Isn't That Spatial

--Joseph J. Kerski

In my last column, I provided what I consider to be core geographic content about biomes, the biosphere, ecosystems, ecoregions, and ecotones.  I wish to discuss other topics that are of major concern to our Earth and its people, and central to geography's themes of human-environment interaction and change:  **deforestation, reforestation, and afforestation.**

**Reforestation** is the replanting of trees in an area that was once forested but where the trees have been cut or destroyed.  This could be because of a forest fire or because trees were clear-cut for lumber.

**Afforestation** is the process of transforming an area into forest, usually when trees have not grown there before.  Afforestation may be used as part of a program to reduce flood hazards in a drainage basin, because increased interception by the trees slows down the rate of water movement.  It could be for the purpose of windbreaks, as on the Great Plains of the USA, or to create a park, as in the case of the Nebraska National Forest.  Afforestation is not without criticism, but is often seen as a solution to reduce soil erosion, reduce greenhouse gases, provide timber for local craft industries, and for improving local fuel-wood supplies.  Natural afforestation has occurred in many areas of the northeastern USA as areas that were formerly cultivated are reverting to the natural forest cover, from Maine to Pennsylvania.

In the UK's Lake District, Ennerdale Reservoir's capacity was increased during the 1930s to provide water to the growing cities of the Northwest, especially Manchester.  Extensive tracts of coniferous forest were planted in Ennerdale to improve the hydrology and reduce situation of the reservoir.  In Bihar, India, a tribal group named Sahyogi Mahila has helped afforest 523 hectares of barren land by planting nearly 2 million saplings, of which 90% have survived.  This group began in one village with 70 families and 10 hectares of acacia trees, and has since spread to 47 villages.  Each village handles everything from planting to keeping out cattle and collecting fines.  The European Union's Common Agricultural Policy has provided afforestation grants to prevent overproduction in agriculture and to increase biodiversity.  In Ireland, policies aim to increase forest cover from 8% to 17% by 2035.

**Deforestation** is the process of clearing of forests, most commonly by burning or cutting down trees, either by clear felling or selective felling.  Perhaps no other human activity has had such a global impact on land cover:  About 40% of the world's forests have been removed or replaced either by smaller and less diverse vegetation or by artificial, impervious surfaces.  Deforestation isn't new—it has been going on for centuries to provide land for settlement, for agriculture, and wood for fuel, building materials, furniture, and paper.  However, nowadays, so many human activities involve a disruption of forest cover, including mining, dams and reservoirs, and airports.  Until 1900, the greatest impact of deforestation had been in temperate lands, the Mediterranean, and Monsoon Asia.  Today, rates of deforestation are highest in tropical rainforests and the northern Boreal forests of Canada and Scandinavia.

Deforestation is a global issue, transcending the boundaries of countries and cultures, making it an important and relevant topic for discussion in geography courses.  Its

impact may be positive in terms of providing space for energy, water, transportation, or agriculture, but it has many negative impacts as well.  Deforestation increases soil erosion and flood threats because roots no longer exist to bind the soil and forest canopy no longer can intercept the rainfall.  Soil fertility declines due to erosion and the lack of trees to return nutrients to the soil by fallen leaves.  As a result, deforestation may lead to desertification. The loss of the forests leads to the loss of habitats for wildlife, and the loss of homes and the traditional way of life for local people.  On a global scale, deforestation contributes to global warming as less carbon dioxide is being taken in by plants and converted to oxygen.  Pollution from forest fires set to deforest areas of Borneo and Indonesia in 1997 lasted for three months and affected 20 million people.

Many of the outspoken opponents to deforestation come from the developed countries, where just such exploitation took place in the past few centuries in the name of development.  Yet it is the developed world that fuels much of the deforestation, with its appetite for rainforest products such as rubber, special drugs, and mahogany.  The develop world's demand for products from plantations and ranches, such as bananas, coffee, and beef, also put continued pressure on tropical land.  Increasingly over the past few decades has come the enormous impact of tourism, with its hotels, golf courses, airports, and roads and trails to connect all of its associated infrastructure.



Ironically, Costa Rica, which has one of the highest percentages of land in national and private preserves of any country in the world, for many years had one of the world's highest deforestation rates on the *unprotected* lands.  Above, deforestation on steep,

erosion-prone slopes in the rainforest adjacent to a resort on the Pacific Coast of Costa Rica.  Photograph by Joseph Kerski, 2005.

**Examining Afforestation, Reforestation, and Deforestation in the Classroom**

Questions you could pose in your geography classroom concerning these issues include the following:  So often, students are keen to disparage the negative impacts of deforestation and don't think about how we are all are involved.  Ask students:  What are the benefits of deforestation?  Next, have them list things in the classroom and at home that are made out of wood products.  In our information age, do we need less forest products, or more?  What are alternative sources for these products, and how could we reduce our demand for these products?  What areas of the world saw the most widespread deforestation in the 1800s?  The 1900s?  Thus far in the 2000s?  Why?  What are some examples of deforestation in your community and why are they occurring?  What examples of deforestation have you personally witnessed?  What was the natural vegetation in your neighborhood before your house, apartment, or school campus was constructed?  To what extent do developing countries have the right to exploit their natural resources to move along the path of development and to provide an acceptable standard of living for their people?  Can a "middle ground" be found, one in which sustainable development of the forests can be achieved?  How?  Discuss the costs and benefits of creating and maintaining natural parks, replanting programs, increased prices for rainforest products, and development of ecotourism opportunities.

**Resources to Examine Afforestation, Reforestation, and Deforestation**

Kerski, Joseph J. and Simon Ross.  2005.  *Essentials of the Environment*, ISBN 10 0 340 81632 5,  London, UK:  Hodder Education, book available from Hodder Education.com, Amazon.com or Oxford University Press.

Compare old topographic maps and old aerial photographs or your community (or other areas) to new topographic maps, aerial photographs, and satellite imagery.  See my former column about how to obtain these resources but start with www.topozone.com, nationalmap.gov, and terraserver-usa.com.

USGS Landsat satellite Imagery 1975-1992 showing deforestation in Brazil: http://edcwww.cr.usgs.gov/earthshots/slow/Rondonia/Rondonia

USGS Forest Cover of the USA map, stock number 100615: http://rockyweb.cr.usgs.gov/outreach/mapcatalog/land.html

USGS Land Cover Map of the USA, stock number 112765: http://rockyweb.cr.usgs.gov/outreach/mapcatalog/land.html

Global Forest Watch's Interactive Maps of the World: http://www.globalforestwatch.org/english/interactive.maps/index.htm

Global Forest Watch's Map of North America: http://www.globalforestwatch.org/english/us/images/map1_forweb.gif

US Forest Service report on forest changes in the USA from 1952 to 1997: http://www.fs.fed.us/pnw/pubs/pnw_gtr613.pdf

Simulation of Forest Cover map of the world in 2025 using GIS and Remote Sensing:
http://www.gisdevelopment.net/aars/acrs/1997/ts12/ts12003pf.htm

World deforestation rates and forest cover statistics:
http://news.mongabay.com/2005/1115-forests.html


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