# The Rekindling of Life

Module 9 • i2P • Biodiversity

"What an extraordinary time to be alive. We're the first people on our planet to have real choice: we can continue killing each other, wiping out other species, spoiling our nest. Yet on every continent a revolution in human dignity is emerging. It is re-knitting community and our ties to the earth. So we do have a choice. We can choose death; or we can choose life."

Frances Moore Lappe

## Ecosystem Services

All organisms on Earth rely on biodiversity to provide the basic ingredients of life. The energy that enables life is captured from the sun by algae, plants and bacteria through photosynthesis. This stored solar energy is transferred to animals when they eat plants. Without the ability of ecosystems to capture the sun's energy, life as we know it would not exist on Earth.

Figure 1: The vast majority of the planet's energy comes the sun (source: Edward Simpson)

Human beings like all other organisms' benefit from the diversity of life on earth. These benefits, called *ecosystem services* (see: ecosystem services), provide humans with the core necessities of life:

- The capture of the suns energy
- The creation of oxygen
- The provision of food and medicines
- The purification of air and water
- The regulation of climate

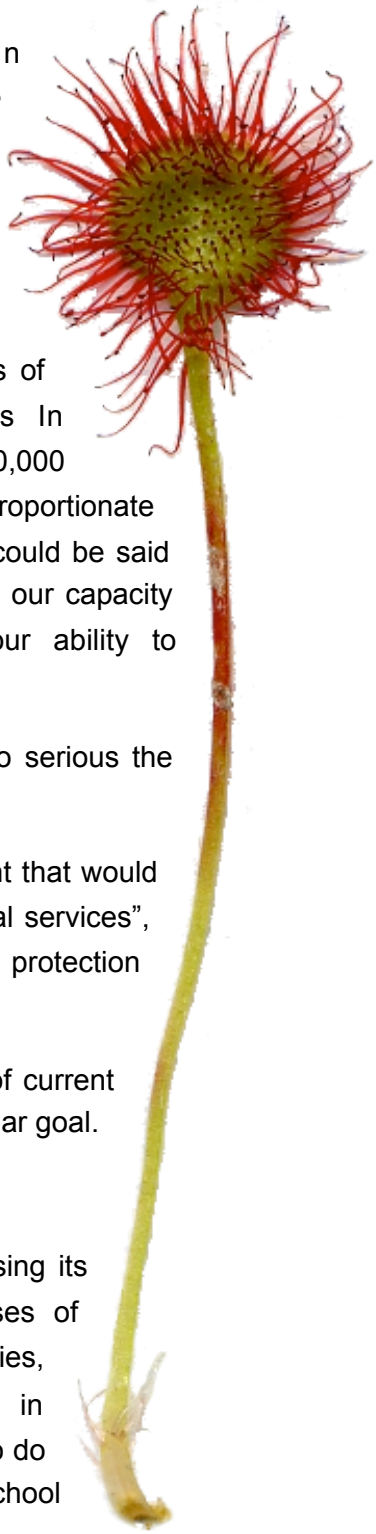
The ecosystems services that the natural world provides to human beings are finite. The rate at which we are consuming these services is increasing rapidly, particularly in the past one hundred years.

Did You Know?

Decreased ecosystem services from deforestation

The Amazon forest, due to the interaction of deforestation, fire and climate change, could undergo a widespread dieback, with parts of the forest moving into a self-perpetuating cycle of more frequent fires and intense droughts leading to a shift to savanna-like vegetation. Such dieback is much more likely to occur if deforestation exceeds 20 – 30% (it is currently above 17% in the Brazilian Amazon). It would lead to regional rainfall reductions, compromising agricultural production. There would also be global impacts through increased carbon emissions, and massive loss of biodiversity.

## Survival



Over this series of education modules, prepared for the i2P Amazon Expedition, we have learned that life on earth is a composite of countless different organisms whose collective welfare is woven together by their diversity. We humans are but one of millions of species, and relative newcomers In geological time. Yet, over the past 10,000 years we have come to exert a disproportionate influence over life on the planet. It could be said that our very success as a species; our capacity to fashion tools, our ingenuity, our ability to harness and transform nature, is putting our very survival at risk.

