

Chapter 7

Public-Private Interactions in the Conservation of Private Forests in the United States

Tatyana B. Ruseva and Burnell C. Fischer

Abstract This chapter discusses the investment decisions of private and public actors in the USA regarding the management and conservation of private forests. Managed by nearly 11 million private owners, these forestlands provide valuable ecological, economic, and social benefits to society. What happens on these lands as a result of public and private investment decisions has implications for society, both in the present and in the future. First, this chapter reviews the interactions between private and public actors in private forestry. A typology is proposed that characterizes public and private investments in forestlands based on their target audiences (e.g., a private investment decision for largely public benefit). This chapter next explores the different ownership features and uses of forests over time and space. The discussion centers on the challenges and opportunities of governing private forests as a bundle of property rights within the proposed typology of public-private interactions in private forestry.

7.1 Introduction

Much attention over the past few decades has been devoted to understanding the sources and consequences of forest change dynamics (Agrawal et al. 2008; Nagendra 2007; Persha et al. 2011; Rudel et al. 2005; Sugden et al. 2008). Human activities directly or indirectly alter the extent, health, and productivity of

T.B. Ruseva (✉)

Department of Government & Justice Studies, Appalachian State University, Boone, NC, USA
e-mail: rusevatb@appstate.edu

B.C. Fischer

School of Public and Environmental Affairs, Indiana University–Bloomington,
Bloomington, IN, USA
e-mail: bufische@indiana.edu

forestlands. Forested landscapes are progressively being converted to other land uses, such as agriculture, biofuel production, and urban development (Stein et al. 2009). At the same time, local communities with support from state and national programs are restoring forests in countries around the world (Chazdon 2008: 1458). This chapter reviews and synthesizes the interactions of public and private actors in the USA and their decisions to invest in the sustainable management of private forestlands.

Interest in the public value of private forests and their contributions to local communities has grown alongside improved awareness of environmental issues (Best and Wayburn 2001). Society enjoys an array of ecological, social, and economic benefits from private forests, which presently account for over half of all forestland in the USA (Butler 2008). Most of these lands are in the eastern part of the country. What happens on private forestlands as a result of the decisions and actions of their owners has implications for society, both in the present and in the future. Privately owned forests provide important goods and services, such as timber and wood products, fish and wildlife habitats, carbon storage, soil and water regulation, and scenic beauty (NRC 1998). Under direct and indirect human pressures of conversion, fragmentation, urban development, and others, and in the absence of incentives, these public goods and services are likely to be lost or undersupplied (Ruhl et al. 2008; Stein et al. 2009).

Additionally, the growing diversity of social and ecological interactions, the complex and nonlinear nature of biophysical processes, changing generational and urban profiles of America's forest owners, and increasing interest in the amenity value of private forests are shaping the changes occurring on private forestlands (Bascompte 2009; Bruyere et al. 2009; Fischer and Ruseva 2010; Ostrom 2009). To better understand the promise and pitfalls of these processes, this chapter explores the interactions between private and public actors and the manner in which they shape private forest management and conservation. As Agrawal and colleagues (2008: 1462) point out, "The challenge of understanding the coupled social and ecological systems that all forest governance represents urgently needs more emphasis and attention than it has received until now."

In this chapter, we review existing institutional arrangements for investment in private forestlands. Institutions affect the incentives and patterns of interactions among different participants, as well as the outcomes of these interactions (Ostrom 2005). First, a brief overview of private forests in the USA is provided. Second, the interconnections between private and public investment decisions are discussed. A typology is proposed that characterizes public and private investment decisions based on their target audiences or primary addressees. Next, this chapter explores different ownership characteristics and uses of forests over time and space. Different features of forests (timber, wildlife habitats, water regulation, etc.) can be linked to specific property-rights regimes and thus subject to different rights of access, use, and appropriation (Ostrom 2009; Ruhl et al. 2007). The discussion focuses on the challenges to and prospects for governing private forests as a bundle of property rights within the existing public-private interactions in private forestry. Insights from

this chapter can be useful in light of the trends and evolving arrangements for natural resource management under private ownership, specifically in a developed country context.

7.2 Sustaining Private Forests in the USA: Threats and Opportunities

Privately owned forests represent a substantial share (56%) of forest resources in the USA (Butler 2008). An estimated 423 million acres of forestlands are owned by 11 million private landowners with diverse values and motivations for land ownership (Bengston et al. 2011; Butler 2008). Among them, individuals, families, estates, trusts, and unincorporated groups—known as family forest owners—are the majority. Family forest owners account for 92% of all private forest owners and over one-third of forestlands in the USA (Butler 2008). These forest owners are integral to the idea and practice of sustainable private forestry—"a model of forest management that attempts to ensure that the flow of goods and services from a land area can be sustained into the future (i.e. current management is not depleting future productivity)" (Daniels et al. 2010: 51). As a policy issue, forest sustainability becomes compounded when studied in the context of private land ownership, where the decisions of autonomous individuals overlap with dynamic social and biophysical processes.

