

People, Forests and Forestry: New Dimensions in the 21st Century¹

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Background

In 1900, as professional forestry was establishing its roots in the United States, the population of the contiguous 48 states was reported at 75 million. In 2000, as the Society of American Foresters is celebrating its Centennial, the population estimate for that same area stands close to 275 million. The addition of some 200 million people to the Nation, on top of a Century's efforts to protect some lands from natural resource exploitation, makes it readily apparent that the people-land equation has changed dramatically. What those gross changes do not tell, however, is where and how the situation has changed, and what those changes may mean to working lands over the next few decades.

This paper takes a look at the facts and trends about people and forests in the United States, in an attempt to identify some of the trends that will challenge foresters and forestry program managers in the near future. How can private forests be managed sustainably, continuing to contribute to both the environmental and economic well-being of the American people? And how can the cooperative federal-state forestry programs best respond to some of the challenges apparent in keeping these forests sustainable? When viewed in conjunction with our concern for retaining working farmland in production agriculture, are the same forces at work? And do the same public policy approaches need to be considered?

It may be useful to start with some notion of the importance of private forests and their relation to the entire forest estate of the Nation. If one listens to the political rhetoric that flies around these days, it is easy to come to the conclusion that the most important forests are the National Forests. But that would be a political, not factual, conclusion. Some 2/3 of all the forests in the United States are privately owned, and if the state and county forests are added, the non-federal forests make up 3/4 of our total forests.

In terms of timber production, almost 90 percent of the timber harvested in the United States in 1997 came from private lands. Clearly, these are the lands that are producing revenue that can support sustainable management. And they are also the forests where good sustainable management means the most in terms of protecting the environments in which people live and work. They are the most accessible, and often the dominant, forests in many regions, particularly East of the Plains.

But the future of forests and forestry is not at all certain in many regions of the United States. While it is clear that we can not produce sawlogs or pulpwood in mid-town Atlanta, it is not at all clear how far Atlanta's effect extends outward from the central city. As the impact of a growing population extends Atlanta's influence through clusters of suburban areas, edge cities, and other communities, what does the effectively-urbanized area become? And how much of that urbanizing area is (or is likely to become) no longer any more supportive of sustainable forest production than a downtown city block? Those are questions that affect many of America's

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urbanizing regions today.

As we begin to come to conclusions on those questions, they clearly lead to other questions of equal importance to the future of forests and forestry in a region. As urban-influenced forests can no longer be managed for sustainable timber production, what else changes? Where do the forest products people need come from?

What happens to the forests as forest management becomes less feasible? As the trees continue to grow and those forest ecosystems continue to change, what emerges? Are they the kind of forests that will continue to produce the environmental and amenity services that people desire, or will they become, in some places, an environmental liability – a tangle of briars and overcrowded trees, or a place marked by runaway exotic species, or one that periodically supports wildfires that endanger communities and ecosystems alike? Almost any of these outcomes is possible, depending on the place involved and the condition of the forest as management is halted.

What is least likely to happen in many places, however, is what the majority of Americans would predict if they were asked these questions. Today, the majority of Americans feel that a forest untouched by people – unmanaged – is one that will be the most environmentally satisfactory. In many cases, however, ecologists have a different prediction. Unmanaged forests will not, in many areas, return to the pre-settlement condition that is often held up as the model of a sustainable forest. Too many things have changed in the environment for that system to re-emerge unaided, it appears.

Can such a forest be restored, at least in part? Here, the answer in many places is a qualified “yes, we believe so.” But this will take intensive forest management, at least for a while, to establish the ecosystem conditions that can begin to develop into the forests we want. That is not an answer that will be pleasing to those who promote a return to “natural” conditions, nor is it an easy answer to implement in the face of increasing pressure from urban populations and their effects. Our goal here, however, is not to be politically correct. It is to focus on the people and the forests, and the types of future interactions that may be needed for both to thrive in a sustainable ecosystem.

Population Trends

The addition of 200 million Americans in the 20th Century followed on a growth of around 70 million in the 19th Century. As Figure 1 indicates, the general rate of growth throughout the 20th Century was fairly uniform except for the brief slowdown in the 1930's. The slight slowing in the last two reporting years is due in part to the fact that they report 1999 and 2004 estimates, so they do not reflect decadal change as does the remainder of the graphic.

