The Deniable Truth of Sustainable Forestry

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The Deniable Truth of Sustainable Forestry

Let's start with the deniable truth—at present sustainable forestry is rare or localized. This is apparent when looking at global scales but also at regional and local scales. Globally, deforestation and land conversion continue. There is less forest each year (-5.2 million ha yr^{-1}), and conversion of frontier (primary, or ancient) forests to second growth forests of shorter rotations of non-native species and lower tree diversity is common (-40 million ha 2000-2010, FAO 2010). The extraction of historic timber has been used to build economies from one part of the planet to another. This is deniable because in a global economy, timber use and extraction are often disconnected. Deniable because we have defined sustainable forestry so broadly that we can all agree that it is "good" without having a common understanding of the term. Finally, deniable because forestry operates on rotations that exceed human life experiences and expectancies, meaning any collapse of a system comes long after generations who initiated the process.

First, let's define what sustainable forestry is not. No one would argue that the conversion of forestland to pastureland, agriculture, or residential development is sustainable forestry. Some private landowners seek to maximize their economic gain through selling land for development or prematurely harvesting timber to meet financial obligations. Intensity and frequency of harvest provides a grey area as differences in opinion regarding proper management often exist. For example, some argue that the U.S. Forest Service no longer practices sustainable forestry because most timber extraction has been curtailed by lawsuits. However this view may too narrowly define forestry, because special forest product extraction is typically permitted and this allows the possibility of sustainable forestry, as permitting systems typically prevent overuse. In contrast, few would argue that *deforestation* by residents seeking fuelwood is sustainable forestry, a common occurrence in much of the developing world. Protected areas (e.g., U.S. National Parks) that exclude extraction are also not sustainable forestry as no human extraction takes place.

Frequently cited definitions of sustainable forestry are based on the unity of the extraction of economic goods, social needs of humanity, and ecological needs of the forest under consideration (e.g., Oliver and Deal 2007) (Figure 1). The concept of sustainable forestry has gained wide popularity under this approach because it appeals to most people who project their own values onto this poorly defined space. A potential disservice of the approach is that it presumes equal weight to social, economic, and ecological needs. This has led to eloquent statements that sustainable forestry involves a proper balance among these three needs; unfortunately some have used the unity *ideal* to detract from the importance of ecological needs. This definition of sustainable forestry (as well as sustainable agriculture and sustainable development) are thus likely too broad

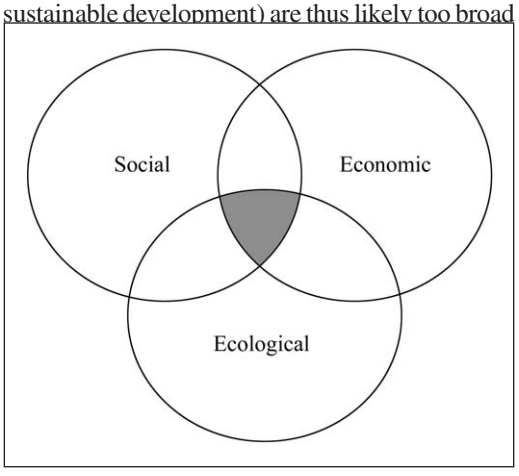

Figure 1. Venn diagram approach to defining sustainable forestry with each circle representing the conceptual space of social, economic, and ecological needs related to forestry in a system. The shaded space defines the boundary of sustainable forestry.

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to be useful; Rolston (2002) defines this as the, "big green umbrella problem" in which most ideas of management can fit the definition.

The intensity and frequency of extraction and the relative balance of extraction to the ecological function of the forest are difficult to define. Although social and economic needs are distinguishable, we have a better chance of achieving sustainable forestry with a definition that lumps social and economic needs. Human needs are critical to defining sustainability. However, the amount of money made through forestry, or the equitability of distribution of those benefits to humanity is of secondary importance. Current inclusion of two human needs (social and economic) of the three elements may skew the conversation away from ecological requirements.

The challenge is to create more useful definitions of sustainable forestry. *Maximum sustained yield* exists where the maximum human use of a forest does not diminished future returns or the ecology, thus defining the maximum rate of human use (Figure 2). *Economic sustainable forestry* can be defined as extracting the greatest amount of revenue from the land that does not diminish the public good—as close to maximum sustained yield as allowed by society. The exact intensity and frequency of harvest to achieve this yield is determined by regulations. Environmental and stochastic variation and potentially lax regulations make the risk of degradation very real but not inevitable.

We also need to define the lowest intensity of sustainable forestry. In a developed economy the concept of *minimum sustained yield* is likely to apply, in that land that cannot generate revenue to support the costs to the land owner of holding the land (e.g., taxes), leading to conversion to, "higher and better use." Working forest is a common term used to describe forests with timber extraction. I define *working forests* as forests capable of generating sufficient revenue to pay the costs of holding the land. There is broad support for working forests, perhaps because it emphasizes American, "work ethic," praising the land's (owner's) ability to meet financial obligations. Non-working forests or *welfare forests* in contrast, would not yield revenue to meet their tax obligations, and require subsidies from tax payers. Subsidizing low intensity forestry is a likely outcome in developed, free market systems, especially with uneven or changing regulations.