Degradation, conversion, and fragmentation of forested landscapes present major threats to the sustainability of private forests (Schaaf and Broussard 2006; Smith et al. 2009; Stein et al. 2009). About 23 million acres of forests are at risk of being lost to developed uses by 2050 (Alig et al. 2010; Stein et al. 2005); another 57 million acres of rural private forestlands will likely have been affected by increased housing density from 2000 to 2030 (Stein et al. 2009). Urban growth, consumption pressures, and amenity-driven relocations put ever greater demands on forestlands and ecosystems (Best and Wayburn 2001; Schaaf and Broussard 2006; Stein et al. 2009). Nowak and Walton (2005) project that forestland area roughly the size of Pennsylvania (118,300 km²) will be lost as a result of urbanization between 2000 and 2050. Eighty percent of Americans already live in cities and towns where forestland is of growing importance for the many services provided (US Census Bureau 2011). The predictions that more than 100 million acres of US forestland will be in urban forests, some of which will be managed by family forest owners, are especially noteworthy (Nowak and Walton 2005; Nowak et al. 2005). The implications for forest management in and near these urban areas are complex and ever-changing. For example, many pests from abroad are introduced first to urban areas and then expand into rural areas. The emerald ash borer (*Agrilus planipennis*) is one of the latest examples (Nowak et al. 2005; USFS 2011).

Besides urban and exurban expansion, the changing ownership, generational, and demographic profiles of America's forest owners pose additional challenges

to forest health and sustainability. Results from the 2006 National Woodland Owner Survey conducted by the US Forest Service (USFS) show that 1 out of 5 acres of forestland will likely be sold or transferred in the next 5 years and that one-fifth of all family forestlands are owned by someone 75 years of age or older (Butler 2008; Smith et al. 2009). Parcelization of private landholdings into smaller forest tracts facilitates conversion to nonforest use, fragmentation of habitats, and disruption of landscape- or watershed-wide ecological processes (Rickenbach et al. 2011; Sampson and DeCoster 2000). Last but not least, threats to privately owned forest resources arise from wildfires, insect and disease outbreaks, ozone pollution, and other natural disturbances (Smith et al. 2009).

Opportunities for sustaining and conserving private forestlands are not in shortage. Studies show an overall commitment and a desire toward forest stewardship and conservation among family forest owners (Arano et al. 2004; Kendra and Hull 2005; Kilgore et al. 2007). Landowners are investing in forest plantations and restoration in pursuit of aesthetic, recreational, and other amenity values (Ross-Davis et al. 2005). Individuals and families see forests as a source of privacy, self-identity, and a legacy for future generations (Ross-Davis et al. 2005). Kendra and Hull (2005) argue that new patterns of forest ownership amid urbanizing and fragmented forest landscapes offer opportunities rather than challenges for sustaining America's private forests. Similarly, Butler and Leatherberry (2004: 9) posit that with more individuals owning forested land, "there will be more people in intimate contact with the land . . . [which] affords an opportunity to educate more people about the benefits and responsibilities associated with forest stewardship." The relationship between forest owners and their land is central to sustainable forest outcomes. Equally important are their connections to other people, as evidence from peer-to-peer learning, forest cooperatives, and cross-boundary cooperation suggests (Allred and Goff 2009; Barten et al. 2001; Gass et al. 2009; Kittredge 2005; Knoop and Rickenbach 2011; Kueper and Sagor 2011; Rickenbach and Jahnke 2006; Rickenbach et al. 2011). Such findings relate to the broader literature on the role of cooperation, collaborative environmental management, and social networks in natural resource governance (Bodin and Crona 2009; Bodin et al. 2006; Crona and Bodin 2006; Crossley et al. 2009; Ernstson et al. 2008; Janssen et al. 2006).

Other barriers to, but also opportunities for, forest sustainability include differences in the life spans of people and forests, a disconnect between the ecological and market values of forestlands, and the effects of global trade and nascent ecosystem services markets (Beach et al. 2005; Best and Wayburn 2001; Dauvergne and Lister 2011). For instance, agricultural subsidies, tax incentives, and market dynamics have a major bearing on the conversion of agricultural lands to forests (Evans et al. 2010; Rudel 2010). Recent transformations and restructuring within the industrial forest sector offer another line of possibilities and opportunities (Bliss et al. 2010). Last, the complex web of federal, state, and local institutions amidst changing agency mandates and dwindling budgets proffers further questions and outlooks toward sustainable private forestry (Best and Wayburn 2001; Schroeder et al. 2011).

7.3 Public-Private Investment Decisions in the Conservation of Private Forestlands

Private and public actors interact in multiple, dynamic ways to conserve and keep private forests healthy and in doing so influence the provision of forest ecosystem goods and services. Forest stewardship and conservation practices undertaken by private landowners constitute private investment in private forestlands. Forest stewardship is defined here as the application of site level, ecologically sound practices that can positively influence the capacity of forestlands to sustain a variety of ecological, economic, and social benefits (Kilgore et al. 2008: 358).¹ Such practices, promoted through technical and financial assistance from state forestry agencies and the USFS State and Private Forestry organization, constitute social investment in the production of goods and services from private forests. Professor of natural resource economics and policy Michael Kilgore (2004: 11) explains:

The public's interest in private forestry is grounded in two fundamental concerns. One is the need to encourage continued investment in land management for a wide range of benefits provided by private forests. The long-term nature of forestry and lack of markets for many of its products tend to discourage landowners from investing in their forests. Public policies are also used to minimize negative impacts that can be associated with forest management and timber-harvesting activities, such as the loss of wildlife habitat, diminished water quality, soil erosion, and reduced visual quality.