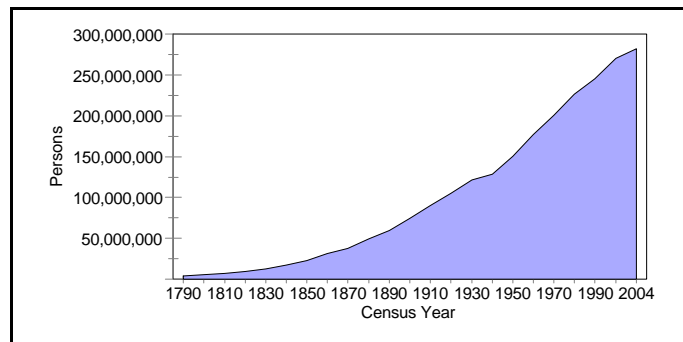


Figure 1. Estimated population in United States, 1790-1999, with projections to 2004. Source: U.S. Census Bureau data by GeoLytics (1999).

The 20th Century growth was accompanied by major shifts from rural to urban areas and from interior lands to coastal regions. Today, it is estimated that 75% of Americans live in places that meet the definition of “urban” area – an area of 2,500 or more.

Population shifting, as well as growth, has been involved. Figure 2 shows, for example, the change in county populations between 1980 and 1999. In percentage terms, the range extends from a loss of 45 percent to a gain of almost 500 percent.

Percentages can be somewhat misleading, however, because the addition of a few people to a sparsely-populated area may result in a noticeable percentage change while involving a negligible impact. But make no mistake – the fastest-growing county in America during the last two decades – Douglas County, Colorado – has grown from about 25,000 people in 1980 to nearly 200,000 today.

Figure 3 illustrates the 1980-2004 change compared to the amount of non-federal land in each county. Since few people reside or build on federal land, this comparison provides a rough index of how the changing population may have affected land use in these counties. The two maps show fairly significant differences in the patterns of change.

Table 1 lists the changes by state and major land region for the last 20 years. It illustrates the fact that most of the recent growth was experienced in the South and West. The northern states, most of which are still growing, have seen much slower growth than the other regions.

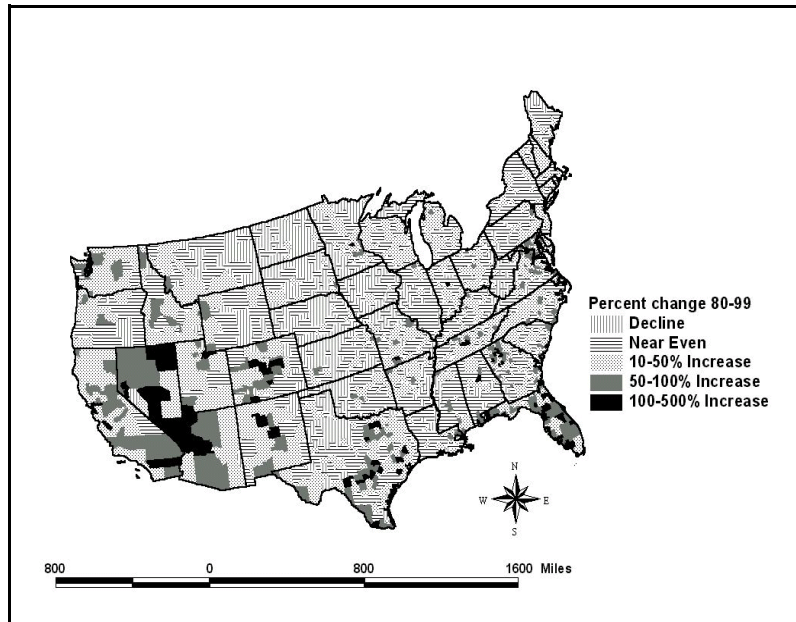


Figure 2. Population change as percent of 1980 level, by county, 1980-1999. Source: U.S. Census Bureau data by GeoLytics (1999).

