**Ecosystem Type: AGROECOSYSTEMS**

**Category: Biodiversity Conservation**

1. **Materials**

***Supplier*** – Proper management of agroecosystems provide an environment that supports biodiversity conservation of aquatic and terrestrial species (Altieri, Funes-Monzote, and Petersen, 2012). These ecosystems are also home to many animal species that help to regulate and support the biodiversity of plant species (Solowey et al., 2013). For example, livestock on pastures control the presence of grasses and shrubs because they trample, thereby mix seedlings into the soil to regenerate species.

***Driver*** – Agroecosystems need nitrogen inputs to maintain its overall productivity (Janzen et al., 2003), which helps support species richness and diversity. The biodiversity of these ecosystems can also be affected by abiotic factors such as water scarcity and biotic factors such as excessive trampling from livestock and other animals (Descheemaeker et al., 2013; Solowey et al., 2013).

***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*** – Agroecosystems can mediate wastes, toxics, and other nuisances to support biodiversity conservation. For example, if managed properly these ecosystems can mediate the impacts of pests of potential disease when there is already a diverse group of species present (Jarvis et al., 2013). This helps to maintain the overall mix of plants as well as the health of the habitat and adjacent ecosystems.

***Driver*** – The presence of disease coupled with a uniform group of species and presence of disease can prevent agroecosystems from mediating nuisances and other wastes from spreading onto other habitats to support biodiversity conservation (Jarvis et al., 2013). Further, pollutants within water resources that flow onto these ecosystems can affect the biodiversity based on the water quality tolerance of the species (Lloyd et al., 2013).

***Demander*** – not applicable

1. **Mediation of Flows**

***Supplier*** – Agroecosystems contain resources that control the flow of water and sediment, maintaining the available supply of clean water that supports biodiversity conservation (Reicosky and Forcella, 1998; Dabney, Delgado, and Reeves, 2007). Since some of these habitats are closely managed by humans, they may contain drainage ditches that allow for water to flow back into downstream and other nearby waterways (Needelman et al., 2007), thus promoting the biodiversity of these ecosystems.

***Driver*** – Agroecosystems managed on poorly draining landscapes can affect this habitat’s ability to support biodiversity conservation on nearby ecosystems. For example, soils with poor drainage can have a negative effect on the biodiversity of crops that are sensitive to saturated conditions. Further, waters flowing from these ecosystems may have an excess of fertilizers because they could not retain them (Randall and Mulla, 2001; Coates et al., 2013). These wastes may then flow into other habitats affecting their biodiversity because of nutrient limitations.

***Demander*** – no literature review available at this time

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

***Supplier*** – Agroecosystems maintain the physical, chemical, and biological factors of the habitat to support biodiversity conservation. For example, terrestrial plants in these ecosystems control the availability of water and thus the soil moisture of habitats because they manage the biophysical process of cycling water (Coates et al., 2013). This occurs because the plants uptake water from the soil through its roots, which transpires back into the atmosphere. This process sustains the life cycle of species within the habitat because soil moisture is regulated.

***Driver*** – The biodiversity of agroecosystem species is affected by changes in nutrient inputs and water availability (Randall and Mulla, 2001; Lloyd et al., 2013). For example, over application of fertilizer on these ecosystems can be harmful for biodiversity because certain species are nutrient limited and can outcompete others. Further, water scarcity can limit the productivity of species on agroecosystems, which can degrade the physical habitat to support biodiversity (Barron, Tharme, and Herrero, 2013).

***Demander*** – not applicable

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

***Supplier*** – Certain cultures in developing countries still manage “traditional” agroecosystems-- systems where plants are heavily interacted with by humans. Communities are more likely to keep native crops and wild plants in their agroecosystems because of the impact they have had on their cultural identity. This allows for the genetic conservation of local species (Altieri, Anderson, and Merrick, 1987).

***Driver*** – Water scarcity and nutrient inputs of surrounding lands can affect the biodiversity of agroecosystems, which provide positive experiences. Further, these positive experiences can be drastically affected by changes in nearby habitats. The combination of development and the modern trend of applying excessive nutrient inputs can degrade adjacent agroecosystems because this produces a greater risk for wastes flowing into the ecosystems (Solowey et al., 2013).

