ANALYZING ACCESS TO CALIFORNIA’S
REGULATORY FOREST OFFSET MARKET

By

Marissa Schmitz

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Committee Membership
Dr. Erin Kelly, Committee Chair
Dr. Steve Hackett, Committee Member
Dr. Andrea Tuttle, Committee Member
Dr. J. Mark Baker, Graduate Coordinator

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Abstract

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Forest offset projects under the California cap-and-trade market offer the potential for landowners to engage in a new, non-traditional forest resource commodification, by monetizing the carbon sequestration of managed forests. Using frameworks of environmental governance, commodity chain analysis, and access theory, this study examines a) development of the forest offset protocol b) the steps and relationships involved in forest offset production and c) market participation trends from year-one operation. Interviews with protocol development stakeholders and forest offset project participants and content analysis of carbon project design documents are important sources of data. Results highlight the complexities of commodifying abstract ecosystem goods, including the ability of stakeholders to favor their own market participation via access to program design, the cost and complexity of rendering intangible goods “real” for market exchange, and the potential for diverse participants to access benefits from a new and unusual good. This research brings empirical evidence to bear on the global search for innovative policy tools for GHG reduction.
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**Introduction**

In the late 1970s, scientists first explored how the natural carbon sequestration of forests could help mitigate atmospheric greenhouse gas (GHG) levels (Dyson 1976; Houghton et al. 1998). As climate change entered the international policy agenda in the 1990s, forests were increasingly viewed as promising GHG sinks, due to their high potential for increased GHG storage (Goodale et al. 2002). Policy-makers experimented with forest carbon sequestration in GHG reduction programs, such as cap-and-trade markets, based on the view that inclusion of terrestrial GHG sinks increases market efficiency, by providing flexible, lower cost compliance options for emitters. The Clean Development Mechanism (CDM), established pursuant to the 1997 Kyoto Protocol, is a notable early example of a regulatory program which allowed capped nations to “offset” GHG emissions by investing in tree planting activities in the Global South, via afforestation and reforestation (Boyd et al. 2008).¹ Forest offset programs of wide methodological variation followed. In addition to regulatory markets, voluntary schemes were also common, providing niche opportunities for corporate and personal carbon footprint reduction. Yet program challenges were common, including low landowner utilization, public scrutiny over methodological credibility, and in some cases even market failure, reflecting the complexity of effectively monetizing these novel ecosystem goods.

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¹ Capped nations included Annex I signatories of the Kyoto Protocol, including states with membership in the Organization for Economic Co-operation and Development (OECD) as well as those with economies in transition (EIT nations).
The state of California joined this effort in 2013 by developing an innovative protocol for Improved Forest Management (IFM), for use in its cap-and-trade market, thus becoming the first methodology applied to working forests within a regulatory context. California’s IFM protocol broke ground on several fronts, including its creation of carbon-based revenue streams that could co-exist with other forms of forest management, such as management for timber harvest, and its development of a performance standard baseline approach, aimed at broadening participation. This research examines this pioneering program through two distinct but related sections. Chapter one traces the development of the IFM protocol by vested-interest actors, asking how protocol development stakeholders exerted self-interest in program design. In-depth interviews with member participants of a stakeholder working group and document analysis of successive protocol iterations illuminate contentions over key design elements, such as baseline, permanence, and natural forest management, which may shape market access.

Chapter two follows the steps and relationships involved in bringing forest offsets to market—including inventory, verification, market sale, and permanent maintenance—and analyzes landowner participation in early days of market emergence. Through in-depth interviews with consulting foresters and forest carbon developers, and review of all IFM project design documents listed on public carbon registry databases, this section asks a) who has access to this new, carbon-based revenue stream at this stage of market operation, and b) which mechanisms are facilitating and constraining access to benefits?