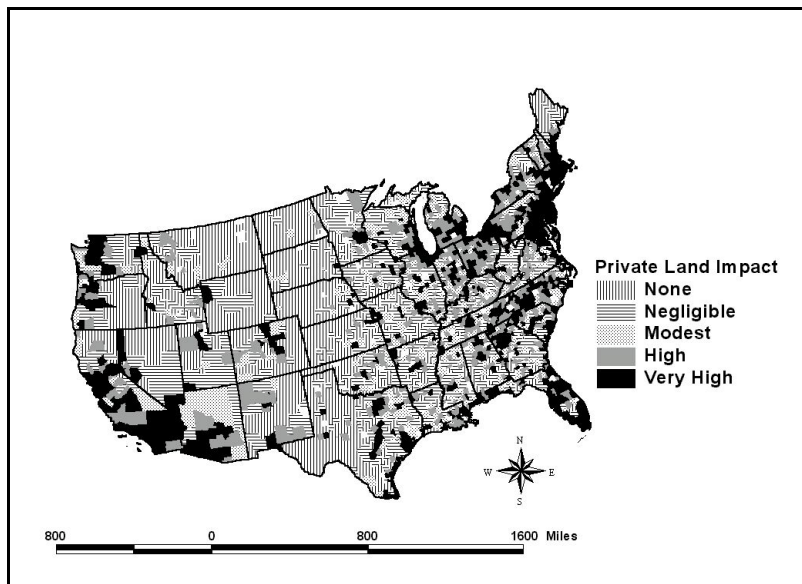


Figure 3. Population change between 1980 and 2004 illustrated in terms of the number of new persons per square mile of private land, by county.

Table 1. 1980-1999 population by state and major region, with 2004 projection.

STATE	1980	1990	1999	2004	CHANGE 1980-99	
					NUMBER	PERCENT
AZ	2,728,215	3,665,228	4,724,641	5,540,618	1,996,426	73%
CA	23,667,902	29,760,021	32,842,146	34,100,511	9,174,244	39%
CO	2,889,343	3,294,394	4,049,728	4,544,660	1,160,385	40%
ID	942,213	1,006,749	1,265,160	1,424,683	322,947	34%
KS	2,363,157	2,477,574	2,623,404	2,726,254	260,247	11%
MT	786,536	799,065	906,127	970,012	119,591	15%
ND	652,717	638,800	644,015	655,021	-8,702	-1%
NE	1,569,825	1,578,385	1,678,477	1,745,363	108,652	7%
NM	1,332,894	1,515,069	1,782,285	1,911,264	449,391	34%
NV	800,493	1,201,833	1,800,919	2,193,008	1,000,426	125%
OR	2,627,773	2,842,321	3,327,961	3,578,854	700,188	27%
SD	690,707	696,004	749,378	773,054	58,671	8%
UT	1,458,784	1,722,850	2,128,896	2,352,067	670,112	46%
WA	4,132,156	4,866,692	5,800,291	6,298,898	1,668,135	40%
WY	469,557	453,588	491,522	512,163	21,965	5%
WEST	47,112,272	56,518,573	64,814,950	69,326,430	17,702,678	38%
CT	3,106,239	3,287,116	3,276,590	3,267,280	170,351	5%
DC	638,333	606,900	521,895	490,994	-116,438	-18%
DE	594,338	666,168	747,435	793,828	153,097	26%
IA	2,911,665	2,776,755	2,877,099	2,926,081	-34,566	-1%
IL	11,425,622	11,430,602	12,021,531	12,302,237	595,909	5%
IN	5,490,185	5,544,159	5,950,587	6,156,878	460,402	8%
MA	5,753,405	6,016,425	6,164,646	6,268,633	411,241	7%
MD	4,198,403	4,781,468	5,183,977	5,361,657	985,574	23%
ME	1,124,660	1,227,928	1,247,204	1,260,322	122,544	11%
MI	9,262,000	9,295,297	9,849,676	10,065,089	587,676	6%
MN	4,075,927	4,375,099	4,755,592	4,964,894	679,665	17%
MO	4,916,591	5,117,073	5,470,708	5,615,402	554,117	11%
NH	935,202	1,109,252	1,183,629	1,241,924	248,427	27%
NJ	7,364,823	7,730,188	8,115,524	8,282,807	750,701	10%
NY	17,558,022	17,990,455	18,188,442	18,201,883	630,420	4%
OH	10,795,072	10,847,115	11,266,343	11,358,410	471,271	4%
PA	11,846,601	11,881,643	12,091,723	12,095,705	245,122	2%
RI	947,154	1,003,464	987,853	973,630	40,699	4%
VT	511,456	562,758	596,907	617,497	85,451	17%
WI	4,705,767	4,891,769	5,244,168	5,393,533	538,401	11%
WV	1,949,644	1,793,477	1,833,161	1,850,611	-116,483	-6%
NORTH	110,111,109	112,935,111	117,574,690	119,489,295	7,463,581	7%
AL	3,893,267	4,040,587	4,385,470	4,591,457	492,203	13%
AR	2,284,614	2,350,725	2,568,170	2,725,840	283,556	12%
FL	9,744,073	12,937,926	15,018,424	16,085,294	5,274,351	54%
GA	5,462,825	6,478,216	7,698,381	8,429,990	2,235,556	41%
KY	3,660,129	3,685,296	3,965,923	4,099,292	305,794	8%
LA	4,205,883	4,219,973	4,394,632	4,450,485	188,749	4%
MS	2,519,711	2,573,216	2,774,493	2,905,761	254,782	10%
NC	5,879,261	6,628,637	7,590,605	8,060,154	1,711,344	29%
OK	3,024,740	3,145,585	3,361,437	3,478,481	336,697	11%
SC	3,121,614	3,486,703	3,855,261	4,019,194	733,647	24%
TN	4,585,757	4,877,185	5,485,923	5,818,327	900,166	20%
TX	14,218,841	16,986,510	19,989,393	21,714,566	5,770,552	41%
VA	5,345,266	6,187,358	6,884,125	7,296,332	1,538,859	29%
SOUTH	67,945,981	77,597,917	87,972,237	93,675,173	20,026,256	29%
NATIONAL	225,169,362	247,051,601	270,361,877	282,490,898	45,192,515	20%