***Demander*** – not applicable

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

***Supplier*** – Agroecosystems can provide humans with experiences of working with a diverse group of species, particularly for those habitats that include native, wild plants (Garbach et al., 2014). Research to improve approaches of managing agroecosystems to promote their biodiversity blends modern science with indigenous practices (Altieri, Funes-Monzote, and Petersen, 2012).

***Driver*** – Agroecosystem habitats enjoyed during activities like hiking, fishing, education, or for pure aesthetics are affected by changes in land use and management. For example, the modern practice of using an excessive amount of nutrients (e.g., fertilizers, manure) on agroecosystem habitats can lead to eutrophication of surrounding waterways (Randall and Mulla, 2001; Coates et al., 2013; Pert et al., 2013). This can degrade the experiential aesthetics of an ecosystem because it impacts the overall biodiversity of the available species.

***Demander*** - not applicable

**Sources:**

Altieri, M.A., Anderson, M.K., and Merrick, L.C. (1987) Peasant Agriculture and the Conservation of Corp and Wild Plant Resources. *Conservation Biology, 1*(1), 49-58. DOI: 10.1111/j.1523-1739.1987.tb00008.x.

Altieri, M.A. and Toledo, V.M. (2011) The agroecological revolution in Latin America: rescuing nature, ensuring food sovereignty and empowering peasants. *The Journal of Peasant Studies, 38*(3), 587-612. <https://doi.org/10.1080/03066150.2011.582947>. [abstract only]

Altieri, M.A., Funes-Monzote, F.R., and Petersen, P. (2012) Agroecologically efficient agricultural systems for smallholder farmers: contributions to food sovereignty. *Agronomy for Sustainable Development, 32*(1), 1-13. <https://doi.org/10.1007/s13593-011-0065-6>.

Barron, J., Tharme, R.E., and Herrero, M. (2013) Drivers and Challenges for Food Security. In Boelee, E. (Ed.) *Managing Water and Agroecosystems for Food Security.* Boston, MA: Library of Congress Cataloging-in-Publication Data.

Calvet-Mir, L., Gomez-Baggethun, E., and Reyes-Garcia, V. (2012) Beyond food production: Ecosystem services provided by home gardens. A case study in Vall Fosca, Catalan Pyrenees, Northeastern Spain. *Ecological Economics, 74*, 153-160. <https://doi.org/10.1016/j.ecolecon.2011.12.011>.

Dabney, S.M., Delgado, J.A., and Reeves, D.W. (2007) Using Winter Cover Crops to Improve Soil and Water Quality. *Communications in Soil Science and Plant Analysis, 32*(7-8), 1221-1250. <https://doi.org/10.1081/CSS-100104110>. [abstract only]

Descheemaeker, K. et al. (2013) Increasing Water Productivity in Agriculture. In Boelee, E. (Ed.) *Managing Water and Agroecosystems for Food Security.* Boston, MA: Library of Congress Cataloging-in-Publication Data.

Garbach, K. et al. (2014) Biodiversity and Ecosystem Services in Agroecosystems. *Encyclopedia of Agriculture and Food Systems, 2,* 21-40. DOI: 10.1016/B978-0-444-52512-3.00013-9.

Janzen, H.H. et al. (2003) The fate of nitrogen in agroecosystems: An illustration using Canadian estimates. *Nutrient Cycling in Agroecosystems, 67*(1), 85-102. <https://doi.org/10.1023/A:1025195826663>. [abstract only]

Jarvis, D.I. et al. (2013) Managing Agroecosystem Services. In Boelee, E. (Ed.) *Managing Water and Agroecosystems for Food Security.* Boston, MA: Library of Congress Cataloging-in-Publication Data.

Lloyd, G.J. et al. (2013) Water Management for Ecosystem Health and Food Production. In Boelee, E. (Ed.) *Managing Water and Agroecosystems for Food Security.* Boston, MA: Library of Congress Cataloging-in-Publication Data.

Reicosky, D.C. and Forcella, F. (1998) Cover crop and soil quality interactions in agroecosystems. *Journal of Soil and Water Conservation, 53*(3), 224-229.