**Ecosystem Type: SCRUBLANDS/SHRUBLANDS**

**Category: Clean and Plentiful Waters**

1. **Materials**

***Supplier*** – Shrubland ecosystems provide materials that support clean air because they have the ability to accumulate atmospheric nitrogen deposition that occurs from expanding population (Zorba-Denison, 2006) as well as carbon (Feng et al., 2013).

***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*** – not applicable

***Driver*** – not applicable

***Demander*** – not applicable

1. **Mediation of Flows**

***Supplier*** – The root systems in shrubs can increase the flow of water through desert soils (Devitt and Smith, 2002).

***Driver*** – not applicable

***Demander*** – not applicable

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

***Supplier*** – For example, heathlands – a shrubland habitat on infertile, acidic soils containing low-growing woody vegetation – can maintain the quality of water by retaining nitrogen inputs (Wessel et al., 2004).

***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:**

Devitt, D.A. and Smith, S.D. (2002) Root channel macropores enhance downward movement of water in a Mojave Desert ecosystem. *Journal of Arid Environments, 50*(1), 99-108. <https://doi.org/10.1006/jare.2001.0853>. [abstract only]

Feng, X. et al. (2013) How ecological restoration alters ecosystem services: an analysis of carbon sequestration in China’s Loess Plateau. *Scientific Reports, 3,* 2846. DOI: 10.1038/srep02846.

Wessel, W.W. et al. (2004) A Qualitative Ecosystem Assessment for Different Shrublands in Western Europe under Impact of Climate Change. *Ecosystems, 7*(6), 662-671. <https://doi.org/10.1007/s10021-004-0219-3>. [abstract only]

Zorba-Denison, G. (2006) “Soil nutrient cycling and storage in semi-arid shrubland ecosystems exposed to high N deposition in Southern California.” Unpublished dissertation, California State University San Marcos, San Marcos, California. Retrieved from <http://csusm-dspace.calstate.edu/handle/10211.3/139979>. [abstract only]