**Ecosystem Type: AGROECOSYSTEM**

**Category: Food, Fuel, and Materials**

1. **Materials**

***Supplier*** – Agroecosystems are important suppliers of food (Altieri and Toledo, 2011) and for materials that can be harvested and used as fuels (Smil, 1999). In fact, global cropland, coarse grain use and vegetable oil use account for 2 percent, 7 percent, and 9 percent of biofuels, respectively, generated in the world (Barron, Tharme, and Herrero, 2013).

***Driver*** – Agroecosystems need nitrogen inputs to maintain its overall productivity (Janzen et al., 2003), which helps support the availability of species used for food and fuel. These ecosystems that are near or on wet soils can experience a flux of nitrogen and other chemicals. For example, a wet soil agroecosystem that supplies food and is frequently affected by these changes are rice-wheat crops (Xie et al., 2008).

***Demander*** – not applicable

1. **Nutrition**

***Supplier*** – Agroecosystems supply food for the entire world, in which over half of the commercial agriculture produced is cereals and legumes (Smil, 1999). The resources provided by agroecosystems are particularly important for areas where there are food shortages (Boelee et al., 2013).

***Driver*** – Water stress and availability is a major driver affecting the productivity of agroecosystems (Barron, Tharme, and Herrero, 2013). There is also a shift in what these ecosystems are producing because of the demand change for higher value products that are of lower nutritional content (e.g., feed for meat) (Barron, Tharme, and Herrero, 2013).

***Demander*** - not applicable

1. **Energy**

***Supplier*** – Agroecosystems are producers of materials that can be used to generate fuel energy because these ecosystems are suppliers of crops that can be transformed into biofuels. In fact, global cropland, coarse grain use and vegetable oil use account for 2 percent, 7 percent, and 9 percent of biofuels, respectively, generated in the world (Barron, Tharme, and Herrero, 2013).

***Driver*** – Agroecosystems need nitrogen inputs to maintain its overall productivity (Janzen et al., 2003), which helps support the availability of species used for fuel. Market value of goods produced on these ecosystems also affect their use for fuel (Barron, Tharme, and Herrero, 2013). This driver is especially impactful in the poor rural communities because it will affect the types of goods they grow and depend on to generate income and support their livelihoods.

***Demander*** – not applicable

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

***Supplier*** – Species in agroecosystems help mediate wastes that come from nutrients and chemicals, which increases the availability and productivity of resources for food (Altieri, 1999). For example, aquaculture agroecosystems can filter domestic waste water resources that would have otherwise drained into downstream waterways (Coates et al., 2013). These waterways are now cleaner and better resources to be used for food production.

***Driver*** – Overabundance of wastes that flow into agroecosystems can affect their ability to mediate nuisances from entering connecting waterways and adjacent habitats. Wastes might include an excess of fertilizers (Randall and Mulla, 2001) or manure (Coates et al., 2013). The number and types of pests that migrate into an agroecosystem can also affect these ecosystems (Pert et al., 2013). For example, pests may carry a disease that impacts the health of agroecosystem plants that provide a mediation of wastes and toxics.

***Demander*** –

1. **Mediation of Flows**

***Supplier*** – Agroecosystems contain resources that control the flow of water and sediment, maintaining the available supply of clean water that can be used to support the production of materials for food and fuel (Reicosky and Forcella, 1998; Dabney, Delgado, and Reeves, 2007). Since these ecosystems are more frequently managed by humans compared to others, they have been modified to capture and retain water to support the production of various materials. For example, beef products among other protein sources consume nearly a third of the world’s global agricultural water use (Boelee et al., 2013).

***Driver*** – The ability for these ecosystems to manage the flow of materials (e.g., water and sediment) to support food and fuel production depends on environmental factors such as soil drainage (Lloyd et al., 2013) and availability of water (Boelee et al., 2013; Lloyd et al., 2013). Soils with poor drainage can have a negative effect on crops that are sensitive to saturated conditions.

***Demander*** – not applicable

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

***Supplier*** – Agroecosystems maintain the physical, chemical, and biological factors of the habitat to support the production of food and fuel materials. For example, these ecosystems control the biophysical process of cycling water (Coates et al., 2013) because its 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 the soil moisture is regulated.

***Driver*** – Agroecosystems near or on wet soils can experience changes in productivity based on the amount of nitrogen and other chemicals flowing into ecosystem. Agroecosystems that may contain wet soils include rice-wheat crops (Xie et al., 2008).

***Demander*** – not applicable

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

***Supplier*** – Agroecosystems provide spiritual and social experiences while supporting the production of food and fuel. For example, pastoral managers who work with livestock may choose to operate its farm differently based on cultural values (Coates et al., 2013). The interaction with the livestock and how they are raised can be influenced by beliefs passed down by generations of farmers or by social norms.

***Driver*** – Managing an agroecosystem can change based on the conditions of the environment. For example, pests that enter these ecosystems can affect the health of the crops and livestock (Pert et al., 2013). A disease that spreads across an agroecosystem can force managers to take drastic actions such as crop removal or euthanization of livestock to prevent further losses.

***Demander*** – not applicable

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

***Supplier*** – There is an increasing interest in studying agroecosystems because they have an impact on the political and economic culture of countries around the globe (McMichael, 2012). Research has shown that food security has always been a concern by governments, so the trend has been to secure this commodity by investing resources in offshore land to build more agroecosystems – a trend that may have catastrophic effects (McMichael, 2012).

***Driver*** – The positive experiences of interacting with agroecosystems can be affected by changes in the habitat. For example, an overflow of wastes into agroecosystems can affect their aesthetics during experiential uses. Wastes flowing into these ecosystems might include an excess of fertilizers (Randall and Mulla, 2001) or manure (Coates et al., 2013). Manure might give off an unpleasant scent that detracts overall enjoyment of working with these habitats to produce food and fuel.

***Demander*** - not applicable

**Sources:**

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