Chapter one found that protocol development stakeholders lobbied for design elements favorable to their own market participation, and frequently debated rival
preferences when interests conflicted. Yet self-interests were at times subordinated to achieve high technical rigor, production of environmental co-benefits, and broad market participation, attributes felt necessary for a strong market commodity. Meta discourses of Ecological Modernization, Green Governmentality, and Civic Environmentalism, previously described by Bäckstrand and Lövbrand as narratives that compete and overlap in forest offset policy broadly, provide useful frameworks for understanding the tensions and complementarity of stakeholder objectives (Bäckstrand and Lövbrand 2006). In chapter two, data reveals firstly that forest offset commodification utilizes a series of costly and technically complex steps in order to transform intangible goods into legitimate market commodities. Secondly, cost, complexity, and risk—which are present all along the commodity chain—increase profitability for some, such as expert third-party professionals, while reducing it among others, such as economically marginal landowners who frequently lack the upfront capital, technical capacity, or knowledge necessary for project development. Third, analysis of project enrollment found that market participation has thus far been robust compared to previous forest offset programs, with 68 IFM projects currently in development from across seventeen states in the US, with over 1.5 million acres of timberland currently enrolled. Participant demographics are surprisingly diverse, including wide-ranging project sizes, landowner types, and forest management objectives and practices. However, economies of scale, management for timber harvest, and participation of large conservation landowners and timberland investors are notable trends.
This case provides a unique empirical example of ecosystem service market construction and usage, which analyzes access to benefits from multiple points of inquiry. Relevance exists for emerging PES initiatives globally, including the relationship between access to protocol design and access to market entrance, and the consequences of high program rigor on scope of market engagement. Future research should re-evaluate participation trends as the market matures, while tracing continuous IFM protocol evolutions. As regulatory and voluntary ecosystem markets proliferate, opportunity also exists to compare methodological design, commodity chain particularities, and market engagement between discreet, and variably constructed, PES markets globally.
Chapter One: Counting Working Forests at the Forefront of Cap-and-Trade: Lessons in Neoliberal Environmental Governance

Introduction

In 2013 the state of California launched a cap-and-trade system with a groundbreaking protocol for Improved Forest Management (IFM), beginning an experiment in the commodification of carbon sequestration in working forests. While interest in sequestration and storage of carbon in forests is high (Goodale et al. 2002), the task of creating markets for forest offsets is complex and includes methodological and political challenges. Few policy initiatives currently reward forest carbon sequestration, and those that do are usually restricted to tree planting (“afforestation” or “reforestation”), with minimal utilization. Earlier efforts include the Clean Development Mechanism (CDM) and Joint Implementation (JI), product of UNFCCC negotiations; however exclusion of offsets produced from these initiatives from the European Union carbon market (EU ETS), high development costs, and market uncertainty limited participation. Utilization to date consists of ten CDM and two JI afforestation projects registered (UNEP DTU 2014).

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2 California’s cap-and-trade system is part of a suite of actions taken in fulfillment of Assembly Bill 32 (AB 32), the Global Warming Solutions Act of 2006.
3 The US Forest Project Compliance Offset Protocol includes categories of Reforestation, Avoided Conversion, and Improved Forest Management; this research is exclusively concerned with Improved Forest Management.
4 Earlier efforts include the Clean Development Mechanism (CDM) and Joint Implementation (JI), product of UNFCCC negotiations; however exclusion of offsets produced from these initiatives from the European Union carbon market (EU ETS), high development costs, and market uncertainty limited participation. Utilization to date consists of ten CDM and two JI afforestation projects registered (UNEP DTU 2014).
This research examines the stakeholder-driven process that produced California’s IFM forest protocol, as a case-study of experimentation in market-based environmental governance. It considers how governing bodies complete the methodological and political work needed to bring these complex, contentious, and abstract goods to market. Previous analysis by Baeckstrand and Loevbrand found the backing of particular discursive groups to be important to this process (Baeckstrand and Loevbrand 2008). Our research applies their framework to California’s IFM forest protocol, and its development by a diverse multi-stakeholder work-group. We conclude that multi-stakeholder involvement was requisite for legitimizing forest offsets as market commodities: diverse interests created tension and forced compromise during protocol design in ways that bolstered the legitimacy, rigor, and participation needed to launch an emerging market. However, stakeholder decisions also pushed and pulled protocol design in ways that may shape market engagement.