The threat to humanity posed by the degradation of biodiversity is so serious the United Nations warns,

> "current trends are bringing us closer to a potential tipping point that would catastrophically reduce the capacity of ecosystems to provide essential services", such as the supply of "food, fresh water, health and recreation, and protection from natural disasters" (see: UN).

The United Nations calls upon all citizens of the world, for the sake of current and future generations, to make the preservation of biodiversity a singular goal.

## Drivers

In order to preserve biodiversity we need to understand what is causing its degradation. We learned in module 5 that the five principle causes of biodiversity loss are habitat transformation, climate change, exotic species, over-exploitation, and pollution. To reverse the downward trend in biodiversity, it is necessary to establish what is driving these causes. To do so, let us engage in a simple exercise: examine an average day at a school in a city in North America and see if this has any bearing on biodiversity.

A school day starts with a series of buses collecting students from the surrounding district and delivering them to the school, which is situated on ten acres of land and

features a running track and two soccer fields. The students spend the morning in a variety of classes, from computer science to english. At noon the students gather in the cafeteria for lunch. After completing their afternoon studies the students return home by school bus.


Figure 3: School bus In Pittsburg Pensylvannia (source: Poitras)

Does this scenario have any bearing on biodiversity? Let us consider the five principle causes of loss of biodiversity:

- *Habitat transformation*: Firstly when the school was built ten acres of land was deforested transforming the habitat of local forestland plants and animals. The construction of the school caused further deforestation when wood was harvested for construction purposes. The electricity that lights the school and powers the computers is produced by a hydroelectric power dam. When constructed, this dam flooded a wide expanse of land and obstructed the migration route of fish that previously swam up river to breed (see: module 5).

- *Climate change*: The buses that carry students to and from hospital burn fossil fuels that release greenhouse gases contributing to global warming (see: module 5).

- *Exotic species*: The food served in the school cafeteria is largely composed of standard crops and animals; corn, rice, wheat, chicken, beef and pork. Prior to being mass produced all of these crops and animals were introduced as exotic species. The mass production of these species is driving genetic erosion and extinction of other species (see module 6 and module 7).

- *Over-exploitation*: The cafeteria is now serving farmed species of fish because the wild species they previously bought have been overfished and are no longer available (see: module 5).

- *Pollution*: The herbicide and fertilizer spread on the soccer field, to maintain the grass, pollutes the local water system contributing to algal blooms and species loss. Similarly, the food purchased by the cafeteria is grown using nitrogen fertilizers that destabilize ecosystems (see: module 5).

By simply considering an average school in North America, we can identify everyday activities that drive all five principle causes of biodiversity degradation. Although one school will do little to tip the balance of global biodiversity, the problem is that there are many schools, and countless businesses, vehicles, factories, farms, and cities all around the world that are also driving biodiversity degradation.

### Population

The single biggest driver of loss of biodiversity is human population growth, which increased from 1.6 to 6.1 billion people between the years 1900 and 2000. By the year 2050 the world's population is expected to reach nine billion people. That's **nine** billion people that will need to rely on ecosystem services for energy, food, and water. Nine billion people wanting to eat, and go to school, and drive cars, and run profitable businesses, and wear designer clothing, and travel. Although each person contributes minimally, as a collective, the activity of all humanity is driving the degradation of biodiversity.

