Background Information and Discussion Topics - Natural Resources: Renewable Resources

A natural resource is by definition, anything from nature that can be used by people. If we look close enough at the base materials of a product, almost everything we use comes from a natural resource.

We divide natural resources into two categories. Renewable natural resources are those that will be replaced in the natural environment quickly enough to be used again in the foreseeable future. Renewable energy sources such as wind and solar energy are commonly referred to in discussions of renewable energy, but many harvestable items are also renewable. Crop plants such as cotton, corn, and bamboo are renewable resources. Most animal products are also renewable resources. Silk, wool, milk, fish, leather, and eggs are just a few examples. The line between renewable and non-renewable resources begins to blur when we discuss the way those renewable resources are harvested and other life history and environmental factors surrounding the use of living organisms.

Paper is a renewable resource, but is paper made from trees grown in tree plantations that will be replanted and grow quickly the same resource as paper made from old-growth forests? If we consider a renewable resource something that will be reusable within a foreseeable future, then mature redwoods can be effectively considered a non-renewable resource as many in the Pacific Northwest are thought to be up to 3000 years old. Once those forests have been harvested, they will not grow back within our lifetimes, or our great-great-great grandchildren's lifetimes. The same thought process applies to bamboo plantations vs old growth bamboo, and other plant resources such as cypress mulch, mahogany, cork, etc.

As for animals, harvesting methodology and life history considerations are just as important as with plants. Most fish are a renewable resource, as long as they are not harvested below a certain population size. A lot of factors are involved in determining how much of a particular species can be harvested before a population can no longer survive. Genetic diversity in populations allows for adaptation to changing environmental conditions and helps populations survive. Too few individuals can create a genetic bottleneck, a lack of variation that could lead to population decline or the inability for a population to adapt. Susceptibility to disease is a big concern when genetic diversity of a population is low and can have devastating results, as exemplified by the Irish potato famine and the American chestnut blight.

Another important factor in resource use is the life history of an organism: how long it takes for an individual to mature to reproductive age, how many young a single female will have when she reproduces, how many times an individual reproduces in its life, and environmental factors influencing growth and reproduction are all important factors that influence how renewable a population of living organisms may be. If a female reproduces within a year of birth, reproduces multiple times a year, lives for many years, and has lots of young each time she reproduces, that population will be more likely to be sustainable than a population where the females reach reproductive maturity after 20 years, reproduce only once, and only have a few young. These two examples are opposite ends of a wide

spectrum, and represent just some of the factors that resource managers and conservation scientists have to take into account in order to make sure that these renewable resources stay renewable.

Environmental effects of harvesting renewable resources are also a concern when discussing resource use. Some environmental effects are obvious. Clear-cutting timber forests lead to erosion of soil, pollution of water sources, and loss of habitat for native species. Selective logging and timber plantations are some of the management strategies put in place to allow timber harvesting without the damaging effects of clear cutting. Other environmental effects are not as obvious, and may not even be recognized as related to resource harvesting for many years. An example of this is a community effect or "cascading ecosystem effect" wherein a change in the availability of a resource or the presence/absence of an organism affects a seemingly unrelated organism or the whole ecosystem. Often, changes in an ecosystem at the community level in response to resource harvesting are not predictable and are only noticed after the fact, making them extremely difficult to manage for.

Environmental considerations of renewable resource use are vast and can become quite complicated. How is the resource processed, packaged, and sold (are non-renewable resources such as oil or natural gas used in the processing and packaging of renewable resources?), and where does it come from. We have already discussed old growth forest, but many other ecosystems are rare and vulnerable, and in addition to the biotic, or living part of an ecosystem, unsustainable harvesting practices can also affect the abiotic, non-living, portion of the environment. An interesting example to consider is cotton. Cotton requires a lot of sunlight and a large amount of water to grow. Cotton grown in the Southeastern US (though it certainly has its own issues) where both sunlight and water is relatively plentiful may be considered a more renewable resource than cotton grown in Egypt where sunlight is plentiful, but water for irrigation is drawn from fossil aquifers that are essentially nonrenewable. Issues such as this lead us into not only environmental, but also human health concerns in regards to water shortages or water pollution problems, food shortages, and even spread of disease. Unsustainable resource use, even of renewable resources, can have a variety of negative effects on people and the environment.

A common concern in food these days can also apply to other natural resources: Is the resource harvested locally (and how far away is "local?") or far away? Transport and storage, in addition to processing and packaging is another way that non-renewable resources are often used in the transition of renewable resources from nature to our homes. Renewable resources that are harvested from far away (bamboo in China, cotton in Egypt, etc.) must be shipped or flown in order to reach our markets. If trees in South Carolina are harvested and made into paper in South Carolina less resources are used than if those same trees are harvested and made into paper in China and then shipped to South Carolina to be sold.

As in so many aspects of Sustainability, we must weigh these issues ourselves and make choices. These are not black and white concepts, and there are rarely right or wrong answers to these sorts of questions. It is important to understand that just because we consider a resource "renewable" does not

mean that there are not consequences surrounding the harvest and use of that resource. Resource managers and conservation scientists as well as policy makers, harvesters, and consumers all have a responsibility to weigh these issues when appropriate and try to make the best decisions that they can in regard to the harvest and use of natural resources. Ideally, with careful research and planning as well as recycling, reuse, and public awareness, most renewable resources can be sustainably harvested and will continue to be available to be used by future generations.

- For more information and examples of cascading ecosystem effects and community interaction, view the following references:

Amsel, Sherry. 2011. Keystone Species: Sea Otter. http://www.exploringnature.org/db/detail.php?dbID=7&detID=77

Wolf Reintroduction Changes Ecosystem. 2011. http://www.yellowstonepark.com/2011/06/yellowstone-national-park-wolf-reintroduction-is-changing-the-face-of-the-greater-yellowstone-ecosystem/

REFERENCES

Chapagain, A.K., Hoekstra, A.Y., Savenije, H.H.G, and R. Gautam. 2005.The Water Footprint of Cotton Consumption. Value of Water Research Report Series No. 18.UNESCO-IHE Institute for Water Education. http://doc.utwente.nl/58372/1/Report18.pdf

Information and photographs of Redwood Old Growth Forest:

Sequoia National Forest. 2006. USDA Forest Service. Retrieved Dec 21 2011. http://www.sfgate.com/getoutside/1996/apr/rwecology.html