**Ecosystem Type: LAKES AND PONDS**

**Category: Natural Hazard Mitigation**

1. **Materials**

***Supplier*** – Lakes and ponds have resources that mitigate natural hazards that might occur from incidences like flood events and climate change. For example, these ecosystems act as a sink for nutrient interception (Cereghino et al., 2008). Lakes are able to trap sediment wastes that are often carried along in floods, intercepting nutrients like carbon and nitrogen which can exacerbate the effects from natural hazards like climate change (Kling, Kipphut, and Miller, 1991).

***Driver*** – Lakes and ponds are highly influenced by the effects that natural hazards cause like soil erosion from flooding (Cui et al., 2013), or intensified precipitation and heat extremes from climate change. These effects are exacerbated by increasing impervious surfaces. Impervious surfaces can increase the amount of runoff flowing into a lake or pond. Higher discharge into lakes can lead to changes in the physical habitat of the ecosystem (Patz et al., 2008), which impacts the benefits that these ecosystems provide to mitigate natural hazards. For example, intensified discharge may lead to a decrease in the overall residence time water has in a lake if the habitat overflows, reducing a lake’s service of slowing down water to prevent flooding and to capture sediment that contains nutrients that could turn into greenhouse gas emissions (e.g., carbon, nitrogen).

***Demander*** – not applicable

1. **Nutrition**

***Supplier*** – not applicable

***Driver*** -not applicable

***Demander*** - not applicable

1. **Energy**

***Supplier*** – not applicable

***Driver*** – not applicable

***Demander*** – not applicable

1. **Mediation of Waste, Toxics, and Other Nuisances**

***Supplier*** – Lakes and ponds mediate wastes generated from natural hazards like flooding (e.g., sediment and bacterial loading). For example, increased precipitation rates cause a greater potential for flooding (Patz et al., 2008). The increased flooding can force sewer overflows into lakes, which carries with it waterborne diseases and other wastes attached to sediments (Patz et al., 2008). Lakes can help slow down the flooding to allow for sediments to settle, preventing the bacteria from entering adjacent waterways that may impact downstream properties.

***Driver*** – The effects from natural hazards like soil erosion from flooding (Cui et al., 2013) and intensified precipitation from climate change are exacerbated by increasing impervious surfaces. Impervious surfaces can increase the amount of runoff flowing into a lake or pond, which may reduce the benefits that these ecosystems provide. For example, intensified discharge can stimulate a greater number of combined sewer overflows (Patz et al., 2008), increasing the amount of contaminated water flowing into these ecosystems. This can lead to flooding into adjacent ecosystems before the lake captures bacteria because it may fill over capacity.

***Demander*** – not applicable

1. **Mediation of Flows**

***Supplier*** – Lakes and ponds mitigate the effects from natural hazards such as flooding and drought because they mediate the flow of water and sediment. These ecosystems intercept rainfall (Cereghino et al., 2014), which is both helpful to reduce the impact rain contributes to flooding as well as maintaining a water supply during periods of drought. Additionally, floodwaters that carry sediments from erosion can be controlled by lakes (Cui et al., 2013), which prevents damage to adjacent and downstream properties after a flood event.

***Driver*** – The effects from natural hazards like soil erosion from flooding (Cui et al., 2013) and intensified precipitation from climate change are exacerbated by increasing impervious surfaces. Impervious surfaces can increase the amount of runoff flowing into a lake or pond, which may reduce the benefits that these ecosystems provide. For example, intensified discharge can stimulate more runoff, increasing the amount of water flowing into these ecosystems (Patz et al., 2008). This can lead to flooding into adjacent ecosystems because the lake may fill over capacity. If the lake overflows into adjacent properties, then it may not have captured wastes from the flood (e.g., sediment).

***Demander*** – not applicable

1. **Maintenance of Physical, Chemical, and Biological Indicators**

***Supplier*** – Ponds and lakes can mitigate the effects of natural hazards by maintaining the physical, chemical, and biological structure of water and the nearby habitats. For example, flood events can carry nutrients with it such as phosphorous and nitrogen, which can negatively impact croplands and downstream habitats. Aquatic plants in lakes can capture phosphorous and nitrogen when these nutrients are attached to sediments (Thiebaut, 2008). This can help maintain the water quality of flooding onto other ecosystems and provide of sink of nutrients available for crop production.

***Driver*** – Flood events can impact the amount of water going into the lakes or ponds, and ultimately impact its ability to mediate pollutants. The effects of flooding will be exacerbated by increased impervious surfaces (Brody et al., 2007). Greater runoff caused by impervious surfaces may cause lakes to overflow into adjacent and downstream habitats before sediment is allowed to settle for aquatic plants to capture nutrients. Not only will the nutrients be lost to waterways rather for available use in crop production, the excess nutrients degrade downstream water quality, which can affect drinking water sources.

***Demander*** – not applicable

1. **Spiritual, Symbolic, Religious, and Social Experiences**

***Supplier*** – not applicable

***Driver*** – not applicable

***Demander*** – not applicable

1. **Physical and Intellectual Interactions w/ Biota, Ecosystems, and Land/Seascapes**

***Supplier*** – not applicable

***Driver*** – not applicable

***Demander*** - not applicable

**Sources:**

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