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## Depleting natural resources and need of biodiesel

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In this era of increasing effects of the human population on the earth and its resources, resource depletion and exhaustion are not uncommon terms. Resource depletion in the simplest of words is the “exhaustion of raw materials within a region”. Further thought and study into this topic gives us a horrific reality check of what is actually happening to the earth and her resources. A few examples are enough to grasp the gravity of the present situation. It has been predicted that oil which runs the whole economy of the country is going to be depleted in another 46.2 years, the gas which we cook within 58.6 years and coal in 118 years. It is high time that we being the most advanced species on Earth realize the after effects of our reckless use of natural resources.

Experts often refer to the two different ends of the environmental problem as sources and sinks. An earlier study emphasized the problem of sources in the form of shortages of raw materials, such as fossil fuels, basic minerals, topsoil, freshwater, and forests (Meadows et al., 1972). Today the focus of environmental

concern has shifted more to sinks, as represented by climate change, ocean acidification, and production of toxics. Declining freshwater resources, peak (crude) oil, loss of soil fertility, and shortages of crucial minerals like zinc, copper, and phosphorus clearly show that the depletion of resources used in production remains critical. The main cause of resource depletion all over the world is over consumption and excessive or unnecessary use of resources. Where man has discovered the value of a particular resource he has extensively exploited it sometimes to the extent of it being completely exhausted. With increasing world population, more and more human beings who have their own needs are being born and this doesn't make the situation any better. Also traditional practices like slash and burn agriculture which used to be considered a useful practice for the renewal and replenishment of forests is now being considered as an event leading to the destruction of our forest resources simply due to the increasing human population that practices slash and burn agriculture.



Technological and industrial development have increased raw material requirement in massive amounts and all these raw materials are directly or indirectly derived from the earth's natural resources. Mining for oil and minerals have extinguished the Earth's supply of these precious resources that take billions of years to form. Large-scale exploitation of minerals began in the Industrial Revolution around 1760 in England and has grown rapidly ever since. Today's economy is largely based on fossil fuels, minerals and oil. The value increases because of the large demand, but the supply is decreasing. This has resulted in more efforts to drill and search other territories.

Another reason for natural resource depletion is the pollution or contamination of resources which are already present. We all realize very late that a particular resource was valuable and that we could have made proper utilisation of it. But often it is too late to do anything.

A fact that we are discovering very late is that forest is a precious resource. Not only does it provide us timber and other NTFPs (Non-Timber Forest Products) but also it provides us indirect benefits like purification of air, replenishment of the water table, creation of a cool micro climate etc. Even the pollutant nitrogen dioxide (NO<sub>2</sub>) is absorbed by the enzyme

rich soil and released as harmless nitrogen. Forests release water vapour which rises and forms the clouds. The working Forest Ecosystem, when restored, will correct climate change.

Another resource which is widely discussed is oil. Whether it's in automotives, economics, history, geography or politics, oil has managed to filter into almost every aspect of our daily lives. It's one of the most discussed (and controversial) commodities that consumers rely on daily. The fluctuating prices of oil are enough to convince the common man of the seriousness of the situation. Prices increase, strikes are conducted, prices reduce and then the whole cycle continuous again. The price of oil is actually supposed to be really high as it is a resource which is getting depleted at a fast pace. But due to the whole economy turning topsy-turvy if the prices of oil are increased, that is not happening. It is high time we look into this grave situation that we are all ignorant of. If we continue drilling the earth for oil like we are doing now, the whole landmass of the gulf countries is going to slip. Oil depletion is happening at a fast pace and if we don't act at the right moment which is now we might be losing the major fuel of our economy. If that happens we will be facing a helpless situation where the whole

economy will come crashing down and a rapid inflation will happen. To prevent this we need to think about alternative methods of fuel which are feasible as well as productive and energy efficient. It is necessary for us to think about all kinds of alternate fuels from bio-based fuels and fuel cell technologies to solar energy and wind power. Things like electric cars and hydrogen fuel cells are being talked about as feasible alternatives to oil. In areas where there is a long duration of day hours cars can be run on solar energy which is being practiced in some parts of Africa. Solar charging is a viable business in these areas and it is able to provide services for mobile phone charging, car battery charging and lantern charging. Solar PV (Photo voltaic) offers an alternative to kerosene, diesel generators and dry cell batteries.

Switching to alternate sources of fuels made from biological ingredients and not fossil fuels like biodiesel is a step that we will all have to undertake to save the remaining oil on the planet. These starting ingredients can range from corn to soybeans to animal fat, depending on the type of fuel being made and the production method.