These findings provide a needed empirical look into design of an ecosystem marketplace, with relevance for emissions trading systems being planned and implemented globally. California’s experimentation with forest offsets will demonstrate the actual outcomes of a politically popular but yet-untested tool. Specific lessons in environmental governance include the challenges of incorporating ecosystem goods into neoliberal marketplaces, the benefits and complexities of delegating work to stakeholders who seek direct participation in the market, and the abilities of vested-interest actors to shape engagement with the market through access to protocol design.
This manuscript begins with a consideration of how neoliberalism and payment for ecosystem services (PES) literature lend understanding to the development of California’s IFM protocol. Neoliberalism is especially embodied in the employment of non-state actors in development of the protocol, which lends a particular shape to the program with implications for market success and participation. Following the literature review, a chronology of protocol development details the evolving ways stakeholders grappled with three key aspects of forest protocol design: establishing the baseline, determining a mechanism of permanence, and defining natural forest management. While the elements of a comprehensive forest offset protocol go far beyond this, these components are particularly useful in understanding contestation between diverse

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5 This research will refer to the protocol produced by the first workgroup as the “Early Protocol,” and to the protocol produced by the second workgroup as the “Cap-and-trade Protocol.” Multiple iterations of each protocol were released, reflecting revisions made by the Climate Action Registry; however, this paper concerns itself with the broader differences between the protocols as produced by each working group.
stakeholders. This narrative is divided into two sections addressing successive working
groups which crafted iterative versions of the protocol (Figure 1): the first developed a
protocol for use among projects located in California, for offset sales into a voluntary
market; the second significantly revised the original protocol for use among projects
located within the contiguous United States, for offset sales into a cap-and-trade market.

**Neoliberalism**

According to David Harvey, neoliberalism is the idea that: “Human well-being can best
be advanced by liberating individual entrepreneurial freedoms and skills within an
institutional framework characterized by strong private property rights, free markets, and
free trade” (Harvey 2005, 2). In a neoliberal system, all aspects of production and
exchange are purportedly best managed through the marketplace in order to maximize
efficiency and utilitarian benefit (Jessop 2002). Rhetorically, markets and their
commodities are natural and self-sustaining. However debate exists about the degree to
which markets can emerge and function without state intervention (Peck 2004). Some
contend that, in practice, neoliberal states intervene frequently to promote and protect the
functioning of their marketplaces, a claim that questions the theoretical foundation upon
which neoliberalism exists (Harvey 2005). Emergence of an unorthodox but increasingly
prevalent class of tradable commodities—that of ecosystem services—is an opportunity
to test neoliberalism in practice by examining the construction of a wholly new
marketplace. California’s forest carbon commodification not only required extensive
work to build trading infrastructure, but also necessitated the creation of the commodity itself through accounting protocols and political support.

Since neoliberalism is also referred to as a “mode of discourse” and a “battle of ideas,” this research also considers the discursive support provided by vested-interest actors who helped build California’s forest offset market via participation in protocol design (Harvey 2005, 3, 21). We draw on the findings of Bäckstrand and Lövbrand, who articulate three meta-discourses which collaborate in support of forest offset policy creation (Bäckstrand and Lövbrand 2008). In their framework Ecological Modernization legitimizes forest offsets as an environmentally and economically efficient solution to climate change; Green Governmentality operationalizes the process by developing the science and language to measure, monitor, and manage forest carbon; and Civic Environmentalism democratizes the process by bringing in nonstate actors who safeguard ecosystem integrity (Bäckstrand and Lövbrand 2008, 52, 54-55). This research therefore asks: What does the California IFM protocol teach us about neoliberal markets, in particular the interactions between state and multiple nonstate actors in creating commodities? And considering its many challenges, how and why do states undertake the complex task of transforming abstract goods into legitimate market commodities?
**Payment for Ecosystem Services**

