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# LET'S PROTECT SRI LANKAN BIODIVERSITY

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## SECOND IN-COUNTRY CONFERENCE SRI LANKA-2022



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**“LETS PROTECT SRI LANKAN BIODIVERSITY”  
THE SECOND RUFFORD IN-COUNTRY CONFERENCE,  
SRI LANKA - 2022**



## **RENEWABLE ENERGY AND BIODIVERSITY – FRIENDS OR FOES?**

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### **Introduction**

With the increasing human population, resources in the world are depleting. When it comes to energy sources, conventional energy sources are depleting faster than any other resource. In addition to the increasing population, the increase in human needs is another factor that drives the energy demand, exerting more pressure on the existing resources. Since its discovery, fossil fuels have been supplying the major part of the energy needs of the humanity.

Scientists have long realized that the fossil fuel resources are limited and going to be finished in foreseeable future. It is only a matter of time before the fossil fuels run out. Majority of scientists believe that peak oil has already been passed. This led the world to consider alternative and renewable energy sources. During the latter part of the last century, scientists realized that burning fossil fuel as the major source of energy has other serious issues such as the emission of green-house gases, warming the atmosphere, contaminating water, and polluting the air. Negative impacts of greenhouse gasses, such as global warming, sea-level rises, triggering climatic changes and consequences are now well known. Loss of biodiversity is one of the adverse effects on the biosphere. When it comes to non-renewable energy sources, coal, petroleum oil, natural gases as well as the nuclear fission fuels such as uranium, are dominant. Out of them, other than the nuclear fuel, all others, i.e. fossil fuels, are known as “dirty” energy, since they all produce greenhouse gases such as carbon dioxide. These greenhouse gases affect all living beings, including humans, animals and plants. Climatic change is one of the largest threats to the biodiversity on the planet.

Undoubtedly, the only foreseeable solution to the energy crisis and the greenhouse emissions is the turning towards renewable energy sources. However, are all renewable energy sources, green? There are questions about the sustainability, cost, adaptability as well as the practicability of renewable energy sources.

### **Objectives**

The objective of this paper is to evaluate both the positive and negative effects of commonly used renewable energy sources on the environment and the biodiversity. This will provide an easy comparison of the popular renewable energy generation methods, and their impacts.

## Results

Table 1. Advantages and disadvantages of the commonly used renewable energy sources

Energy Source	Advantages	Disadvantages	Negative effects on biodiversity
Hydro power	No emissions during operation	Need large areas for water storage & transport Damage to the environment Landslide & flooding risk Unreliable and weather-dependent	Habitat loss of animals Use of water in large amounts Disturbing the nutrient flow Noise pollution
Solar Photovoltaic (PV)	Low maintenance cost Solar energy is free No moving parts No emissions during operation Generally long lasting Scalability - from few KW rooftop to large MW scale solar farms Silent operation	Low energy density High initial cost Unreliable & fluctuating Need large areas for large power plants Processing and purifying of PV material is an energy intensive process Difficulty in recycling of solar cell material	Habitat loss of animals
Solar Thermal	More efficient than PV Low maintenance cost Solar energy is free No moving parts No emissions Silent operation	Low energy density High initial cost Unreliable & fluctuating Usually small scale units	Habitat loss of animals
Concentrated Solar	Solar energy is free No emissions during operation	Only viable in arid and desert areas with no clouds High initial cost Weather dependent Need large open areas	Habitat loss of animals Risk of killing birds and flying insects and their eggs
Wind Power	No emissions during operation	Same as Solar PV Recycling rotor blades very difficult	Threat to birds & bats Noise pollution
Wave Energy & OTEC	No emissions during operation	High initial cost Unreliable and fluctuating	Disturbance to marine life
Biomass & bio fuels	Bio fuels can be used in internal combustion engines	Greenhouse emissions Need of large arable land areas for cultivation	Habitat and biodiversity loss Deforestation
Geothermal	Reliable and stable Not-weather dependent Low operational cost Low environment impact Low land easement	High initial cost Only possible at certain locations Some emissions possible in volcanic regions	Drilling stages can disturb animals Release of cooling water can affect biodiversity

## Discussion

In general, for all energy generation methods, whether renewable or non-renewable, require equipment, specific material and installations. Energy is used for mining of raw materials, processing, production, transport, construction and product use. In certain energy sources, especially where highly specific materials are used, re-cycling is difficult or extremely energy intensive. Comparatively, renewable energy is still more expensive than non-renewable energy,

and difficult to generate. However, compared to fossil fuel, their effect on the biodiversity and the carbon foot print is much less. For example, estimated annual bird deaths in USA due to fossil fuel use, is around 15 Million, while the wind generators only kill about 2% of that figure. Still, every renewable energy source has some costs and negative impacts on the environment.

**Hydropower:** By far the largest source of renewable energy, contributing ~16.2% of global electricity production and about one third of electricity production on Sri Lanka. Hydropower projects can be a major driver of habitat loss/change and fragmentation, as well as blocking fish migration. In addition, hydropower plants and dams can flood extensive upstream areas, cause decline in water quality due to changes in sediment loading and nutrient cycles leading to negative environmental effects such as eutrophication, eventually affecting biodiversity.

**Solar Power:** One of the major drawbacks of the solar electricity is the initial cost per unit energy, which includes the massive cost of energy used during purification of silica. Due to its nature, the solar power is area dependent and has a low energy density.

**Wind Energy:** Similar to solar energy, this is also highly weather dependent power source requiring large unobstructed areas. An estimated 235,000 birds & 52,000 bats are killed annually from wind turbines in the United States. Noise pollution is also an issue with the wind energy.

**Tide Waves and OTEC:** Installations on the sea bed or littoral zones may cause disruption to the marine life. High initial cost and low energy density are other major drawbacks.

**Biomass and Biofuel:** Production of biomass and bio fuels needs large arable areas for fuel crops, causing potential food scarcity, loss of biodiversity due to deforestation and monoculture, and habitat loss (e.g. sugar cane cultivation on Brazil, Oil palm cultivation in Southeast Asia). Biogas production releases methane and burning of biofuel produces CO<sub>2</sub>.

**Geothermal:** Drilling operations and seismic surveys may disturb some wild life, if in a sensitive area. However, geothermal power is one of the most stable sources of renewable energy with minimum effect on the environment and biodiversity.

One of the ways to reduce the impact on the environment is to improve the efficiency of energy conversions. Thermoelectricity is a way of converting waste heat into useful electric energy. Hydrogen energy, nuclear fusion and energy storage are some of the promising areas to replace the “dirty energy”. With technological advances as well as increased awareness, it is possible to reduce the environmental impact of the energy generation.