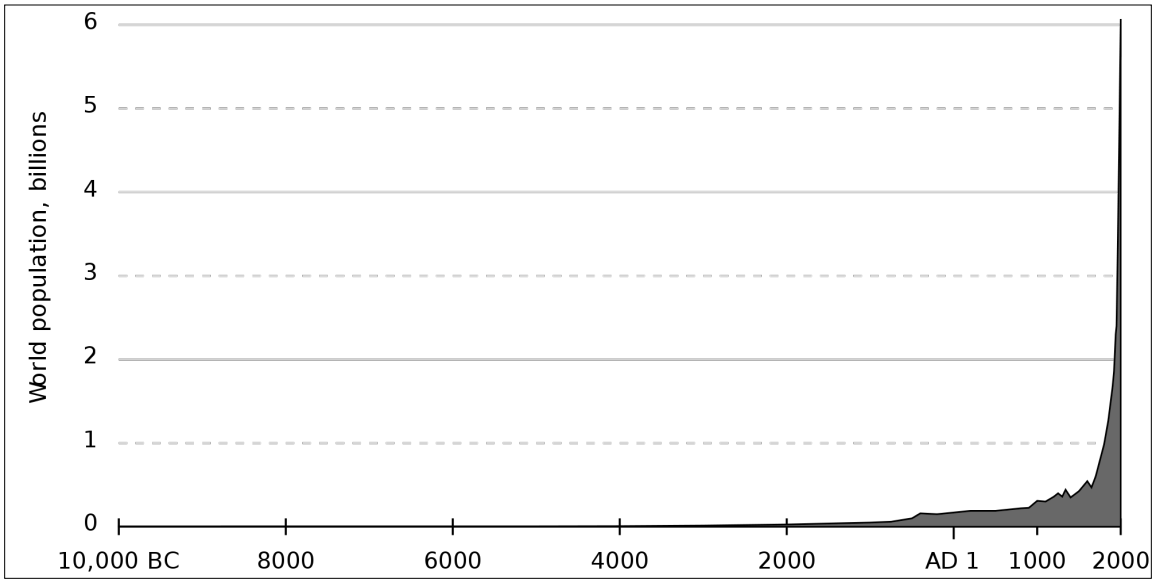



Figure 4: World human population (est.) 10,000 BC–2000 AD (source: EI T)

### Consumption

Added to the dramatic rise in population are social forces that are propelling greater consumption of ecosystem services (see: consumption). The rate of consumption is enabled by technology that allows us to alter ecosystems much quicker than before. For example:

- One-hundred years ago men with handsaws harvested lumbar from the Amazon Rainforest. Today using chains-saws, skidders and logging trucks, a similar crew of men can deforest countless acres of rainforest in the same time.
- Humans once circumnavigated the world in wind powered sailing ships. Today we circle the globe in a few hours on greenhouse gas generating fossil fuel powered jets.

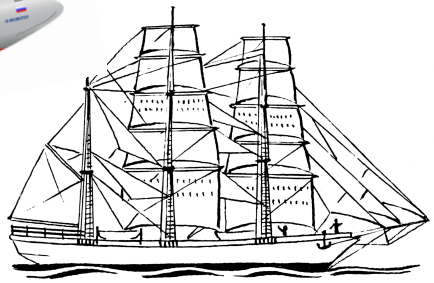



Figure 6: A modern airplane moves much quicker than a traditional tall ship, but creates greenhouse gases (sources: Shahram and Pearson Scott Foresman)

These are but two examples of how the burgeoning human population can use the natural resources of the world much quicker than before. Ultimately, the combination of population explosion and increased consumption is driving the rapid degradation of the Earth's biodiversity.

## What Has Been Done?

The degradation of global ecosystems has mobilized the nations of the world to unite in an effort to preserve biodiversity. Under the leadership of the United Nations, the Convention on Biological Diversity was signed at the Earth Summit in Rio de Janeiro in 1992. This agreement, which brings together most of the world's nations, has three main goals:

- the conservation of biodiversity
- the sustainable use of ecosystem services
- the equitable sharing of genetic resources

The Convention requires that countries adopt regulations to conserve their biological resources. Unfortunately, the biodiversity targets set for 2010 have not been met. "The rate of biodiversity loss is increasing at an unprecedented rate, threatening the very existence of life as it is currently understood" (see United Nations). With this in mind a conference of all the signatories of the

Student Exercise
Consider how your grandparents lived. Can you identify how your current lifestyle results in the consumption of more ecosystem services than your grandparents did.

Did You Know?