The conservation of private forests in the USA is promoted through private and public investments (NRC 1998). The decision of individual landowners to protect forest resources or to increase forestland by planting trees represents a *private investment decision*. Such decisions affect the level of private goods (e.g., timber) and public benefits (e.g., carbon storage, groundwater recharge) produced from private forestlands. On the other side, collective-choice decisions formulated at federal, state, and local levels determine the type and amount of *public investment* in private forest conservation. Public policies about the management, use, and protection of private forests seek to prevent the loss of and/or to perpetuate the benefits society derives from forestlands, such as the sale or donation of development rights, or the enhancement of wildlife habitats. Both private and public investment decisions have relevance for the ecological and social benefits derived from forests, specifically what quantities of land to designate to forest use, what quality standards and forest practices to apply, or how to plan and manage forestlands with an eye to the future (e.g., via a written landowner management plan).

With an inadequate level of private investment in forestlands, and declining resources for public investment, concerns about the future sustainability of private forests are growing (Rickenbach et al. 2011; Schroeder et al. 2011). The USFS

¹The characteristics and definitions of "forest stewardship" vary. Drawing from others, forest stewardship is understood, here broadly, as a type of sustainable land use and management (Kilgore et al. 2008, 358).

Table 7.1 Four spheres of public-private interactions in private forestry

		Investment Decision	
		PUBLIC	PRIVATE
Primary Addressee	PRIVATE	Public investment for (largely) private benefit: <ul style="list-style-type: none"> • Educational programs • Technical assistance • Financial assistance (cost-share) • Economic incentives (tax breaks, direct payments, cost-share) • Other (free or low-cost seedlings) <p style="text-align: right;">-box 1-</p>	Private investment for private benefit: <ul style="list-style-type: none"> • Timber production • Food and other forest products • Cultural practices (thinning, pruning) • Certification of private forests • Conservation easements (upfront private gain) <p style="text-align: right;">-box 3-</p>
	PUBLIC	Public investment for public benefit: <ul style="list-style-type: none"> • Regulatory programs (timber harvesting, road and trail practices) • Zoning regulations • Environmental laws (e.g. Endangered Species Act) • Purchase of rights in real property; purchase of forestland <p style="text-align: right;">-box 2-</p>	Private investment for (largely) public benefit: <ul style="list-style-type: none"> • Reforestation practices • Forest protection practices • Harboring and enhancing wildlife • Conservation easements (long-term, perpetual social gains)^a <p style="text-align: right;">-box 4-</p>

Sources: Best and Wayburn (2001), Ellefson et al. (2007), Kilgore et al. (2008), Tompkins and Eakin (2012)

^aConservation easements have both private and public benefits spread across time, including (1) reduced tax burden for property owners as an upfront private benefit and (2) protection of forest from future development as a long-term social benefit

estimates that only 4% of family forest owners have written management plans, which represents 17% of family forestland (Butler 2008: 25). State-level resources and staff are also limited, and funds for landowner assistance and outreach have and likely will continue to wane. Combined with the larger socioeconomic and environmental challenges outlined above, these trends suggest a need for assessing the potential of coupling public with private investments in private forests.

The interconnections between private and public investment decisions in the context of private forests can be conceptualized as activities in four spheres of public-private interactions (Table 7.1). Table 7.1 displays, in a fairly simplistic way, four areas of private and public action. Each entails specific investment tools and has direct implications for private landowners or the public interest. In basic terms, differences exist with regard to the target audiences or addressees of investment decisions. A public policy, such as the legal requirement to obtain a permit before timber harvesting on private lands, has a direct effect on a segment of the population

(i.e., private landowners and the timber buyers/producers who harvest and process the timber) and only indirect implications for society as a whole. When individual actions generate positive externalities, policies will target those individuals and their behavior in order to encourage the provision of public goods or services (Weimer and Vining 2010). Vaccination is one case illustrating how private actions can generate benefits for society in terms of improved public health (Tompkins and Eakin 2012). Private landowners who conserve or restore forests similarly create social and environmental benefits. Alternatively, public policies may provide benefits to all of us and have direct implications for society. Creating a state forest or a national park generates socially and ecologically valuable assets for present and future generations. This brief discussion allows us to characterize public and private investment decisions in relation to their primary addressees or direct benefit receivers (Table 7.1).

An important caveat is that the typology presents categories of public/private investment that vary in degree, type of forest features, and the scale and timing of effects. Certain forest investments can be directly addressed to private landowners in the short run (financial assistance) but provide medium- to long-run secondary benefits to neighbors (e.g., water regulation, recreation), local communities (e.g., scenic beauty, clean air), and society as a whole (e.g., carbon storage). This consideration is undertaken in the fourth part of this chapter. The purpose here is to distinguish between the provider and the primary benefit receiver of investment decisions, which offers practical and policy insights. In particular, the spheres of public-private interactions displayed in the upper left and bottom right of Table 7.1 are of growing policy relevance: one, because of the wealth of experience with some of these arrangements (box 1) and, two, due to the increased popularity of some partnerships to conserve forestland (box 4). Each box in Table 7.1 is described in detail below with illustrations from national- and state-level² contexts.

7.3.1 Public Investment for Largely Private Benefit

A number of government programs for technical, educational, and financial assistance are addressed directly at nonindustrial private forest (NIPF) owners.³ The main purpose is to encourage and support the sustainable management of

²We use the state of Indiana, in the Midwest USA, because of its significant share of privately owned forests and similarities to other Midwest states, which display a mix of small-scale forest and agricultural land use, residential expansion, and susceptibility to invasive plants and natural disturbances (see Kauneckis and York 2009; Koontz 2001; Smith et al. 2009: 48).

