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Reducing Environmental Impact via Off Grid Living

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Introduction

Off-grid living is an eco-conscious lifestyle that is becoming increasingly common around the world. It serves as an alternative to modern day living, in which households are dependent on public utility systems. In developed countries, these widespread utility systems are conveniently providing water and electricity to rapidly increasing populations. However, these contemporary conveniences have been established at the cost of environmental friendliness.

To this day, energy provided to households is almost entirely produced by burning fossil fuels, releasing harmful greenhouse gasses into the atmosphere, and ultimately contributing to global warming. Not only that, but many other systems tied with an average household, such as water, food, and waste, contribute to harmful effects on the environment and atmosphere. In an off-grid living situation, a household would become self-sufficient in their needs, breaking free of the non-eco-friendly public systems, thereby reducing their carbon and waste footprints.

This poster will serve as an exploration into the differences between an average American household, and an off-grid living situation, in order to display how an off-grid lifestyle is a powerful solution to reducing a household's environmental impact. Environmental impact will be defined as resource usage, carbon emissions, and waste.

Process Description

The process of Off-grid living has to do with a wide-range of components that have to be considered. There's multiple key components when structuring an Off-grid living housing unit. To start this process, these processes include the following:

1.) Solar Pannels: Solar Pannels are a great and efficient way to help decrease your carbon footprint. Solar Pannels are a great energy efficient way that starts with generate power by catching the rays from the sun and converting the sun rays into energy for everyday necessities. Solar Pannels are an expensive purchase depending on the house size ranging in price from ($6,000 - $40,000). It pays off in the long run.

2.) Well: Wells are another cost-efficient way to use recycled rainwater for your everyday necessities. The initial cost to install a well can range from ($1,500 - $12,000) depending on the drilling depth of the well.

3.) Compost (Compost Toilet): Composting the right materials Is a great benefit to the environment. It saves water by helping the soil hold more moisture and reduce runoff. Additionally, composting benefits the environment by recycling organic resources such as (Grass clipping, Landscaping trimmings, vegetable peelings, and fruit waste. These organic matters are fast to break down and provide important nitrogen for the soil to keep moist. Traditional toilets are one of the most uses in a average household. When it comes to a compost toilet, this is a toilet that has no water plumbing attached to it. It treats human waste by a process called composing. By turning human waste into compost-like material.

4.) Greenhouse: Planting your own fruits and vegetables is a much more economically friendly way to live as well as decreasing your carbon footprint from going to the local farmers market to get your fruits and vegetables. The cost to build a Greenhouse ranges from ($3,500 - $25,000).

5.) Chickens: Chickens are a great way to produce livestock that produces the lease amount of greenhouse gasses such as Cows and Horses.

Potential Impact Ecosystem Services

Off the grid housing greatly reduces a person's carbon footprint since living in this manner requires more self-sufficiency and living a more minimalistic lifestyle. The solar panels eliminate needing to rely on fossil fuels for power and the green house greatly reduces the dependence on a grocery store for food.

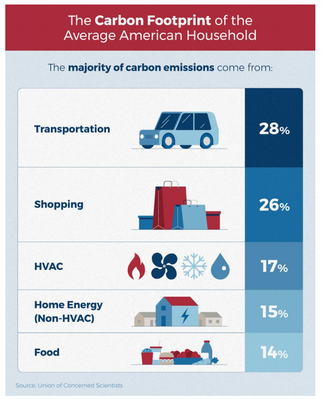

Figure 1: Carbon emission source. (Furnace Compare)

In order to setup this kind of system, the removal of several trees is most likely going to be necessary so that there is enough room for the house, the garden, and the solar panels. Trees will also have to be used as a fuel source for the wood burning furnace and stove meaning that the loss of trees to the surrounding area won't be just a onetime thing. This continual loss of trees to the area around the house could eventually lead to soil erosion, flooding, and loss of habitat.