We also need to define a low intensity of sustainable forestry purely from the ecology of the system (e.g., Callicott and Mumford 1997). Protected areas that exclude human use are outside sustainable forestry, however in other areas, a minimum level of extraction might be defined. For example, salvaging recently dead and down materials could be considered a minimum extraction or *subsistence sustainable forestry*. Ecologically this is meant to be equivalent to minimum harvest pressure. This definition is distinct from the practice of subsistence-level fuel wood gathering that may simultaneously be the minimum a family needs to survive but still exceed the capacity of the land.

Ecological sustainable forestry emphasizes ecological processes as a management guide by attempting to mimic the frequency and intensity of disturbances that would occur through natural

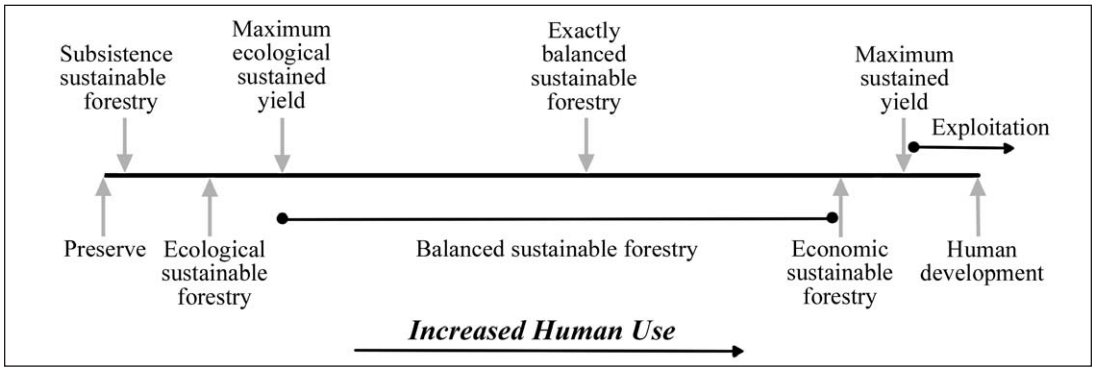

Figure 2. The continuum sustainable forestry concept combines the social and economic needs into one and contrasts harvest intensity from preservation to maximum sustained yield. The harvest intensity and also the satisfaction of human need increase from left to right. Terms defined in italics in the text are placed along this gradient for comparison and demonstration of the sustainable forestry conceptual space.

processes. For example, low severity wildfire might be mimicked through variable silvicultural thinning and underburning. Ecological sustainable forestry demands a landscape approach, returning the land to its historical age, size, structure, and species compositions. This approach would argue for vast areas of plantation to be converted to natural stand development trajectories. Most forested landscapes are so altered (e.g., substantially younger and uniform) from their original state that under this definition massive restoration efforts would be required. Management plans that take the landscape *closer* to historical conditions could be considered ecologically sustainable, and the maximum timber harvest that achieves this goal could be termed *maximum ecological sustained yield*. The process of moving forested systems toward historical conditions could be termed *restorative forestry*, and the speed of restoration would depend on how close one chooses to harvest toward the maximum ecological sustained yield. The most fundamental point here is systems in which ecological measures are clearly and steadily improving: increased soil quality, older stands with structures and diversity closer to native systems are more likely sustainable.

Finally, *balanced sustainable forestry* is the continuum from economic to ecological sustainable forestry, including any harvesting with an intensity and frequency that lies between the extremes. This category returns us to the, "big green umbrella" in which most intensities of harvest would fit. Economic pressures often necessitate moving away from ecological sustainable forestry and we need some means of avoiding categorizing these intermediate levels of sustainability as equal. A useful term might be *exactly balanced sustainable forestry***,** a halfway point between ecological sustainable forestry and economic sustainable forestry for any location. However, the exact amount of harvest that achieves a balanced sustainable forestry is more political a question than the boundaries of ecological and economic sustainable forestry that are at least theoretically determinable.

Lack of regulations in many developing countries has led to large-scale deforestation and degradation. In developed countries, economic and regulatory pressures mandate economic sustainable forestry more than ecological sustainable forestry, and regulations that reduce yields have the unintended consequence of land conversion and/or shifting production to less regulated countries. Much of the Pacific Northwest has sufficiently complex land ownerships (mixture of federal protected and private working forest) that ecological or balanced sustainable forestry definitions may apply, but in locations (or at scales) that lack federal protected areas, sustainable forestry is in question. Sustainable forestry is rarer than public perception, and precise definitions of sustainable forestry should facilitate our understanding. At a minimum it should prevent us from hiding under the, "big green umbrella" and face head-on the deniable truth.

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