

# **“SAVE THE PLANET EARTH”**

**KEY NOTE ADDRESS DELIVERED BY S. INGERSOL, SCIENTIST SG, ISRO  
@ BHARATHI DASAN UNIVERSITY, TIRUCHIRAPALLI on 24 Apr 2010**

- Everyone in the world depends completely on Earth’s ecosystems and the services they provide, such as food, water, disease management, climate regulation, spiritual fulfillment, and aesthetic enjoyment. Over the past 50 years, humans have changed these ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber, and fuel.
- This transformation of the planet has contributed to substantial net gains in human well being and economic development. But not all regions and groups of people have benefited from this process, in fact, many have been harmed. Moreover, the full costs associated with these gains are only now becoming apparent.
- Over the past 50 years, human beings have changed ecosystems more rapidly and extensively than in any comparable period of time in human history, largely to meet rapidly growing demands for food, fresh water, timber, fiber, and fuel. This has resulted in a substantial and largely irreversible loss in the diversity of life on Earth. The structure and functioning of the world’s ecosystems changed more rapidly in the second half of the twentieth century than at any time in human history.
- More land has been converted to cropland in the 30 years after 1950 than in the previous 150 years between 1700 and 1850. Cultivated systems (areas where at least 30% of the landscape is in croplands, shifting cultivation, confined livestock production, or freshwater aquaculture) now cover one quarter of Earth’s terrestrial surface.
- Approximately 20% of the world’s coral reefs were lost and an additional 20% degraded in the last several decades of the twentieth century, and approximately 35% of mangrove area was lost during this time.
- The amount of water impounded behind dams quadrupled since 1960, and three to six times as much water is held in reservoirs as in natural rivers. Water withdrawals from rivers and lakes doubled since 1960; most water use (70% worldwide) is for agriculture.
- Since 1960, flows of reactive (biologically available) nitrogen in terrestrial ecosystems have doubled, and flows of phosphorus have tripled. More than half of all the synthetic nitrogen fertilizer, which was first manufactured in 1913, ever used on the planet has been used since 1985.

- Since 1750, the atmospheric concentration of carbon dioxide has increased by about 39% (from about 280 to 389 parts per million in 2010), primarily due to the combustion of fossil fuels and land use changes. Approximately 60% of that increase (60 parts per million) has taken place since 1959. Human beings are fundamentally, and to a significant extent irreversibly, changing the diversity of life on Earth, and most of these changes represent a loss of biodiversity.
- Across a range of taxonomic groups (plants, animals and micro-organisms) either the population size or range or both of the majority of species is currently declining. Over the past few hundred years, Human beings have increased the species extinction rate by as much as 1,000 times over background rates typical over the planet's history (*medium certainty*). Some 10–30% of mammal, bird, and amphibian species are currently threatened with extinction (*medium to high certainty*). Freshwater ecosystems tend to have the highest proportion of species threatened with extinction.
- Genetic diversity has declined globally, particularly among cultivated species. Most changes to ecosystems have been made to meet a dramatic growth in the demand for food, water, timber, fiber, and fuel. Some ecosystem changes have been the inadvertent result of activities unrelated to the use of ecosystem services, such as the construction of roads, ports, and cities and the discharge of pollutants.
- Between 1960 and 2009, the demand for ecosystem services grew significantly as world population doubled to 6.8 billion people and the global economy increased more than six fold. To meet this demand, food production increased by roughly two-and-a half times, water use doubled, wood harvests for pulp and paper production tripled, installed hydropower capacity doubled, and timber production increased by more than half.
- The growing demand for these ecosystem services was met both by consuming an increasing fraction of the available supply (for example, diverting more water for irrigation or capturing more fish from the sea) and by raising the production of some services, such as crops and livestock. The latter has been accomplished through the use of new technologies (such as new crop varieties, fertilization, and irrigation) as well as through increasing the area managed for the services in the case of crop and livestock production and aquaculture.
- The changes that have been made to ecosystems have contributed to substantial net gains in human well being and economic development, but these gains have been achieved at growing costs in the form of the degradation of many ecosystem services, increased risks of nonlinear changes, and the worsening of poverty for some groups of people. These problems, unless addressed, will substantially diminish the benefits that future generations obtain from ecosystems.
- Approximately 60% (15 out of 24) of the ecosystem services evaluated (including 70% of regulating and cultural services) are being degraded or used unsustainably.

