to those affected, in particular where deaths, serious injuries and loss of property occur. ——————————————————-

Flood forecasting[edit source | editbeta]

Anticipating floods before they occur allows for precautions to be taken and people to be warned [5] so that they can be prepared in advance for flooding conditions. For example, farmers can remove animals from low-lying areas and utility services can put in place emergency provisions to re-route services if needed. Emergency services can also make provisions to have enough resources available ahead of time to respond to emergencies as they occur. In order to make the most accurate flood forecasts for waterways, it is best to have a long time-series of historical data that relates stream flows to measured past rainfall events.[6] Coupling this historical information with real-time knowledge about volumetric capacity in catchment areas, such as spare capacity in reservoirs, ground-water levels, and the degree of saturation of area aquifers is also needed in order to make the most accurate flood forecasts.

Radar estimates of rainfall and general weather forecasting techniques are also important components of good flood forecasting. In areas where good quality data is available, the intensity and height of a flood can be predicted with fairly good accuracy and plenty of lead time. The output of a flood forecast is typically a maximum expected water level and the likely time of its arrival at key locations along a waterway,[7] and it also may allow for the computation of the likely statistical return period of a flood.

In many developed countries, urban areas at risk of flooding are protected against a 100-year flood – that is a flood that has a probability of around 63% of occurring in any 100 year period of time. According to the U. S. National Weather Service (NWS) Northeast River Forecast Center (RFC) inTaunton, Massachusetts, a general rule-of-thumb for flood forecasting in urban areas is that it takes at least 1 inch (25 mm) of rainfall in around an hour's time in order to start significant ponding of water onimpermeable surfaces. Many NWS RFCs routinely issue Flash Flood Guidance and Headwater Guidance, which indicate the general amount of rainfall that would need to fall in a short period of time in order to cause flash flooding or flooding on larger water basins.[8] ———————————————————-

Control[edit source | editbeta]

Main article: Flood control

In many countries around the world, waterways prone to floods are often carefully managed. Defenses such as detention basins, levees,[9] bunds, reservoirs, and weirs are used to prevent waterways from overflowing their banks. When these defences fail, emergency measures such as sandbags or portable inflatable tubes are often used to try and stem flooding. Coastal flooding has been addressed in portions of Europe and the Americas with coastal defences, such as sea walls, beach nourishment, and barrier islands. In the riparian zone near rivers and streams, erosion control measures can be taken to try and slow down or reverse the natural forces that cause many waterways to meander over long periods of time. Flood controls, such as dams, can be built and maintained over time to try and reduce the occurrence and severity of floods as well. In the USA, the U. S. Army Corps of Engineers maintains a network of such flood control dams.

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Benefits[edit source | editbeta]

Floods (in particular more frequent or smaller floods) can also bring many benefits, such as rechargingground water, making soil more fertile and increasing nutrients in some soils. Flood waters provide much needed water resources in arid and semi-arid regions where precipitation can be very unevenly distributed throughout the year. Freshwater floods particularly play an important role in maintainingecosystems in river corridors and are a key factor in maintaining floodplain biodiversity.[10]

Flooding can spread nutrients to lakes and rivers, which can lead to increased biomass and improved fisheriesfor a few years. For some fish species, an inundated floodplain may form a highly suitable location for spawning with few predators and enhanced levels of nutrients or food.[11] Fish, such as the weather fish, make use of floods in order to reach new habitats. Bird populations may also profit from the boost in food production caused by flooding.[12] Periodic flooding was essential to the well-being of ancient communities along the Tigris-EuphratesRivers, the Nile River, the Indus River, the Ganges and the Yellow River among others. The viability ofhydropower, a renewable source of energy, is also higher in flood prone regions. ——————————————————-

Computer modelling[edit source | editbeta]

While flood computer modelling is a fairly recent practice, attempts to understand and manage the mechanisms at work in floodplains have been made for at least six millennia.[13] Recent developments in computational flood modelling have enabled engineers to step away from the tried and tested “ hold or break” approach and its tendency to promote overly engineered structures. Various computational flood models have been developed in recent years; either 1D models (flood levels measured in thechannel) or 2D models (variable flood depths measured across the extent of a floodplain). HEC-RAS,[14] the Hydraulic Engineering Centre model, is currently among the most popular computer models, if only because it is available free of charge. Other models such as TUFLOW[15] combine 1D and 2D components to derive flood depths across both river channels and the entire floodplain.

To date, the focus of computer modelling has primarily been on mapping tidal and fluvial flood events, but the 2007 flood events in the UK have shifted the emphasis there onto the impact of surface water flooding.[16] In the United States, an integrated approach to real-time hydrologic computer modelling utilizes observed data from the U. S. Geological Survey (USGS), [17] various cooperative observing networks,[18]various automated weather sensors, the NOAA National Operational Hydrologic Remote Sensing Center (NOHRSC),[19] various hydroelectric companies, etc. combined with quantitative precipitation forecasts (QPF) of expected rainfall and/or snow melt to generate daily or as-needed hydrologic forecasts.[20] The NWS also cooperates with Environment Canada on hydrologic forecasts that affect both the USA and Canada, like in the area of the Saint Lawrence Seaway.