Proper planning, installation, maintenance, and disposal need to be practiced in order to avoid contaminating the soil and ground water. If any kind of fertilizer, pesticides, or herbicides are used then special precautions need to be implemented to avoid contaminating the soil. Also improperly disposing of toxic materials such as fecal matter both human and animal, batteries, and common household chemicals could cause them to leak out into the soil and eventually into the ground water. This would be both hazardous to the environment and to the people living there since the ground water feeds directly into the well.

Figure 2: Waste disposal contamination. (Government of Canada)

Sensitive Unit

One's lifestyle and economic situation play critical roles in off grid living overall. These aspects are tedious and not usually favorable.

Lifestyle

In an off-grid setting, one is completely excluded from all large communities unlike a suburban setting. This could potentially serve as a massive learning curve for the ones who are not used to being lonely on occasions. Although, there are quite a few off-grid places for those who prefer to have some type of community like "The Three Rivers Recreation Area located in Oregon, USA." (Murray) Though, if one is new to the off-grid lifestyle, there will be some learning curves. For example, growing food for oneself as well as switching to reusable items.

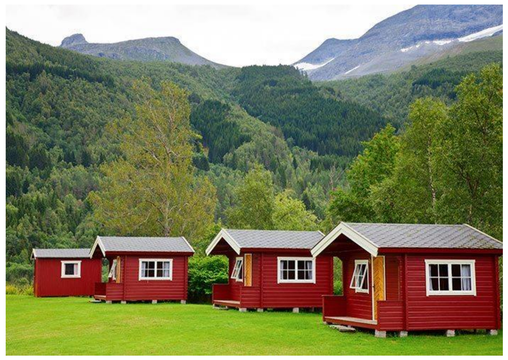

Figure 3: Three Rivers Recreational area. (Eric)

Finances

In order to successfully live in an off-grid setting, there are quite a few expenses that one would need to tackle. One is purchasing land. According to The United States Department of Agriculture, in 2019, one acre of land costs on average $4960 per acre in the state of Michigan, which is one of the cheaper places to buy land. (Murray). One must also have to purchase a tiny house or use other options that are more economically friendly like using a personal van. The most expensive part of the transition to off-grid living is the electricity source. Either solar panels or wind turbines will be used and both cost at least fifteen thousand dollars. There are other expensive pieces of this off-grid life like greenhouses for agriculture and implementing a well for water. If you one is in an economical favorable situation then off-grid living might be too expensive.

Figure 4: Off grid house utilizing solar power for the source of energy. (Steph Coelho)

Research

Hypothesis: Consciously done off-grid living can lessen the environmental impact when compared to "on-grid living" regarding the areas of resource conservation, carbon emissions, and waste

Protocol:

- Establish control group of average suburban households located in similar geographic regions to the experimental group.
- The experimental group should consist of an off-grid household configured with solar panels, well water, composting toilet system, as well as compost pile, livestock limited to chickens, and a greenhouse for agriculture.
- Both households in control and experimental groups should be between 3-4 people.
- Data should be collected by:
  - Measuring energy and water used each month
  - Logging food harvested or bought (by collecting food receipts).
  - Keeping daily meal logs
  - Collecting trash samples weighing trash weekly
  - Waste added to compost pile should also be weighed and logged (specifically stated if food waste, or yard clippings, etc.)

Analysis:

- When evaluating data, it is important to consider many aspects outside of simply how much each household consumes but also:
  - The source of energy, such as renewable/nonrenewable to determine carbon footprint
  - Where the food is obtained from whether it be grocery store/garden since shipping and travel increase the carbon footprint
  - The specifics of what is thrown away, as plastics take much longer to decompose than others, as well as where the trash is headed (landfill, incinerator, compost)
- An estimate of a carbon footprint for each respective household can be determined, collected, and then can be compared.

Other Considerations: Environmental impact can be greatly impacted by wealth status, and off-grid living can be extremely costly. Another factor that can influence environmental impact include culture/lifestyle, such as diet, attitude toward recycling/environment, and choices made in transportation.

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