

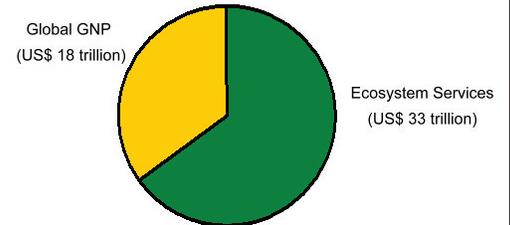
## BIODIVERSITY BENEFITS – COMPANION SHEET

### Maintaining Biodiversity on Agricultural Lands – Who benefits?

There are a variety of goods and services provided to agricultural producers and to society in general by biodiversity – these are called **ecological goods and services\***. Humans are heavily reliant on these goods and services for our survival, though we generally think more about being dependant on finances. Although there is no concrete way to measure the entire value of ecological goods and services, it is important to discuss, debate and work towards establishing methods to calculate these values. Their importance to the well-being of humanity and the health of the planet should be fully recognized when business or policy decisions are made. In 1997, it was estimated that ecosystem services were worth \$33 trillion US compared to a global Gross National Product of \$18 trillion US. In our highly urbanized society, agricultural producers are very aware of our dependence on the earth's environment and biodiversity for survival because they maintain ecological goods, and work with ecosystem services every day.

#### Estimates of Human Economic Activities and Ecosystem Services

Source: Costanza et al. 1997



The ecological goods and services that humans rely on are outlined below.

#### Ecosystem Services

- Storage and cycling of nutrients** – Natural storage and cycling of nutrients reduces input costs of fertilizers and increases productivity.
- Protection of water quality and quantity** – Guarantees a safe supply of drinking water for people and livestock.
- Breakdown of pollutants** – Microorganisms and plants break down and absorb many pollutants created by human activity.
- Recovery from catastrophic events** – Large areas that are home to numerous species of plants and animals are better equipped to rebound from fire or flood.
- Stabilization of climatic fluctuations** – Vegetation is the only natural way to filter many greenhouse gases.
- Maintenance of stable ecosystems** – All elements of the natural environment are connected and essential to maintain the ecosystem.
- Formation and maintenance of healthy soils** – Healthy soils allow us to grow plants – the basis of agricultural production.
- Pollination of crops and natural vegetation** – Various crops grown in Saskatchewan, such as alfalfa, require natural pollinators like bees to reproduce.

#### Biological Resources

- Food production** – Naturally grown plants and animals are the basis of all human diets.
- Wood and other fibre production** – Most human and livestock shelter is built from wood produced from native tree species.
- Habitat** – Natural areas provide places for wildlife to reproduce, find shelter, and obtain food.
- Genetic resources** – Wild plants, animals and microorganisms are the source of medicinal resources, ornamental plants, breeding stock, etc.



#### Social Benefits

- Recreation** – Trail riding, bird watching, hiking, nature photography, hunting, fishing, and all ecotourism depends on maintaining biodiversity.
- Cultural values** – For many people the natural environment fulfills inspirational, aesthetic, spiritual, historical and educational needs.
- Research and education** – Our natural environment still holds many mysteries for us to discover.
- Community Building** – Our economy and cultural values are tightly linked to nature – healthy landscapes equal healthy communities.

## GLOSSARY

**Agroecosystem** is a farm or ranch or a cluster of farms and ranches where ecological principles are applied to the design and management of agricultural systems. An agroecosystem is made up of mineral cycles, energy flows, biological processes and socioeconomic relationships.

**Biodiversity** (biological diversity) is the total diversity of life on earth. It is the variety and variability found among living organisms and the natural systems they live within. Biodiversity occurs at three levels encompassing all life as we know it.

- 1) Genetic diversity is the variation of genes (characteristics) within a species. Genetic diversity partially explains why cattle breeds have varying levels of marbling in their meat or why two crocuses growing side by side under the same conditions are slightly different colours or have a different amount of fuzz on their petals. Without sufficient genetic diversity, a species can be at risk of extinction, especially when living conditions change and none of the individuals in the population can adapt to the change.
- 2) Species diversity is the variety of species within an area. On a section of native prairie, well over 100 species contribute to that area's diversity – a badger, a coyote, Richardson's ground squirrels, hawks, song birds, cattle, wheat grass, June grass, shooting stars, spear grasses, shrubby cinquefoil and the list goes on.
- 3) Ecosystem diversity is the variability of habitats that occur across a landscape. An example of the great diversity of habitats in our southwest prairie landscape is found in the forested and fescue areas of the Cypress Hills; riparian areas, grasslands and fields of the Frenchman River Valley; and the upland grasslands and wetlands of the dry mixed grass prairie. Near Saskatoon in the Parklands of Saskatchewan, there are pothole areas, aspen forests, open meadows, grasslands, cropland, and the North and South Saskatchewan River valleys.

**Ecological Goods and Services** are the direct or indirect economic, social and environmental benefits (see previous page) that all populations, including people, receive from ecosystems. Healthy, functioning ecosystems provide various functions:

- 1) Regulation functions maintain our water supply, clean air, and soil quality.
- 2) Habitat functions provide wild plants and animals with homes.
- 3) Production functions produce or allow us to produce food, medicinal or ornamental resources.
- 4) Information functions provide opportunities for education, recreation, research, and cultural activities.

**Heterogeneity** refers to high variability in vegetation structure, composition, density and biomass. Heterogeneity influences species diversity and ecosystem function and is, therefore, the catalyst for high biodiversity.

**Natural Capital** includes the assets that nature provides to make human life possible. These assets include renewable resources such as livestock, wildlife or forage, and non-renewable resources such as water and oil. They also include ecological functions and processes such as the ability of a wetland to filter pollutants from water, and a forest to filter air. Natural capital is a term used to describe natural resources and processes in economic terms. Biodiversity is an asset provided by nature. The greater the diversity of habitats available, the greater the diversity of species present and likely the greater the diversity of genetics. Although these assets are essential to our survival, we know very little about how to replace or replicate them.

Man's greatest attempt at creating an ecosystem illustrates how little we know. Biosphere 2, in the Arizona desert, attempted to create a self-sustaining ecosystem without any outside influence except energy from the sun. The 3500 plant and animal species that had their surroundings specifically designed for their needs had difficulty surviving, while species that were unintentionally introduced thrived. It was a humbling experiment, and illustrates the immense complexity of our natural world.

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*Nature Saskatchewan is a charitable conservation and cultural organization of naturalists dedicated to protecting and promoting nature, its diversity, and the processes that sustain it.*

*Our supporters include about 1,500 individual members and 11 local naturalist groups.*

*Our vision is "Humanity in Harmony with Nature".*



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