Forest landowners’ actions can benefit society at large by providing ecosystem services such as wildlife habitat and diversity, watershed improvements, scenic landscape, and carbon storage. Payment for ecosystem services (PES) programs like California’s IFM protocol offer ways to encourage management for these benefits by “compensating landowners for the many public goods they [otherwise] provide at little or no cost to consumers” (Jenkins and Smith 2013, 25). Governing bodies have options for influencing landowners’ behavior—including direct state regulation, taxation, and state subsidy programs—yet the last decade has seen a turn toward PES as a favored tool for environmental governance (Gomez-Baggethun et al. 2009). The perception of PES as a win-win solution, capable of both environmental and economic benefit, contributes to this. Market-based PES is especially favored because it is voluntary, incentive-based, and purportedly fits within a neoliberal paradigm, letting free markets direct economic decision-making (Engel et al. 2008). PES was first popularized in the sustainable development context in the 1990s; yet today their usage is expanded to climate change mitigation, with forest-offset programs described as the most promising PES market opportunity for landowners (Corbera et al. 2009; van Kooten and Sohngen 2007).

However, a critique exists that PES creates winners and losers via program design (Muradian et al. 2013). Empowering vested-interest actors in crafting rules for participation is a common strategy, because it potentially creates a more usable program
with wider engagement (Wunder et al. 2008). Yet this may open PES to the “push and pull of many stakeholders,” influencing program design according to particular political contexts (Muradian et al. 2013). Critics caution that empowering particular actors through access to market design affects the scope of environmental benefit and shapes who benefits from program incentives.

Studies of existing forest carbon PES programs demonstrate that participation is not guaranteed, but instead depends on a variety of factors including program design (Corbera and Brown 2010; Galik et al. 2012, Muradian et al. 2013.; Ribot and Peluso 2003). Research found protocol methodologies have significant bearing on revenue potential, influencing the forest size and maturity needed for project feasibility (Galik et al. 2009, 2012; Gunn et al. 2009; Remucal et al. 2013; Russell-Roy et al. 2014). Relationship between program design and cost was also explored, e.g. Galik et al. compared seven different forest offset methodologies and concluded: “Offset program rules can strongly influence project feasibility and the corresponding level of engagement with [the program]” (Galik et al 2012, 129-130; emphasis ours). Our research therefore asks: How might design elements of California’s IFM protocol shape stakeholder engagement and benefits from the market?

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6 We draw on the framework of Access articulated by Ribot and Peluso.
Interest in Emerging Forest Carbon Markets

Forest carbon market opportunities in the US were first created in the 2000s. A proliferation of voluntary schemes generated interest in new income opportunities that could provide multiple benefits for forest landowners and forest ecosystems. Early attention asked how carbon revenue might help reduce forest fragmentation among smaller landowners (Wayburn et al. 2000; Best and Wayburn 2001). Yet many found barriers to market entry for this demographic, predicting particular difficulties meeting rigorous requirements for accounting, monitoring, and permanence (Fletcher et al. 2009; Wade and Mosely 2009; Charnley et al. 2010; Fisher and Charnley 2010; Markowski-Lindsay et al. 2011; Thompson and Hansen 2012; Miller et al. 2012). Results pointed towards a “precision versus practicality paradox” which makes forest carbon commodification less accessible the more technically demanding it is (Gosnell et al. 2011). Many concluded that smaller landowners will need assistance from state extension offices or from carbon financiers in order to benefit from forest carbon revenue (Markowski-Lindsay et al. 2011; Gosnell et al. 2011; ESFF Report 2010). Some acknowledged small landownerships may be at odds with the needs of the marketplace for permanence and rigor, and suggested this group may be better incentivized by non-market mechanisms (Miller et al. 2012).

Researchers writing in the late 2000s frequently tested landowner compatibility against wide-ranging protocol options, because forest carbon program design was variable and evolving. Dubbed the “Wild West” days of carbon, this time period saw a
proliferation of diverse carbon offset schemes that suggested many paths to market (Jenkins and Smith 2010, p. 26). The existence of wide-ranging carbon offset standards allowed for experimentation by both users—buyers, sellers, and other market actors—and program developers (Galik et al. 2009 and 2012; Jenkins and Smith 2010). However it also reflected uncertainty about how best to convert intangible forest carbon sequestration into a marketable commodity, and a need to clarify and institutionalize a credible forest offset methodology. From this period of innovation, California’s IFM protocol emerged as the only forest offset program operating in a regulated environment, suggesting that from among the several options, it offers both the strongest demand and greatest revenue potential for timberland managers. While prices in voluntary markets have dropped significantly since high points in 2008, many predict California’s IFM protocol will endure as a significant forest-carbon revenue opportunity for landowners (Jenkins and Smith 2010; Smith 2010; Caldwell et al. 2014).