Population Density

One of the ways of looking at the influence of people on land management is to evaluate the implications of population density on the management of adjacent rural lands. Americans move into rural areas to take advantage of amenities such as open space, scenic views, and lack of congestion. But often, the land uses that attract them also produce impacts they find offensive. The new subdivision downwind from a farm seldom enjoys the pungency of animal waste or the nuisance of dust. The homeowner with a forest vista is offended by a timber harvest that cuts down the trees on a facing hillside, or over the back fence. The result can be controversy pitting a rural land manager, carrying out the traditional activities essential to that land use, against a group of neighbors that bought into a situation that, in their minds, did not include those activities.

One argument says that those people moved into a rural area; they must learn to live with rural realities. But often, the final result is significantly different. As urban impacts and attitudes grow, rural activities give way. More farms and forests are subdivided and sold for property value, not production value. As this process begins to take more land out of production, the services and businesses that depend on farming and forestry also tend to vanish. Neither the farm store nor the logging contractor can continue as business shrinks, and soon face the choice of relocating or finding another occupation. As those businesses dry up, the remaining farmers or forest landowners find their costs rising. They are driving further to get the services they need, or paying more, or simply becoming unable to get needed work done.

In forestry, the loss of local services is felt most keenly by the owners of small properties, who generally have less equipment with which to carry out forestry operations. They may have a situation that demands immediate attention, such as an ice storm that breaks trees that need to be removed before they invite insects or disease to affect the entire stand. Where the property is small, however, the owner may have trouble finding a contractor willing to undertake the task. If local contractors have left the immediate area, that makes the situation even more difficult.

The Virginia Department of Forestry published a study in 1997 that carefully analyzed that state's commercial forest in terms of its availability for future forest production (Liu and Scrivani, 1997). They found that, while the amount of forested land in Virginia has been relatively stable for the last quarter-century, the future on much of that land looks greatly different than its past. Population growth, urban and suburban sprawl, and changes in forest ownership have caused some 20 percent of the State's forests to be doubtful in terms of future timber production.

The basis for assessing population pressures came from research by Wear (1995) indicating that the probability of sustainable management approaches zero at 150 people per square mile (psm); that there is a 25% chance at 70 psm; a 50% chance at 45 psm; and a 75% chance at 20 psm. Using those thresholds, we utilized a new population density analysis produced by Oak Ridge National Laboratory to do a coarse-screen analysis of the likely impacts of the current population densities on future forest management.

In looking at these data, we were also able to take advantage of a recently-developed national map of current vegetation (Hardy et al. In press). This map allowed us to compare dominant vegetation patterns with the population density patterns. These products were both arrayed as 1 kilometer square grids, so must be used with some caution, particularly as the scale of the analysis is reduced. We did not attempt to estimate the acreage involved, but use the maps for illustrative purposes. The actual maps, which are too complex to illustrate well in black and white, can be found at www.yale.edu/yff in their entirety.

Three issues are involved. The first is the degree to which increasing population densities put pressure on the chance that rural businesses can survive. To illustrate this, we used the Virginia

thresholds cited above to prepare a series of maps to show, at the national and regional levels, the “forestry chance” that may be associated with the current levels of population density. Those maps, which did not differentiate between forest and other land uses or covers, may also serve as a surrogate for indicating some of the same pressures that might be felt by farmers and ranchers, as well as forest owners.

The next issue is the ability to maintain reasonably large forested landscapes intact. This is largely the “fragmentation” issue as discussed by ecologists. As population grows and land is chopped up into smaller ownerships, forests become fragmented by other land uses and roads. We illustrated that phenomena by masking our forestry chance map with the areas of non-forest vegetation such as crop and grass lands. The remaining “green” areas are the forested regions where neither population pressures nor competing land uses have intruded too deeply.