**Biofuel History:** The concept of biofuels is surprisingly old. Rudolf Diesel, whose invention now bears his name, had

envisioned vegetable oil as a fuel source for his engine. In 1900, for example, at the World Exhibition in Paris, France, Diesel demonstrated his engine by running it on peanut oil. Similarly, Henry Ford expected his Model T to run on ethanol, a corn product. Eventually petroleum replaced these fuels because it proved to be the more logical fuel source. This was based on supply, price and efficiency, among other things. Though it wasn't common practice, vegetable oils were also used for diesel fuel during the 1930s and 1940s.

Bio-diesel as the name suggests is a kind of fuel made from vegetable oil- or animal fat-based diesel fuel consisting of long-chain alkyl (methyl, ethyl, or propyl) esters. According to ASTM (American Society for Testing and Materials) biodiesel is a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the requirements of ASTM D 6751. Biodiesel is typically made by chemically reacting lipids (e.g., vegetable oil, animal fat with an alcohol producing fatty acid esters. Unlike the vegetable and waste oils used to fuel converted diesel engines biodiesel is meant to be used in standard diesel engine. It is both non-toxic and renewable. Because biodiesel essentially comes from plants and animals, the sources can be

replenished through farming and recycling. Although animal fat can be used, plant oil is the largest source of biodiesel. Scientists and engineers can use oils from familiar crops such as soybean, rapeseed, canola, palm, cottonseed, sunflower and peanut to produce biodiesel. Biodiesel can even be made from recycled cooking grease. An advantage of bio diesel is that it needs little or no modification to be used. Although it can be used in its pure form it is often blended with standard diesel fuels. Biodiesel is environmentally friendly such as

- It can help reduce dependency on foreign oil.

- It helps to lubricate the engine itself, decreasing engine wear.
- It can be used in almost any diesel with little or no engine modification.
- It is safer than conventional diesel.
- The main key points of biodiesel are that it has fewer emissions than standard diesel, is biodegradable, and is a renewable source of energy. Biodiesel does reduce hazardous emissions. Of the current biofuels, biodiesel is the only one to have successfully completed emissions testing in accordance with the Clean Air Act.

<b>Average Biodiesel Emissions Compared to Conventional Diesel</b>		
Emission Component	B100	B20
Total Unburned Hydrocarbons	-67%	-20%
Carbon Monoxide	-48%	-12%
Particulate Matter	-47%	-12%
NOx	+10%	+2%
Sulfates	-100%	-20%
PAH	-80%	-13%

(Source: National Biodiesel Board)

In addition, B100 can reduce CO2 emissions by 78% and lower the carcinogenic properties of diesel fuel by 94% (National Biodiesel Board, U.S. DOE Office of Transportation Technologies). Much of the world uses a system known as

the "B" factor to state the amount of biodiesel in any fuel mix. Blends of biodiesel are indicated by the abbreviation Bxx, where xx is the percentage of biodiesel in the mixture. For example B100 implies that 100% of the fuel is

made of biodiesel, B30 implies that 30% of the fuel is made of biodiesel and 70% is made of petro-diesel. Blends with 20% or below can be used in diesel engines with little or no modifications.

By far the largest example of renewable resources being substituted for nonrenewables is the use of agricultural products such as corn, soybeans, sugarcane, and palm oil to produce ethanol and biodiesel to replace gasoline and diesel fuels. But the limited energy gain for most biofuels, the use of nonrenewable resources to produce these “renewable” resources, and the detrimental effects on people and the environment are so great as to make large-scale production and use of biofuels unsustainable (Magdoff, 2008).

The era of abundant cheap resources is drawing to an end, for reasons equally straight forward. It is highly recommended that we slow down our resource utilization. If careful measures are not taken right now

we will have to face the consequences in a harsh way. Even now it's too late to do anything but as the saying goes “It's better to be late than never”.

#### References:

- Meadows, D. H., Meadows, D. H., Randers, J. And Behrens, W.W. 1972. *The Limits to Growth*. Universe Books, New York.
- Magdoff, F. 2008. *The Political Economy of Biofuels*. *Monthly Review* 60(3) 34–50.
- Biomass - the growing energy resource - Australian Academy of Science ([www.science.org.au/nova/039/039key.htm](http://www.science.org.au/nova/039/039key.htm))
- National Renewable Energy Laboratory ([www.nrel.gov/lab/pao/biomass\\_energy.html](http://www.nrel.gov/lab/pao/biomass_energy.html))
- Exploring Ways to Use Biomass Energy. U.S. Department of Energy Consumer Guide Biomass. U.S. Department of Energy.