California’s IFM protocol is showing signs of market strength, but who will benefit remains an open question. Compared to other methodologies in the voluntary context, California’s IFM protocol was found to have a conservativeness, costliness, and prescriptiveness that bode poorly for more marginal landowners (Galik et al. 2009 and 2012). Feasibility studies of IFM project development on specific forest tracts are few, but suggest viability limitations for certain management objectives, such as restoration forestry (Gunn et al. 2011; Remucal et al. 2013; Russell-Roy et al. 2014). Yet enthusiasm remains. Forestry professionals emphasized compatibility between California’s IFM protocol and more traditional timber management strategies, suggesting carbon-based
income can work especially well on commercialization of less marketable timber types and forest tracts, and can stabilize return on investment during economic downturns (Jenkins 2013, Caldwell 2014). Studies also pointed-out the prevalence of project development among land trusts owning large tracts of forestland (defined as several thousand acres or more), depicting carbon revenue as an innovative conservation funding source (Wroblicka 2014). While limited in scope, this literature suggests tensions between engagement of more marginal landowners and forest types who could benefit most from carbon revenue—such as those at risk of fragmentation or conversion, or those in need of restoration activities—and feasibility of market entry. Emerging also is the view that carbon-based income can be integrated with more traditional timber revenue streams among larger landowners, both for-profit and non-profit. This research therefore asks: How did California’s IFM protocol design address questions of access for more marginal landowners? How did the evolution of the protocol change its accessibility to different land owners and land management contexts?

**Research Methods**

We conducted a total of thirty-six semi-structured interviews between fall of 2013 and spring of 2014, each lasting one to one and a half hours each. Targeted sampling was used to gain interviews with a variety of actors with first-hand knowledge of protocol development and/or implementation. Included were participants of a multi-stakeholder workgroup tasked with developing the California IFM protocol, forest carbon project
developers and managers, and to a lesser degree, non-participant interest group members
who followed and commented on the process (Table 1). Participants were asked about
experiences engaging with the protocol—from viewpoints of development, usage, and
management—depending on their particular expertise. Interviews were audio recorded,
transcribed, and coded according to the methods of Corbin and Strauss (Corbin and
Strauss 2014); codes were then organized and analyzed using qualitative data analysis
software, ATLAS.ti (Friese 2012; see Appendix B for code list). Interview data was
augmented with additional findings drawn from document review of workgroup meeting
notes and attendance at forest carbon policy meetings and conferences (n=3).

Table 1, Interview breakdown by type and source method

<table>
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<th>Interviewee Label</th>
<th>Number of participants</th>
<th>Participant Breakdown</th>
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<td>Protocol development Work Group members</td>
<td>17</td>
<td>Land Trust: N=5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Timber Industry: N=5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Science/Academia: N=4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other: N=3</td>
</tr>
<tr>
<td>Stakeholders outside the Work Groups</td>
<td>19</td>
<td>Consulting foresters: N=6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>For-profit carbon developers: N=4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NGOs: N=7</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Other: N=2</td>
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The Spadework: creating, testing, and promoting a voluntary market for forest offsets

California’s current IFM protocol emerged from an important period of experimentation and revision, which took place in a voluntary market for offset trading. Stakeholders with vested interests in the market drove this process, beginning with conservation non-profits, notably land trusts. These early advocates broke ground in the development of an innovative methodology for forest carbon accounting by articulating core concepts underpinning forest carbon offsets—i.e. product specifications of “Real, Additional, Quantifiable, Verifiable, and Permanent”—at a time when definitions of these terms were not yet resolved. Besides advancing the thinking on how to quantify forest offsets, the efforts of Workgroup One also gained important political and public support for forest-based offsets as tools for GHG reduction; the successful operation of this voluntary market facilitated the later inclusion of forest-based offsets in California’s regulatory cap-and-trade program, by demonstrating that carbon from managed forests could be quantified and sold as legitimate market commodities.