Finally, we illustrated the availability of those forests for private land management by masking out the public lands. In the Western Region, where public lands are the most extensive, the pressures on the remaining private lands are highest.

Parcelization

America’s private forest lands are held by almost 10 million owners, the vast majority of whom hold less than 5 acres. Sampson and DeCoster have argued that public policy should improve program assistance to assist forest owners holding 10 to 500 acre parcels (Sampson and DeCoster 1997). That size range was selected on the basis that a parcel size of under 10 acres was primarily a large house lot that would seldom, if ever, be possible to manage for forest production. At the larger end of the scale, owners of large plots generally have, or can hire, the kind of professional land management assistance needed.

Their analysis of the trends shown in the 1978 and 1994 Forest Service landownership studies indicated that, during that period, there had been a dramatic increase in the number of ownerships in the 10 to 40-acre size range. Those were, apparently, coming largely from the Parcelization of medium-sized (100 to 1000 acre) properties. Some purchase of medium-sized parcels by very large ownerships has been suggested, but this trend is not apparent in the ownership data. Table 2 shows the 1978 and 1994 surveys.

Table 2. Private forest land acres and ownerships in the United States, 1978 and 1994, by the size of ownership (acreage category).

Acreage Category	1978 Owners	1994 Owners	1978 to 1994 Change	1978 Acres	1994 Acres	1978 to 1994 Change
1-9	5,528,000	5,795,000	267,000	11,000,000	16,600,000	5,600,000
10-49	1,164,000	2,762,000	1,598,000	28,100,000	60,400,000	32,300,000
50-99	464,000	717,000	253,000	32,900,000	47,200,000	14,300,000
100-499	538,000	559,000	21,000	102,600,000	91,600,000	(11,000,000)
500-999	40,000	41,000	1,000	26,900,000	24,500,000	(2,400,000)
1000+	23,000	27,000	4,000	131,600,000	153,000,000	21,400,000
Total	7,757,000	9,901,000	2,144,000	333,100,000	393,300,000	60,200,000

The implication we draw from this data, coupled with the continued pace of development into forest land shown by the National Resource Inventories, is that the average size of individual forest ownerships, which has been steadily declining for many years, will continue to decline. At the current rate of change, foresters will be dealing with average ownership sizes in the range of 17 acres. That is not a property that lends itself to either sustainable production or professional

management, so the future for many of these lands appears to be one marked primarily by neglect. It can be argued that this will be benign neglect, done by owners who love the land but have little or no desire to use it for income-production purposes. That may prevent the land from being logged off as many forests were in the past, but it will not stop trees from growing, forests from changing, or other disturbances from occurring. When those forests need treatment, it will be increasingly difficult for small owners to find skilled people or appropriate equipment in those regions where the existence of small parcels has reduced or eliminated the forestry infrastructure.

Industrial Forests

The forest products industry has, apparently, changed its mind about the value of owning forest land. Once seen as a vital strategic asset that could provide needed supplies of industrial timber, forest lands seem to be increasingly seen as a financial drag on company performance. The result has been a recent trend for the forest products industry to sell company forest land to financial owners, conservation groups, or public agencies. In 30 sales completed in 1999, it appears that only about one-third of the land was bought and sold by industrial companies (HTRG 1999). Of the remainder 58 percent was purchased by financial owners and 9 percent went to conservation groups or public agencies. Much of the 558,000 acres bought by the conservation groups is destined for public ownership, as well.

These trends are probably too new for the implications to be fully clear. The financial companies, often called Timber Investment Management Organizations (TIMO's), are buying and managing timberland as an asset for pension and investment funds. Their interests are financial, so they often re-sell some of the land shortly after purchase. In many cases, the sensitive lands are sold to conservation organizations or public agencies, while the more valuable development sites such as waterfront lots, are sold for development. This appears to be a further trend that will contribute to fragmentation and parcelization, but the available data on the extent is still very limited.

Conclusions

The conclusions that come from this brief review include:

- As populations grow and concentrate in already-urbanized areas, the chances for rural farm and forest businesses to succeed declines.
- This process results in both forest fragmentation and parcelization, through smaller parcels, higher road densities, and increased land clearing for homes and other land uses.
- It affects land management quality, as small parcels are less likely to be managed with professional resource assistance, and many management tools, such as prescribed fire, may become difficult or impossible to use.
- Maintaining forest lands in sustainable production may be increasingly unattractive to large forest products companies, who seem to be selling land and either seeking long-term supply contracts or looking abroad to meet their needs for industrial wood. Neither of those trends seem positive for the future of managing small to medium-sized sustainable forests.

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