**Ecosystem Type: GRASSLANDS**

**Category: Clean Air**

1. **Materials**

***Supplier*** – Studies have found that grasslands are important ecosystems that help capture air pollutants to reduce greenhouse gases (Heil et al., 1988; Osborne, 2007). Grasslands can absorb pollutants like carbon dioxide (Saigusa, Oikawa, and Liu, 1998).

***Driver*** – not applicable

***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*** – Grasslands can absorb and transform nitrogen for their own productivity, which can minimize the amount of nitrogen in the air (Mosier et al., 2002).

***Driver*** – not applicable

***Demander*** – not applicable

1. **Mediation of Flows**

***Supplier*** – Grasslands manage the flow of nitrogen emissions, such as ammonia, released to and absorbed from the air to help maintain clean air (Sutton et al., 2001). Disturbance of these ecosystems can cause greater nitrogen emissions into the atmosphere.

***Driver*** – not applicable

***Demander*** – not applicable

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

***Supplier*** – Grasslands sequester carbon, which helps reduce overall greenhouse gas pollutants in the atmosphere (Jongen et al., 2011).

***Driver*** – not applicable

***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:**

Heil, G.W. et al. (1988) Capture of atmospheric ammonium by grassland canopies. *Science, 239*(4841), 764-765. DOI: 10.1126/science.239.4841.764. [abstract only]

Jongen, M. et al. (2011) The effects of drought and timing of precipitation on the inter-annual variation in ecosystem-atmosphere exchange in a Mediterranean grassland. *Agricultural and Forest Meteorology, 151*(5), 595-606. <https://doi.org/10.1016/j.agrformet.2011.01.008>. [abstract only]

Mosier, A.R. et al. (2002) Soil-atmosphere exchange of CH4, CO2, NOX, and N2O in the Colorado shortgrass steppe under elevated CO2. *Plant and Soil, 240*(2), 201-211. <https://doi.org/10.1023/A:1015783801324>. [abstract only]

Osborne, C.P. (2007) Atmosphere, ecology and evolution: what drove the Miocene expansion of C4 grasslands? *Journal of Ecology, 96*(1), 35-45. DOI: 10.1111/j.1365-2745.2007.01323.x.

Saigusa, N., Oikawa, T., and Liu, S. (1998) Seasonal variations of the exchange of CO2 and H2O between a grassland and the atmosphere: An experimental study. *Agricultural and Forest Meteorology, 89*(2), 131-139. <https://doi.org/10.1016/S0168-1923(97)00060-9>. [abstract only]

Sutton, M.A. et al. (2001) Biosphere-atmosphere interactions of ammonia with grasslands: Experimental strategy and results from a new European initiative. *Plant and Soil, 228*(1), 131-145. <https://doi.org/10.1023/A:1004822100016>. [abstract only]