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7 See Figure 1 for clarification on California IFM protocol iterations.
8 Advancements in common understandings for forest carbon methodologies were greatly aided by separate but related work done under the auspices of the World Resources Institute (WRI), which convened a stakeholder working group contemporaneous to CCAR’s first workgroup. WRI’s initiative began in 1998 and culminated in a Land Use, Land Use Change, and Forestry GHG Protocol, released in 2006. This document is similar to the voluntary protocol produced by CCAR in 2005 in its definitions of core concepts, due in part to cross-over between workgroup participants. The WRI protocol, released shortly after CCAR’s early protocol, was viewed as a seminal document in a nascent field, and was said to lend credence to the framework newly introduced in California. See World Resources Institute, 2006.
An Effort Instigated and Run by Land Trusts

While much of the work of crafting the IFM protocol was done by nonstate actors, legislation built the foundation for forest offset trading. Senate Bill 1771 was a critical first step (Sher 2002). By establishing the California Climate Action Registry (CCAR) as a voluntarily database for GHG reporting, this legislation enabled California industry emitters to develop the tools for monitoring and reporting GHG emissions.

Contextualized by the 1997 Kyoto Protocol and efforts within the US to pass domestic climate legislation, SB 1771 aimed to make California an early actor in a new age of GHG regulation.

San Francisco based land trust, Pacific Forest Trust (PFT), which had worked previously on forest carbon sequestration policy at the international level, saw the creation of CCAR as an opportunity to promote forest-based offsets in California. In 2003 they wrote and sponsored a second piece of legislation, Senate Bill 812 (SB 812), which clarified the role of CCAR to include methodological development for production and sale of carbon offsets to registry users. From among many potential offset sources, SB 812 specifically required the crafting of a protocol for forest carbon sequestration, suggesting promotion by land trust sponsors made an unlikely thing possible. Stated one: “[CCAR] probably wouldn’t have started with forests absent this legislation, because everyone would have focused on fossil fuels, or refrigerants or something” (Interview 28, Land Trust). Also articulated in the legislation were core concepts that had ongoing influence over methodological design. Explained one: “It set these clear principles:
permanent, native [species], additional, quantifiable. Those anchors held things together” (Interview 2, Land Trust).

State legislation provided a basic structure for the new protocol; however, many details were left open and delegated to a working group which convened in 2003 (Figure 1). Land trusts provided the majority participation, with additional members including the California Department of Forestry and Fire Protection, forest industry, and a California electric utility who later became a primary buyer of forest offsets in the voluntary market. In contrast to what would later be strong interest in the program, the first workgroup was small, with only a few key actors staying through completion. As participants of the first workgroup were quick to point out, this was long before the passage of California’s cap-and-trade legislation, and demand for forest offsets was unclear. Stated one:

People didn’t think this was real. Companies weren’t beating down the door to be part of the [first protocol development] process, because they just didn’t think this was going to go anywhere. So why bother? This was going to be some boutique-ey little thing that didn’t really have an impact. (Interview 2, Land Trust)

However land trusts showed a willingness to invest time and energy in the process, motivated by hopes that forest carbon could facilitate forestland conservation, by providing an alternative revenue stream for working forests. The goal was to overcome a common trajectory on small-scale forest lands of heavy logging followed by conversion. Recalled one: “We thought, are there potentially other drivers of return that are better aligned with keeping forests as forests, and in fact sustaining their ecological functionality?” (Interview 28, Land Trust). Initial interest in forest-based offsets thus
focused heavily on the broader benefits this PES could have for forest conservation and in fact saw forest carbon as a “low hanging fruit” of ecosystem services.