³Nonindustrial private forest is a subset of private forestlands, where the owner does not operate wood-using plants. A difference exists between families and individuals who own forestland but do not operate a wood-processing facility (nonindustrial private forest owners) and private groups and corporations who own and operate a primary wood-processing facility (industrial private forest owners) (Butler 2008: 3; Smith et al. 2009: 144).

private forestlands. While a stream of forest goods and services is expected, the direct benefits accrue principally to individuals or families who own forest and participate in these programs (Tompkins and Eakin 2012). The public does not and cannot manage private forestlands. The government, on behalf of the public, invests financial and human resources in private forestlands because they are identified as important to society (NRC 1998). Public investment in private forests takes the form of federal and state assistance programs that promote forest stewardship through information and educational programs (e.g., publications, workshops, training courses), professional advice and technical assistance from extension foresters to forest owners (“walking the forest” or writing a forest management plan), financial assistance through grants and cost sharing for forest practices, property tax incentives, and provision of low-cost or subsidized tree seedlings.

Most states in the USA rely on a mix of education and incentive programs tailored to local needs and landscapes (Ellefson et al. 2007; Kilgore et al. 2008). In Indiana, where 86% of forests are privately owned, most government programs address private forestlands. A tax incentive program with a long and successful history in Indiana is the Classified Forest and Wildlands program, which places an assessed tax value of one dollar per acre on enrolled properties. In return, landowners must meet specific forest conservation standards, such as protection from fire and grazing, property development (e.g., construction of a building), and following a written management plan (IDNR n.d.). Similar voluntary programs exist in other states, for instance, Vermont’s Agricultural and Managed Forest Use Value Program, Iowa’s Forest Reserve Laws, and Wisconsin’s Forest Crop Law and Managed Forest Law (Greene et al. 2010). Practitioners argue that with sound tax policies reasonable returns from forestland investments are possible (Kimbell et al. 2009: 93). Examples of incentive programs at the federal level include the Wildlife Habitat Incentive Program, Environmental Quality Incentives Program, and the Conservation Reserve Program, among others. A grant under the Wildlife Habitat Incentive Program primarily and directly benefits the landowner but also encourages activities on private lands, for instance, the enhancement of habitats for migratory birds, the enjoyment of which is joint and nonexcludable. The expectation is that such public investment (e.g., in wildlife habitat) on private forestlands will yield public benefits in the future.

The activities described in box 1 in Table 7.1 are where a significant share of public-private interactions related to private forest conservation currently takes place. These arrangements suggest several important trends and empirical lessons. Federal funding for NIPF assistance programs has fluctuated over time and declined considerably in recent years (Best and Wayburn 2001; NASF 2010; Schroeder et al. 2011). Shrinking investment and agency capacities, paralleled by a growing number of NIPF owners and threats to forests (wild fires, declining wetlands), has important distributional implications for forest stewardship. Other considerations include changing landowner demographics and ownership structure, parcelization, rising land values, and development, which collectively challenge the effectiveness and acceptance of NIPF assistance programs (Davis et al. 2010; Knoop et al. 2010). Over the years, researchers have sought to examine the extent, to which public

programs lead to additional private investment in forest management and their impact on forest land use and management (Beach et al. 2005; Kauneckis and York 2009; Kilgore et al. 2007; Munroe and York 2003; Nagubadi et al. 1996; Schaaf and Broussard 2006; York et al. 2005). Studies show that the involvement of NIPF owners is often conditioned on ownership characteristics (preferences, motivations, ownership size, and duration), land conditions, market drivers, and public policies (Beach et al. 2005; Kauneckis and York 2009). In all, the engagement of private landowners is paramount because they are the primary addressees of the public investment decisions in box 1 in Table 7.1.

7.3.2 Public Investment for Public Benefit

Box 2 in Table 7.1 captures public investment decisions for primarily public benefit. Decisions by state and federal governments to conserve forest resources take several forms, regulation being the prime example. Other approaches include the purchase of land for conservation or public use and purchase of development rights.

Regulation is “generally used to set minimum standards for forest practices to ensure protection of public trust resources on private lands” (Best and Wayburn 2001: 130). A variety of state-level regulatory programs seek to control activities on private land, albeit in a limited fashion. A comprehensive study by Ellefson et al. (2007) indicates that only 15 states have prominent regulatory programs.⁴ These regulatory programs target different forestry practices on private lands, namely, timber harvesting, road and trail practices, forest protection and reforestation, cultural practices, chemical substance application, and administrative practices. Regulatory programs seem to be most effective for controlling the application of chemicals and least effective with regard to cultural practices like pruning, thinning, and timber stand improvement (Ellefson et al. 2007). Generally, state governments have jurisdiction over the regulation and zoning of different types of activities on private lands. On average, five state-level agencies are involved in the design, implementation, and enforcement of regulatory programs (Ellefson et al. 2007). Research, however, indicates that the effectiveness of these programs is “modest when compared to non-regulatory programs” while the investment cost remains considerable (Ellefson et al. 2007: 629).⁵

In addition, governments can directly purchase forestland and create state and national parks, forests, wildlife areas, and wilderness lands, in the interest of present

⁴Most states rely on education and incentive programs to encourage sustainable forestry practices. Ellefson et al. (2007) examined statewide programs for all private lands. Certain targeted programs, such as the Indiana Classified Forest and Wildlands program, do set standards and regulate forest use on lands enrolled *voluntarily* in the program. This is an important differentiation since many states have such voluntary programs.