Actions to increase one ecosystem service often cause the degradation of other services. For example, actions to increase food production typically involve increased use of water and fertilizers or expansion of the area of cultivated land, these same actions often degrade other ecosystem services, including reducing the availability of water for other uses, degrading water quality, reducing biodiversity, and decreasing forest cover (which in turn may lead to the loss of forest products and the release of greenhouse gases). Similarly, the conversion of forest to agriculture can significantly change the frequency and magnitude of floods, although the nature of this impact depends on the characteristics of the local ecosystem and the type of land cover change.

- The degradation of ecosystem services often causes significant harm to human well-being. The information available to assess the consequences of changes in ecosystem services for human well-being is relatively limited. Many ecosystem services have not been monitored, and it is also difficult to estimate the influence of changes in ecosystem services relative to other social, cultural, and economic factors that also affect human well-being.
- Most resource management decisions are most strongly influenced by ecosystem services entering markets; as a result, the non marketed benefits are often lost or degraded. These non marketed benefits are often high and sometimes more valuable than the marketed ones. For example, one of the most comprehensive studies to date, which examined the marketed and non marketed economic values associated with forests, found that timber and fuel wood generally accounted for less than a third of total economic value of forests in each country. Values associated with non-wood forest products, recreation, hunting, watershed protection, carbon sequestration, and passive use (values independent of direct uses) accounted for between 25% and 96% of the total economic value of the forests.
- The total economic value associated with managing ecosystems more sustainably is often higher than the value associated with the conversion of the ecosystem through farming, clear-cut logging, or other intensive uses. Relatively few studies have compared the total economic value (including values of both marketed and non-marketed ecosystem services) of ecosystems under alternate management regimes, but some of the studies that do exist have found that the benefits of managing the ecosystem more sustainably exceeded that of converting the ecosystem. The economic and public health costs associated with damage to ecosystem services can be substantial.
- The incidence of diseases of marine organisms and the emergence of new pathogens is increasing, and some of these harm human health. Episodes of harmful (including toxic) algae blooms in coastal waters are increasing in frequency and intensity, harming other marine resources such as fisheries as well as human health.

- The frequency and impact of floods and fires has increased significantly in the past 50 years, in part due to ecosystem changes. Examples are the increased susceptibility of coastal populations to tropical storms when mangrove forests are cleared and the increase in downstream flooding that followed land use changes in the rivers. Annual economic losses from extreme events increased tenfold from the 1950s to approximately \$80 billion in 2008, of which natural catastrophes (floods, fires, storms, drought, earth quakes) accounted for 84% of insured losses.
- The present generation of scientists and technologists are presented with the challenge of providing the eco system services needed for the increasing humanity with sustainability and in amity with nature. If the challenge is well taken, we can convert the challenge into an opportunity, which will be remembered for by our future generations.
- Without the commercial corporate interests, if we look at the problems faced by our planet we always have solutions that include 1) End to the Fossil fuel era, 2) Aforestation – planting of trees, 3) Switching over to renewable energy technologies like wind, solar, geo thermal, wave energy etc.. 4) Smart use in transmission of energy by reduced transmission losses (generating energy locally), 5) A simplified life style approach with reduced consumption and simple living & 6) Care for Nature.
- We must remember that in the history of the solar system planets like Mars had water flowing in them and only due the increased presence of CO<sub>2</sub> in its atmosphere has made the planet very hot and cold ( +200 to -200 deg C) within a mars day. Let us not bring the same fate to our mother earth by our actions of today which is pointing in that direction.
- It is not the Planet Earth we are protecting by way of our changed actions, but we are protecting the Human beings ourselves from being extinct to continue to live on mother earth. We must understand that earth can survive for billions of years as a barren planet without the company of human beings. There is a very rare probability that human Life in this intelligent form can be brought back to earth once it is extinct due to our own actions.