*Early Protocol: Methodological Innovations Aim to Broaden Participation*

Workgroup participants borrowed concepts from existing GHG accounting conventions, such as notions of baseline, additionality, and third party verification. However much of their work broke ground, in order to avoid perceived shortcomings of earlier offset programs—including low utilization, prohibitive transaction costs, and high degrees of uncertainty by investors. The targeting of managed forests was among the innovations, viewed as an advance because it made climate goals potentially compatible with other beneficial forest management practices, such as timber harvest. Whereas previous forest carbon programs had been limited to tree planting (“afforestation” and “reforestation”), California workgroup members strove intentionally to create a carbon-based revenue stream that worked with other forest management objectives. We focus on three components of early protocol design: baseline, permanence, and natural forest management.

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9 These common tenets of GHG accounting were used previously and most notably in the international context with Clean Development Mechanism (CDM) and Joint Implementation (JI) protocols.
Baseline: Establishing a Performance Standard

A baseline is used to demonstrate additionality, i.e. greater carbon sequestration than would occur in absence of project development. Forest carbon accounting prior to this employed project-specific baselines, resulting in counterfactual scenarios viewed as difficult to verify, qualitative in nature, and overly reliant on landowner-provided information about the costs and benefits associated with various land management decisions (World Resources Institute, 2006, p. 23). This approach was also viewed as a participation deterrent due to time-consuming burdens it placed on project developers. Said one: “It was like writing a novel every time you did a carbon project. So it was very very inefficient” (Interview 28, Land Trust). Workgroup members therefore favored a performance standard baseline, i.e. a consistent, quantitative analysis which could be applied across numerous projects, more clearly conveying risk and return to project developers. Explained one interviewee:

You need to make it so that people know going into the project what they are getting into and they can do feasibility assessments, they can determine ahead of time whether it is going to be worth the effort, and then they are going to know the rules of the road so they are ready, willing, and able to make actual expensive up-front investments in order to get the project going. You can’t expect people to make all of these investments…and then wait and see. Is it going to work? Are you going to believe me? Who is going to do that? No one. The risk is huge. (Interview 28, Land Trust)

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10 Prevailing forest carbon accounting systems which used project-level accounting included mechanisms that came out of United Nations Framework Convention on Climate Change (UNFCCC) negotiations, the CDM and JI, but extended also to most voluntary carbon offset programs in existence domestically in the US at this time.

The forest regulatory context of California made the performance standard baseline possible. Unlike most states, California has a well-established, prescriptive, and measurable set of guidelines articulated in its Forest Practice Rules, pursuant to the 1973 Forest Practices Act. Workgroup One utilized these rules as a framework for their baseline methodology, allowing project developers to determine economic potential on forestland within the constraints of familiar regulatory restrictions.

Workgroup members also pointed out that determining the economic potential of forestland via its regulatory restrictions mirrored something many were already familiar with: the standards for timber appraisals. Land trust stakeholders, in particular, had an awareness of timber appraisals from their work with conservation easements, and favored this method of accounting because it recognized the value of older forests. By considering what landowners could have harvested, this method rewarded forests upfront for past growth that exceeded what was required by law. At a time when the most common approach among forest carbon protocols was to credit landowners for new growth only, California workgroup members recognized past beneficial stewardship, a strategy supported by land trusts:

You wanted to say thank you very much for not having liquidated your forest down to the economically optimal levels and legally allowed levels. Thank you. And here is an alternative revenue stream that will enable to you to afford to keep doing that

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12 California’s prescriptive Forest Practice Rules are unique when compared against the regulatory frameworks utilized by state’s elsewhere, which commonly rely instead on things like Best Management Practices (BMPs). Workgroup members pointed-out that BMPs are less useful for determining a baseline counterfactual.

13 The Chicago Climate Exchange (CCX), the only alternative IFM protocol at the time credited for growth only.
in the face of very compelling economics to do otherwise. (Interview 28, Land Trust)

Yet the baseline premised on California’s Forest Practice Rules provoked criticism from outside the process for inflating credits—e.g. by allowing conservation-minded landowners to assume maximum harvest allowable by law under their baseline scenarios, without clear intention to actually harvesting at high levels. Nonetheless, this accounting approach was defended by land trusts as the most holistic way to consider forests’ twin climate benefits of carbon sequestration and storage.