⁵The estimated annual state government investment in regulatory programs targeted at private forestlands was \$57.6 million dollars in 2003 (Ellefson et al. 2007: 629).

and future generations. Where private forests harbor and serve as habitats for endangered or threatened species, government agencies administer rules regarding the taking of such species from private lands (ESA 2005: Sec. 9). A hybrid partnership between government actors, namely, the US Fish and Wildlife Service, and private landowners arises in the context of developing and adopting habitat conservation plans. The primary objective of the plans is to protect endangered or threatened plants and wildlife on private lands, which “are of aesthetic, ecological, educational, historical, recreational, and scientific value to the Nation and its people” (ESA 2005: Sec. 2(a)(3)).⁶ A statutory requirement, thus, initiates public-private collaboration to preserve biological diversity as a benefit to current and future generations.

Last, the government can acquire development rights through a conservation easement as a way to protect private forestland from future development. Conservation easements are “legally binding agreements transferring a negotiated set of property rights from one party to another, without removing the property from private ownership” (USFS 2008). While directly benefiting and serving public purposes, easements under the federal Forest Legacy Program depend on private landowners’ choices to donate or sell development rights.⁷ Conservation easements produce another hybrid public-private partnership for largely public benefit but with an added short-term gain for property owners from reduced taxes. A recent study of private rural lands in Massachusetts suggests that easements (whether through a public or private conservation organization) may prove to be a critical mechanism for maintaining forest benefits from private lands, especially where timber revenues are inadequate to meet escalating property taxes (D’Amato et al. 2010). Acknowledging both the financial and conservation benefits from easements, D’Amato et al. (2010: 36) note that conservation easements can protect forestland from conversion, preserve forest management, and “ensure continued flow of ecosystem services and public benefit.”

7.3.3 Private Investment for Private Benefit

Both industrial and nonindustrial forest owners can make investment decisions about the production of timber and other forest products. As Best and Wayburn (2001) argue, private forestlands are some of the most productive lands in the country. About 58% of the nation’s timber supply comes from private lands (Smith et al. 2009). Traditionally, industrial forest owners have possessed the requisite

⁶Habitat conservation plans in the Endangered Species Act fall under the responsibility of the US Fish and Wildlife Service (<http://www.fws.gov/endangered/what-we-do/hcp-overview.html>. Accessed 18 Sept 2011).

⁷The Forest Legacy Program (FLP) “complements private, Federal and State programs focusing on conservation in two ways. First, FLP directly supports property acquisition. Additionally, FLP supports efforts to acquire donated conservation easements. FLP funded acquisitions serve public purposes identified by participating states and agreed to by the landowner” (USFS 2008).

resource stocks and sawmills to process forest products and by and large have engaged in the activities described in box 3 of Table 7.1. Large-scale transformations since the 1990s, however, have led to the disintegration of the forest industry in the USA (Bliss and Kelly 2008; Smith et al. 2009). Significant shares of timberland are now in the hands of timber investment management organizations, real estate investment trusts, family forest owners, land trusts, and other institutional investors (Bliss et al. 2010).

At the state and local levels, key players are sawmill companies, such as Pike Lumber Company in Indiana which owns and operates sawmill facilities, manufactures and distributes lumber, and engages in market transactions with other private landowners. Private-private partnerships, such as the Family Forest Legacy Program offered by Pike Lumber Company,⁸ currently manage over a 100 tracts of private forestland in Indiana, Michigan, and Ohio in order to ensure a “healthy vibrant forest free from development pressure.” A study examining the effects of the forest industry divestiture suggests three potential paths of development: intensive timber production, continued parcelization and conversion, and conservation (Bliss et al. 2010: 53). Researchers further note that new forms of ownership, rising land values, smaller ownership parcels, and the costs of harvesting timber are likely to change the cost structure of private forest production in the future (Bliss and Kelly 2008; Bliss et al. 2010; Sampson 2004: 12; Sampson and DeCoster 2000).

Presently, 62% of family forest owners manage forestland parcels less than 10 acres (Butler 2008). Their decisions about how to use forestlands are based on the costs and benefits of the goods supplied by forests. Existing markets for private goods, such as timber, food, and medicinal products, offer incentives to landowners that inform their investment decisions. The benefits of such decisions accrue largely to private interests—corporate or noncorporate private forest owners. Timber harvests on smaller NIPFs are episodic and driven by market prices for timber, financial, or family need, as well as the health of the forest (Davis et al. 2010; Sampson 2004). Research indicates that harvesting decisions are often part of the multiple objectives landowners have for their land. Their management goals often blend financial gain with an interest in the noncommodity and amenity values of forests (Best and Wayburn 2001; Egan 1999; Kroot et al. 2010; Koontz 2001).

In this context, forest certification programs on small forest landholdings have gained popularity as a form of private-private partnership, for instance, between family forest owners and the American Tree Farm System.⁹ Third-party certification of family forests and audits for sustainable forest standards seek to provide landowners with access to unique markets and a better return on their investments.

⁸<http://www.pikelumber.com/Partner.php>. Accessed 23 Oct 2010.

⁹American Tree Farm System Certification Program (<http://www.treefarmssystem.org/afscertification>. Accessed 23 Oct 2010).

Developing markets for certified forest products, ecosystem services, and carbon may offer potential income gains, thus stimulating innovative private investments in private forestry.

