# THE EFFECTS OF NITROGEN ON BIODIVERSITY

#### What is biodiversity?

Name: \_\_\_\_

Biodiversity underpins life on Earth, and refers to the variety found in biota from genetic makeup of plants and animals to cultural diversity.

#### What does biodiversity mean for human health?

People depend on biodiversity in their daily lives, in ways that are not always apparent or appreciated. Human health ultimately depends upon ecosystem products and services (such as availability of fresh water, food and fuel sources) which are requisite for good human health and productive livelihoods. Biodiversity loss can have significant direct human health impacts if ecosystem services are no longer adequate to meet social needs. Indirectly, changes in ecosystem services affect livelihoods, income, local migration and, on occasion, may even cause political conflict.

Additionally, biophysical diversity of microorganisms, flora and fauna provides extensive knowledge which carry important benefits for biological, health, and pharmacological sciences. Significant medical and pharmacological discoveries are made through greater understanding of the earth's biodiversity. Loss in biodiversity may limit discovery of potential treatments for many diseases and health problems.

### Threats to biodiversity and health

There is growing concern about the health consequences of biodiversityloss and change. Biodiversity changes affect ecosystem functioning and significant disruptions of ecosystems can result in life sustaining ecosystem goods and services. Biodiversity loss also means that we are losing, before discovery, many of nature's chemicals and genes, of the kind that have already provided humankind with enormous health benefits.

#### Nutritional impact of biodiversity

Biodiversity plays a crucial role in human nutrition through its influence on world food production, as it ensures the sustainable productivity of soils and provides the genetic resources for all crops, livestock, and marine species harvested for food. Access to a sufficiency of a nutritious variety of food is a fundamental determinant of health.

Nutrition and biodiversity are linked at many levels: the ecosystem, with food production as an ecosystem service; the species in the ecosystem and the genetic diversity within species. Nutritional composition between foods and among varieties/cultivars/breeds of the same food can differ dramatically, affecting micronutrient availability in the diet. Healthy local diets, with adequate average levels of nutrients intake, necessitates maintenance of high biodiversity levels.

Intensified and enhanced food production through irrigation, use of fertilizer, plant protection (pesticides) or the introduction of crop varieties and cropping patterns affect biodiversity, and thus impact global nutritional status and human health. Habitat simplification, species loss and species succession often enhance communities vulnerabilities as a function of environmental receptivity to ill health.

Source: http://www.who.int/globalchange/ecosystems/biodiversity/en/

# What role does Nitrogen play in an Ecosystem?

- Review the Nitrogen Cycle and Read the Section "Ecological Implications of Human Alterations to the Nitrogen Cycle" and the Summary; Answer the questions below:
  - http://www.nature.com/scitable/knowledge/library/the-nitrogen-cycle-processes-players-andhuman-15644632

### The Nitrogen Cycle: Processes, Players, and Human Impact:

- 1. Define (in your own words) nitrogen fixation.
- 2. Explain how human influence plays a role in the Nitrogen cycle.

- 3. How can excess Nitrogen affect terrestrial life?
- 4. Explain how Nitrogen negatively impacts marine and coastal systems.
- Read the following report; Answer the questions below.
  - o http://www.esa.org/esa/wp-content/uploads/2013/03/issuesinecology15.pdf

## Excess Nitrogen in the U.S. Environment: Trends, Risks, and Solutions

- 1. Explain the benefits and risks N has had on human health.
- 2. What impacts does N have on ecosystems?
- 3. What is "reactive Nitrogen?"
- 4. Read "Box 1: Critical Loads How much Nitrogen is too much?" (pg. 6) and explain.

- 5. What impact is excess nitrogen having on climate?
- 6. How are Nitrates affecting our drinking water? What effects can nitrates have on our health?

7. What is being done to mitigate this problem?

8. Summarize Box 2 "Case Study." (pg. 11)

9. Using the summary, explain the sources of nitrogen, some impacts and mitigation options that are presented in *Issues in Ecology*, Vol. 15.

- 10. Go to the following sites, Watch the animations and draw a picture of the Nitrogen cycle, giving a brief description of what is happening
  - i. <u>https://www.classzone.com/books/ml\_science\_share/vis\_sim/emo5\_pg20\_nitrogen/em05\_</u> <u>pg20\_nitrogen.swf</u>
  - ii. http://www.pbslearningmedia.org/asset/lspso7\_int\_nitrogen/