**Ecosystem Type: LAKES AND PONDS**

**Category: Recreation, Culture, and Aesthetics**

1. **Materials**

***Supplier*** – Lakes and ponds provide materials for recreation, culture, and aesthetics. These ecosystems can be used for activities like fishing (Ball and Tousignant, 1996; Lynch et al., 2016), swimming, and boating (Lindeberg and Albercook, 2000). They can also be enjoyed along hiking trails or adjacent to home owners (Gonzalez-Abraham et al., 2007). Additionally, the water and aquatic species in these ecosystems can be extracted for recreational, social, and cultural activities (Lynch et al., 2016).

***Driver*** – Nutrients that cause eutrophication in a lake or pond, such as nitrogen or phosphorous, increase the health risks of using the ecosystem’s materials for recreation (Dodds et al., 2008). These nutrients can increase because of changes in water use and adjacent land cover. For example, impervious surfaces intensify the effects of greater storm events, such as increasing runoff rates, which leads to a decrease in the overall residence time for sediments and nutrients flowing into the reservoir (Verstraeten and Poesen, 2000). A shorter residence time limits the lake or pond’s ability to capture and trap these wastes from flowing into adjacent waterways that are used for recreational activities.

***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 can help maintain the cleanliness of connected downstream waterways enjoyed recreationally, culturally, or aesthetically because they have the ability to intercept and trap sediment wastes (Cereghino et al., 2008). These sediments may carry with them toxics like chemicals (Arain et al., 2008), by-products of manufacturing wastes (Czuczwa, Niessen, and Hies, 1985), or bacteria (Gachter, Meyer, and Mares, 1988). One study found that by-products from combustion was a major source of pollutants trapped on lake sediments (Czuczwa, Niessen, and Hies, 1985).

***Driver*** – The ability for lakes and ponds to mediate wastes to support recreational activities is affected by changes in water use and adjacent land cover. Impervious surfaces intensify the effects of greater storm events, such as increasing runoff rates, which leads to a decrease in the overall residence time for sediments flowing into the reservoir (Verstraeten and Poesen, 2000). A shorter residence time limits the lake or pond’s ability to capture and trap these wastes from flowing into adjacent waterways that are used for recreational activities.

***Demander*** – not applicable

1. **Mediation of Flows**

***Supplier*** – Lakes and ponds support aquatic recreational and cultural activities because they help to mediate the flow of water. Lakes supply about 87% of the world’s surface freshwater available for use (Gleick, 1996). One reason these ecosystems account for this large supply is because of their ability to intercept and retain rainfall and runoff.

***Driver*** – The ability for lakes and ponds to retain water in order to supply a reservoir that can be enjoyed recreationally, culturally, and aesthetically can be affected by changes in water use and adjacent land cover. For example, a decrease in water supply within these reservoirs--due to excessive human consumption or droughts--can lead to a degradation of ecosystem (Paerl, Hall, and Calandrino, 2011).

***Demander*** – not applicable

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

***Supplier*** – Ponds and lakes are able to maintain the physical and biological structure of its reservoirs so they can be enjoyed recreationally, culturally, and aesthetically. For example, flood events that carry nutrients such as phosphorous and nitrogen, can be captured in the floodplains of lakes and ponds (Bonnet et al., 2008). This helps to maintain the water quality of the runoff entering the reservoirs, allowing for recreational and cultural activities to occur.

***Driver*** – Excess nutrients that enter lakes either from over-application or intensified runoff can affect the ability of these ecosystems to control its physical habitat that can support its overall aesthetics and recreational and cultural activities. The effects of flooding will be exacerbated by increased impervious surfaces (Brody et al., 2007). Greater runoff may carry with it higher loads of nutrients that will settle into these ecosystems. As a result, these nutrients (e.g., nitrogen and phosphorous) can cause eutrophication in a lake or pond because the ecosystem cannot manage an overabundance. This creates a health hazard for recreational activities to occur (Dodds et al., 2008).

***Demander*** – not applicable

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

***Supplier*** – Lakes and ponds are ecosystems that support spiritual and social experiences that happen during recreational and cultural activities. These ecosystems can be used for recreational activities like fishing (Ball and Tousignant, 1996; Lynch et al., 2016), swimming, and boating (Lindeberg and Albercook, 2000). They can also be enjoyed spiritually or socially for their aesthetics along hiking trails or while adjacent to home owners (Gonzalez-Abraham et al., 2007). Additionally, the water and aquatic species in these ecosystems can be extracted for cultural activities, such as how fishing defines a community because it is their main economic driver (Lynch et al., 2016).

***Driver*** – The quality of water and habitat that lakes provide for spiritual and social activities is influenced by changes with chemical and physical inputs (i.e., runoff, precipitation, nutrient loads). For example, impervious surfaces can have a negative impact on the lake’s overall water quality. One study found that the nutrient flux in Lake Tahoe increased greatly over the last 50 years since the surrounding community urbanized and converted land (Schuster and Grismer, 2004). This has increased algal production in the lake, affecting the quality of the available water. A degradation in water quality can affect the amount of tourism that takes place by these reservoirs because it can impose risks on health.

***Demander*** – not applicable

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

***Supplier*** – Lakes and ponds are used for educational experiences (Simmons, 1998). They also provide a habitat enjoyed for physical activities. These ecosystems can be used for fishing (Ball and Tousignant, 1996; Lynch et al., 2016), swimming, and boating (Lindeberg and Albercook, 2000). They can also be enjoyed along hiking trails or adjacent to home owners (Gonzalez-Abraham et al., 2007). Additionally, the water and aquatic species in these ecosystems can be extracted for recreational, social, and cultural activities (Lynch et al., 2016).

***Driver*** – The quality of water and habitat that lakes provide to supply an ecosystem that is interacted with by people is influenced by changes with chemical and physical inputs (i.e., runoff, precipitation). For example, impervious surfaces can have a negative impact on the lake’s overall water quality. One study found that the nutrient flux in Lake Tahoe increased greatly over the last 50 years since the surrounding community urbanized and converted land (Schuster and Grismer, 2004). This has increased algal production in the lake, affecting the quality of the available water. A degradation in quality can affect physical activities in the reservoir such as swimming because it may impose risks on health.

***Demander*** - not applicable

**Sources:**

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