

Reaching a forest land per capita milestone in the United States

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Abstract During April 2007, forest land per capita in the United States dropped below 1 ha. This is the result of a rather static area of forest land in the United States for the past 100 years combined with population growth. The US now joins the ranks of most countries (77%) having forest land per capita below 1 ha. The combination of an increasing human population with stable or increasing per capita natural resource utilization may place even more demand on resources derived from forest land in the future. The forest land per capita should be expected to continue its downward trend unless substantive demographic, resource utilization, and land-use changes occur.

Keywords Forest land area · Sustainability · Population growth · United States

1 Forest area and population trends in the United States

It has been estimated that in 1630 there were over 420 million ha of forest land in the US (Kellogg 1909; Smith et al. 2004). However, this estimate is merely an educated guess regarding a dynamic natural resource that was affected by widespread natural disturbances (e.g., fires and insects/disease) and forest land conversion to agricultural systems by indigenous inhabitants (Mann 2005). No systematic inventory of US forests was conducted until the early twentieth century when the USDA Forest Service's Forest Inventory and Analysis (FIA) program was

delegated the task by Congress to report on the current status and trends in US Forest Resources (Frayer and Furnival 1999). Forest land estimates for the US from 1907 to 2002 are available from the most recently published FIA report (Smith et al. 2004). The FIA's estimates for 2006 are based on the most recently assembled inventory data (for sampling and estimation procedures see Bechtold and Patterson 2005). Since the beginning of the twentieth century, total forest land area in the United States has remained static at around 300 million ha, much lower (29%) than estimated upon European settlement (Fig. 1). Currently, forest land area in the US is estimated by FIA to be approximately 301.6 million ha. It is important to note that although forest land area has remained stable, forest volumes and biomass have still increased greatly representing denser and/or more mature forests on the same unit of area (Woodall et al. 2006). Given the past 100 years of stable forest area and current land-use trends (e.g., urbanization, parcelization, and fragmentation), the most hopeful future scenario is that forest land area will maintain its current area with little opportunity for forest area to increase towards its historic 420 million ha extent.

Human population data coupled with affluence/consumption information is one key to understanding the sustainability of forest land area in the US. The first census occurred in 1790 and every 10 years thereafter. The population of the US has been increasing rapidly for the past 100 years (Hobbs and Stoops 2002) (Fig. 1). On October 17, 2006, the population of the US reached 300 million with a live birth every 7 s, a death every 13 s, and one new immigrant every 31 s (US Census 2006). It is projected that the US will add another 100 million residents to its population in approximately 30 years (US Census 2004). The US population was estimated to have exceeded 301.6 million during April 2007 (US Census 2007). In contrast to population

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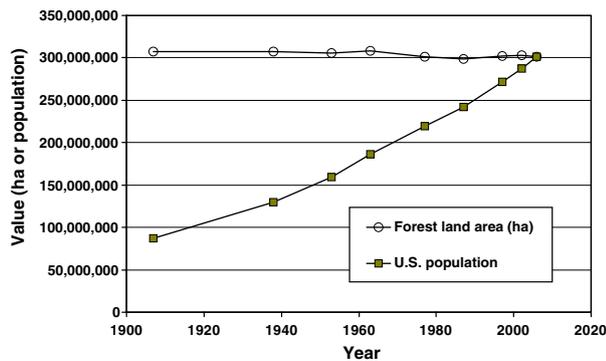


Fig. 1 Estimates of forest land area and human population in the United States, 1907–2007

growth, the consumption of domestic forest resources has remained stable during recent decades (Howard 2001; Smith et al. 2004) with any increases offset by imports.

2 Per capita forest land area

During April 2007, forest land per capita in the US (ha of forest land area per person) fell below 1. The forest land per capita at the turn of the twentieth century was approximately 3.5. In another 30 years, the forest land per capita may reach 0.75 based on current population projections and a stable forest land area. These estimates represent an increasing annual rate of forest land per capita change. Given that US residents are relatively affluent consumers with a growing ecological footprint (Dietz et al. 2007), the future may see increasing population commensurate with increasing consumer demand for forest resources (e.g., water, bioenergy, and wood products) being met with static or declining domestic supply. A key unresolved question is whether the production of natural resources from US forests can match the rising demands from a growing US population?

When viewed in the context of the forest land per capita of nations around the world, most nations (77%) have a forest land per capita less than one (Fig. 2) (FAO 2006). In contrast, nations such as Canada, Russia, Australia, and Finland have forest land per capita levels over four times that of the US. Although the US has traditionally been thought of being forest “rich,” in a global context this may no longer be the case on a per capita basis. However, given the sheer absolute number of ha of forest land and its associated resources, the US still ranks highly among all countries (Alvarez 2007).

3 Forest land per capita as a sustainability threshold

As documented by decades of assessments in the US, forest land area has remained stable. In contrast, the US

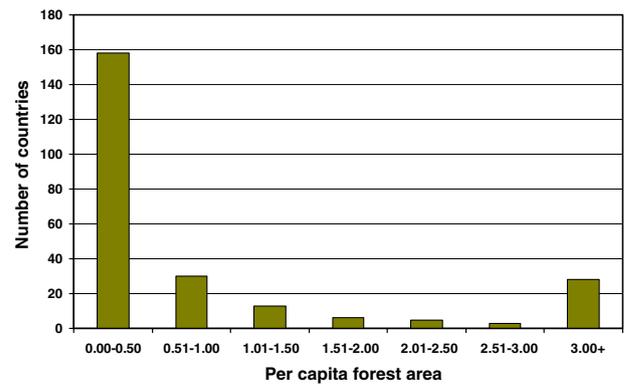


Fig. 2 Distribution of forest land per capita (forest land ha per person) among 228 countries, 2005 (based on estimates published by FAO 2006)

population has surged along with stable or increasing per capita natural resource utilization (e.g., per capita consumption of energy and wood products; Howard 2001, US DOE 2006). If forest land per capita is used as an indicator of limits to forest resource availability, it can be hypothesized that the accretion of forest resources in the US will be threatened by greater development forces in the future unless substantial resource development efficiencies are realized. Several recent trends in the US point toward increased pressure on resources produced on forest land including: the conversion of private forest land into urban developments (Sampson and DeCoster 2000), the expansion of agricultural lands for biofuel production (Giampietro et al. 1997), and rapid climate change (Allen and Breshears 1998). Even national efforts to sequester carbon through forest growth will be limited by static or declining forest area in the US. If a forest land per capita of one still indicates sustainable forest resource management in the US, what per capita threshold may signal a tipping point towards unsustainable reductions in forest resources?

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