7.3.4 *Private Investment for Largely Public Benefit*

Private landowners, nongovernment conservation organizations, and land trusts help preserve private forestlands for the benefit of everyone. These represent private investment decisions for largely public benefits (Table 7.1, box 4). Notwithstanding the upfront or immediate private gain embedded in some of these investment decisions, the ultimate purpose is social, for the addressees—present and future generations.

The role of land trusts for the conservation of forestlands is growing in importance. The efforts and investments of land trusts, such as the Nature Conservancy, the Trust for Public Land, and many state and local land trusts, such as Sycamore Land Trust in south-central Indiana, account for 37 million acres of family forestland currently under conservation easement (Aldrich and Wyerman 2005). The Nature Conservancy completed the largest conservation purchase of private land in 2006—700,000 acres across 10 southern states, Maine, and Wisconsin (Woodard 2006 cited in Bliss et al. 2010: 61). A landowner's decision to sell or donate development rights to a private conservation organization, such as a land trust, is an important investment decision likely to support a stream of ecosystem goods and services from private lands. While also providing a financial incentive and a short-term profit to landowners, a conservation easement has a broad public intent—to perpetuate benefits from forests—which outweighs the short-term tax alleviation.

Direct social and ecological benefits result from privately undertaken activities to maintain and conserve forest resources. Research suggests that private individuals increasingly invest in their land and trees (Davis et al. 2010). About seven billion dollars were spent by private households in 2006 on forest care services, such as professional assistance, pruning, fertilizing, pest management, and removal (Butterfield 2007 cited in Davis et al. 2010: 322). According to a national survey,¹⁰ this represents 16% of the total investment of households in the care of their trees and gardens. These data, while incomplete and context specific, provide information about the types of activities landowners engage in (e.g., enhancing beauty, building roads, planting trees) and the kind of positive externalities expected from private spending. Such practices are reflective of the motivations and values of most family forest owners today, which focus on aesthetic enjoyment, recreation, privacy, and investment (Butler 2008; Davis et al. 2010; Koontz 2001; Kroeger and Casey 2007).

Planting trees is associated with the real cost of seedlings, landowner's time, and effort. Keeping forests as forests represents a cost to private landowners, who may consider a different land use. A number of other social and institutional factors may undermine private decisions to invest in forests as a source of largely social and environmental benefits. Where such efforts exist, scholars note, coordination and cooperation among landowners may be needed to optimize landscape- and watershed-scale benefits from forestlands (Best 2004; Butler and Leatherberry 2004; Vokoun et al. 2010). Researchers and practitioners observe that important landscape-wide benefits from forests will be lost in the face of increasing parcelization, fragmentation, and lack of coordination among family forest owners (Best 2004; Bliss 2001; Butler and Leatherberry 2004; Vokoun et al. 2010). From a policy standpoint, the private provisioning of forest benefits might be encouraged through improved communication, cooperation, and coordination among forest owners and other private and public actors.

To summarize, this section reviewed four spheres of private-public interactions as a way to better understand the sufficiency and utilization of investment in private forests. It proposed a typology of decisions by private and public actors to invest in the provision of forest benefits. These investment decisions were organized based on the direct recipient or addressee of the investment arrangement. Such a categorization, however, fails to escape the fact that all forest ecosystems, as well as human systems, are multidimensional and dynamic. We can start to incorporate the multiple dimensions of forests as a socioecological system by looking at its individual components, namely, the nature of the resource system (forests) and its outputs (forest benefits), and the decisions and interactions of resource owners at multiple scales.

7.4 **Forests as a Bundle of Property Rights: Implications for Forest Ownership and Governance**

Forests are complex socioecological systems that provide a range of ecosystem goods and services and are subject to different property-rights regimes (Ostrom 2009). Some features of forests are common-pool resources (CPRs), such as hunting and habitats for wild plants and animals; some have public good characteristics, for instance, water purification, pollination, carbon sequestration, and aesthetics, and other features are private goods, such as timber, mushrooms, and land for homesites (de Groot et al. 2002; Fischer and Ruseva 2010; Fisher et al. 2009) (Table 7.2). The effectiveness of many of the private-public interactions described above is challenged by a lack of existing mechanisms to separate these features over time and space. In particular, the public goods and CPRs provided by private forests are hard to quantify, price, and exchange; they are consumed jointly and simultaneously, and their meaning is dependent on the decision context and social actors involved (Costanza and Farber 2002; Lubchenco 1998). Other important characteristics of

¹⁰Results from a 2006 survey conducted in conjunction with the National Gardening Association of America estimated the total investment of American households on landscaping and tree care services (Butterfield 2007 cited in Davis et al. 2010: 322).

Table 7.2 Possible governance arrangements for forest goods and services

Forest ecosystem functions	Forest features (goods and services)	Type of good	Public-private spheres of interaction	Possible governance arrangements
Regulation	Clean air, water, and soil regulation, carbon storage	Public goods and services	State forestry assistance, regulation (Table 7.1, boxes 1, 2)	Government programs Polycentric and multiscale governance
Habitat	Hunting	Common-pool resource	Habitat enhancement (Table 7.1, box 4)	Community organizations Private-public partnerships at parcel or multiple scale
Production	Food, timber, raw materials, energy resources	Private good	Forest certification, working forests (Table 7.1, boxes 1, 3)	Market-based arrangements
Information	Spiritual enrichment, recreation and aesthetic enjoyment	Public good Toll/club good	Conservation easements (Table 7.1, boxes 2, 4)	Public-private partnerships Polycentric and multiscale governance

Sources: de Groot et al. (2002), Fisher et al. (2009): 647, Gatzweiler (2006): 299

forests include the frequency of use or consumption of forest products and services; varying spatial and temporal scales; joint investment decisions (e.g., conservation easements offered by both public and private conservation organizations); complexity due to feedbacks, time lags, and nested processes; and dependence as well as interactions among all these characteristics (Fisher et al. 2009). All in all, the multiple features of forests presuppose the existence of a bundle of property rights.