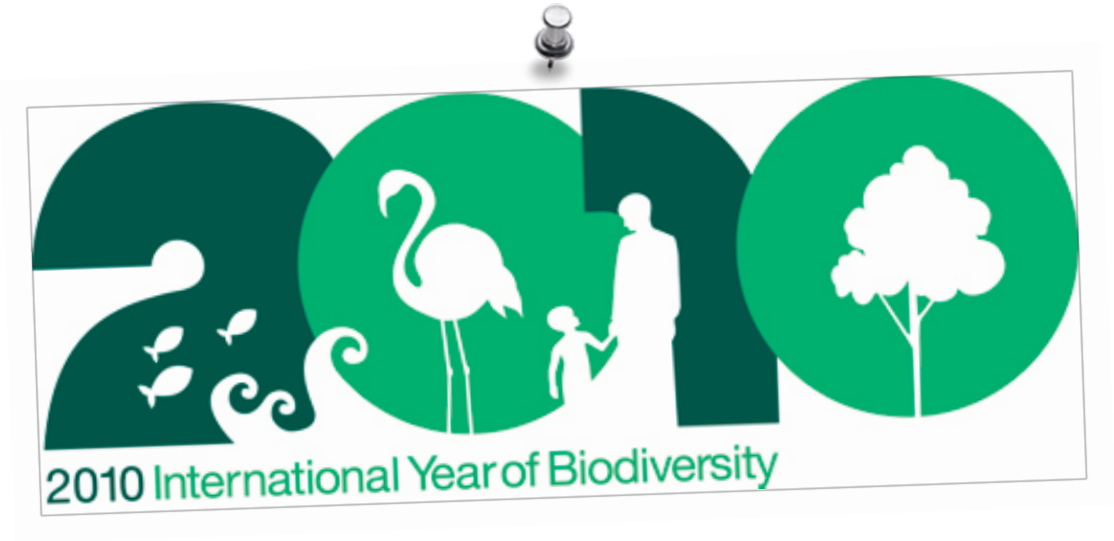
If current birth and death rates remain unchanged, world population could reach 27 billion by the end of the next century.

see: population

Convention on Biological Diversity is being held in Nagoya Japan from October 18 - 29, to develop a new strategic plan for the coming decades, including a 2050 vision and 2020 mission for biodiversity.

## WHAT CAN WE DO?

We need not await the United Nations and governments to address the biodiversity crisis. The action required to preserve biodiversity must involve a collective change in behavior by all citizens of the planet. A great place to start this initiative is as a grassroots movement, and there is no better place than among youth.




A dialogue needs to start that places the issues of human population and the consumption of natural resources front and center. In schools, and institutions of higher learning, education needs to be tailored to address the unifying issue of biodiversity. By highlighting the grave consequences of further biodiversity loss, a cultural shift away from the consumer society of the past century can be seeded. This discussion is particularly needed in developed countries, who house a minority of the world's population yet consume roughly four-fifths of its natural resources. Developing countries will require infrastructure and mentorship to help alleviate poverty and refocus the debate on achieving ecosystem sustainability.

On a pragmatic basis the issues that each citizen of the world needs to consider are:

Student Exercise

In what manner do your day to day activities influence the degradation of biodiversity? Please consider:

- the food you eat
- the transportation you use
- the size of your family
- the size of your house
- how you heat your home
- your leisure activities

- *Human population.* Is it responsible for human population to continue to grow or will this cause biological degradation and widespread suffering? How can mankind attain a stable human population?
- *Consumption.* How does my use of automobiles, lawn fertilizer, meat or any other consumer good affect biodiversity? Are my consumption patterns harming the natural environment?
- *Government action.* How can I compel my government to take action on biodiversity?
- *Global warming.* Are my actions impacting global warming? What can I do to help alleviate climate change?

As these questions reflect, the ultimate drivers of loss of biodiversity are the day-to-day activities of our lives. It is our daily consumption patterns that drive factories, farms, overfishing and deforestation. It is only if each of us, as responsible citizens of the planet, begin to question our actions, that the loss of biodiversity can be curtailed. The actions of only a few will not be enough. We must act together.

Figure 7:Malnourished child (source: Dr. Lyle Conrad)

It is our daily consumption patterns that drive factories, farms, overfishing and deforestation. Therein lies the challenge, for it is only if each of us, as responsible citizens of the planet, begin to question our actions, that the loss of biodiversity can be curtailed. The actions of only a few will not be enough. We must act together.