Property-rights systems are key components in the use and misuse of forest resources (Costanza and Farber 2002; Ostrom 2005). Political scientists Edella Schlager and Elinor Ostrom (1992: 256) write, "Different bundles of property rights, whether they are de facto or de jure, affect the incentives individuals face, the types of actions they take, and the outcomes they achieve." Various aspects of forests, such as timber, wildlife habitat, and carbon sequestration, can be associated with different property-rights regimes and users and subject to different rights of access, management, allocation, and appropriation (Fischer and Ruseva 2010; Ruhl et al. 2007). Additionally, the difference between private landowners, who typically hold a complete set of rights, and all others, who do not have complete rights, and their respective discount rates shape public and private investment decisions and their interactions (Schlager and Ostrom 1992).

A public-private interaction aimed at a specific forest good, such as timber, can be fairly uncomplicated due to the existence of private markets for timber products.

An interaction between private actors focused on a set of forest features spread across space and time, for instance, carbon credits, soil formation, and clean water credits, may entail a detailed designation of different users/consumers. While soil formation is produced locally and used directly for agricultural cultivation, water regulation services produced by forests at the top of a hill or mountain are consumed as benefits downstream (Fisher et al. 2009: 648). Similar disconnects between the scale of production and scale of consumption of forest features (e.g., carbon sequestration) underscore the spatial and temporal heterogeneity of forest features. A designation of the type of forest feature, its providers, and users/consumers may be essential for enhancing private, as well as public, investment in private forests.

As a bundle of property rights, private forests may become subject to multiple regimes of ownership and governance. A typology of forest ecosystem functions includes regulation, habitat, production, and information functions (de Groot et al. 2002; Gatzweiler 2006). Each function is associated with a particular type of forest good or service. In turn, these features can be characterized according to their joint use/rival consumption and exclusion, i.e., as a public, private, or toll good or CPR (Fisher et al. 2009: 647; Ostrom and Ostrom 1999: 78). This private-public good aspect of ecosystem services guides potential public-private investment decisions and governance arrangements for their delivery (Table 7.2).

Forest governance provides a foundation for understanding the implications of managing forests as a bundle of property rights within existing public-private interactions in private forestry. Institutions, understood as rules, guide human behavior and influence the use and misuse of forest resources (Costanza and Farber 2002; Ostrom 2005). Markets, government programs, and property rights are key institutional mechanisms that enable or hinder outcomes on private forestlands. By providing information to resource owners and users, for instance, through price signals, educational programs, title, or property boundaries, these institutions shape the nature and scope of private-public interactions. Different institutional regimes are associated with different forest features (e.g., wildlife enhancement, timber production), policy levels (federal, state, local), actors (private, public), and scales of interactions (ownership parcel, neighborhood, watershed, ecoregion, or other) (Koontz et al. 2004; Rickenbach et al. 2011; Wondolleck and Yaffee 2000). In brief, these institutional arrangements affect the incentives and patterns of interactions among different actors, as well as the outcomes of their interactions (Ostrom 1998).

Governance is a useful concept when we seek to understand the institutions that support and constrain the conservation of private forests. Governance is characterized by the decisions, actions, and interactions of actors in the private forest sector (Tucker 2010: 690). These actors have authority to make decisions that shape activities and social and ecological outcomes on forestlands. Governance also entails "continuing interactions between [actors], caused by the need to exchange resources and negotiate shared purposes" (Rhodes 2007: 1246). In the context of private forestry, landowners, land trusts, professional foresters, timber buyers, developers, and state and federal agencies engage in conversations and consultations with each other. They share and process information and form beliefs and preferences, which affect their behavior and decisions about forest use and

management (Fishbein and Ajzen 2010). Thus, *private forest governance* can be conceptualized as the decisions and interactions of private landowners and other public and private actors, caused by the need to exchange resources, and bound toward different activities and outcomes on private forestlands (Oakerson 1999: 18; Rhodes 2007: 1246; Tucker 2010). Such interactions, across levels and sectors of governance, are reliant on information, knowledge, and other resource exchanges.

Information and knowledge have direct and indirect effects on natural resource management decisions (Dietz et al. 2003; Ostrom 1998). As an investment, the decisions of public and private actors (described in Table 7.1) are contingent upon available and relevant information. Information and knowledge are key components of decision-making processes and are central to the choices private and public actors make with regard to private forests. Information can directly influence individual choices (e.g., what and how much land to keep as forest) and indirectly affect the sustainability of private forestlands. Learning occurs in the process of information and resource sharing among actors. Learning also affects the attitudes, preferences, and choices of individuals with regard to forest practices and land use (Ostrom 1998; Smith et al. 1995 cited in Tompkins and Eakin 2012).

Private forest governance may also vary based on the communication patterns and social ties of private forest owners. Interactions with others, as observed by sociologist Bernice Pescosolido (1992: 1101), form “an essential element in the dynamics of decision-making processes.” Landowners make decisions about the care and management of their forests within particular social environments. An environment encompasses the connections a landowner has, both with the land and with others, such as family members, neighbors, and forestry professionals. Informal and subjectively meaningful social interactions form a network of social relationships (Crossley et al. 2009; Pescosolido 2007). Social networks, such as this, provide the “context for embedded, rather than individualized, decision-making” (Heath et al. 2009: 657). Conceptual and empirical work indicates that social contacts are positively associated with information and knowledge sharing, the adoption of best management practices, and willingness to coordinate forest practices toward ecological and economic benefits (Gass et al. 2009; Olsson et al. 2007; Prokopy et al. 2008; Warriner and Moul 1992). Information channeled through informal conversations and interpersonal contacts may facilitate learning and diffusion of knowledge and enhance the governance of private forests (Knoot and Rickenbach 2011; Nybakk et al. 2009; Rickenbach 2009).

In brief, social interactions form a basic mechanism through which landowner attitudes, behaviors, and practices are shaped (Borgatti et al. 2009; Freeman 2004; Pescosolido 2007). This mechanism has direct implications for private forest governance, where parcel-scale decisions are linked to social interactions at multiple scales. Figure 7.1 summarizes the social and ecological challenges and opportunities that cumulatively shape the governance of private forests. Items in each rectangle have the capacity to operate as risks or windows of opportunity for sustainable forest governance. Arrows represent feedback mechanisms among human-environment interactions at different scales. The importance of private ownership is recognized

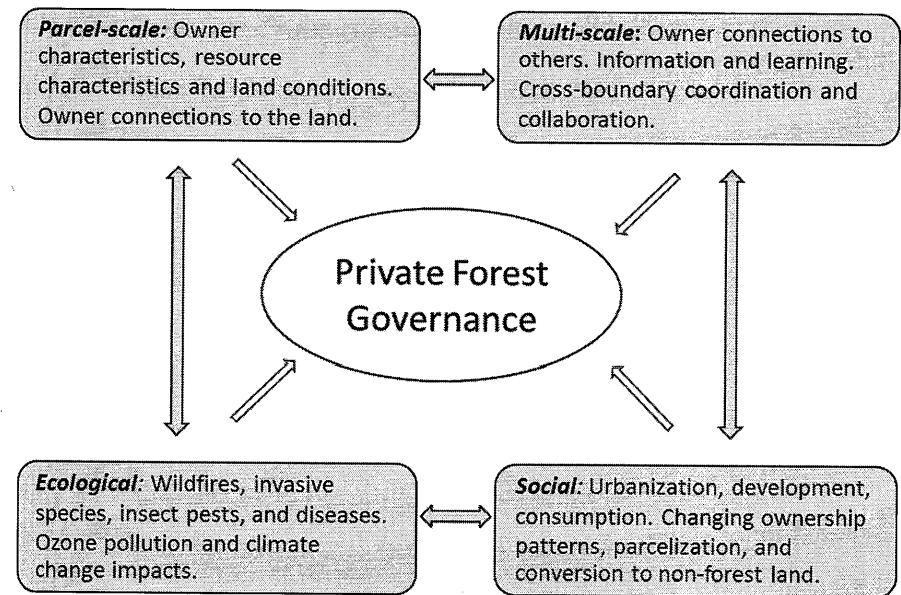


Fig. 7.1 Challenges and opportunities in the governance of private forests

by the separation of parcel scale as opposed to other multiple-scale processes within definable socioecological units (e.g., ownership parcels, watersheds, ecoregions) (Rickenbach et al. 2011). The diversity of actors involved in forest management decisions and practices presupposes multiple scales. Coordination and collaboration among landowners, neighbors, professional foresters, loggers, land trusts, and others are important dimensions of forest governance with implications for forest sustainability. Such partnerships that cross boundaries are able to address issues that cannot be solved or easily solved by a single actor or entity (Agranoff and McGuire 2003). Thus, effective interactions among landowners and other private and public actors have the potential to lead to multisector and multiscale partnerships that facilitate the long-term management of private forestlands.

7.5 Conclusion

This chapter reviewed existing scholarship on private forest management with an eye to identifying and synthesizing the processes, risks, and challenges to forest governance. It discussed the interactions among private and public actors involved in the management and conservation of privately owned forests in the USA. With more than half of all forestlands in the country under private ownership,

it is important to better understand the decision-making contexts and human and nonhuman forces shaping forest dynamics and outcomes. One way to systematically study these processes is to categorize private-public interactions in relation to their primary benefit receivers. We discussed four types of private-public investment in forestlands that lead to largely private or largely public benefits. The practical difficulty of separating the private from the public value of forests can be aided by a categorization of the different features (goods and services) produced by forest ecosystems. We believe that integrating the proposed typology of private-public interactions with a refined and legally defined bundle of property rights over forests, as a socioecological system, may aid efforts to preserve and sustain the wealth produced by these valuable ecosystems.

The typology presented in this chapter may need to be developed further, both conceptually and empirically, in order to respond to and inform policy-relevant decisions at local, state, and national levels. Attention needs to be directed not only at the benefits but also at the costs (e.g., transaction and opportunity costs) of enabling and investing in some partnerships over others. In a world of fixed resources, economic hardships, and social change, choices about the governance of privately owned forests will not be easy. Sustainable forest management is increasingly compounded by decisions and interactions among interdependent individuals within diverse and dynamic socioeconomic settings. From such a broad socioecological perspective, this chapter offers some ideas for the sustainable management of natural resources under private ownership.

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