Permanence via Conservation Easements

The second main component of protocol design—determining a mechanism of permanence—also worked to protect standing forests. Workgroup members pushed for a requirement that landowners place conservation easements on project lands, as a means of ensuring that carbon sequestration was permanently maintained. Once again, stakeholders drew on familiar tools, selecting conservation easements because they were well-established, legal mechanisms with reputations for contractual strength. Importantly, easements were viewed as superior to other possible permanence tools because they created perpetual obligations to maintain forests as forests, and because they allowed ongoing third party monitoring by easement holders, such as land trusts. These factors offered ways of dealing with inherent uncertainties in the lifespan of atmospheric carbon,
i.e. the question of how long sequestered forest carbon must be stored in order to wholly offset emitted carbon tons. Unlike alternatives, such as contracts of limited duration, conservation easements were viewed as truly permanent.

Co-benefits through “Natural Forest Management”

A third major element of early protocol design was the obligation to practice “natural forest management” in order to foster the production of “co-benefits” on project lands. Co-benefits are familiar concepts in forest offset programs and refer to additional positive ecological contributions beyond carbon sequestration, such as watershed improvements, habitat creation, or biodiversity increases. Yet California’s forest offset protocol was unique in its articulation of “natural forest management”—a concept derived for this methodology—as a vehicle to achieve these secondary benefits. This concept had origins in the founding legislation and was a deliberate effort to improve upon perceived problems in previous carbon programs. By requiring landowners to manage for a diversity of timber species of mixed age classes, this condition sought to prevent projects from becoming “carbon farms” that maximized carbon sequestration at the expense of ecological integrity. Explained one workgroup member: “The commonest approach was: Hey, let’s put this into Eucalyptus plantation or Acacia. [With California’s program] you could get no credit for that, because we wanted to protect natural systems” (Interview 2, Land Trust). This requirement was a key innovation of the early protocol and one that had continued influence over the program as it evolved. Yet unlike the baseline and
permanence requirements, which were more clearly and objectively articulated, a degree of uncertainty clouded the natural forest management component. As one carbon registry staff member explained:

You can ask a hundred different people what natural forest management means, and you will get a hundred different responses…There was something [in the original legislation] that referenced ‘With a diversity of age classes.’ But a diversity of age classes can be debated as to what that means and on what scale. On every acre, every five acres, every ten acres? (Interview 8, Registry Staff)

Questions like these were prevalent and foreshadowed coming debates. Workgroup members would eventually need to contend further with the question of how best to maintain ecosystem integrity within the context of working forests, i.e. forests which would likely be subject to other management practices such as timber harvest.

**A need for demonstration projects**

By 2005 workgroup members had completed an innovative forest protocol. Yet demonstration projects were needed to provide evidence that the methodology could successfully bring offsets from managed forests to market. Early entrance into a market with unclear demand brought risk, but a select group of land trusts and conservation landowners accepted this uncertainty and developed California’s first forest carbon projects on their own lands. PFT—prominent architect of SB 812 and early workgroup contributor—led the experiment by registering the first carbon project on 2200 acres of
forestland that they managed. Several other non-profit forest landowners followed. Though few in numbers, these early actors demonstrated the possibility of forest carbon accounting from managed forests and the feasibility of forest-based offsets as legitimate market commodities.

Successful examples of project development in California’s voluntary market heightened interest in the program. From a diversity of carbon trading schemes in the US in the mid to late 2000s—a period referred to by many as the “Wild West” days of carbon—a bifurcation began to occur. Offsets from California’s early protocol started to command higher prices. Most notably the precipitous decline of the Chicago Climate Exchange, a leading alternative for voluntary forest offsets, between 2008 and 2009, at a time when sales of California credits were strong, suggested a differentiation in public perceptions of program quality. According to some, a brewing awareness that a regulatory market was close at hand also contributed, because it increased buyer preferences for credits perceived to have greater rigor.

Signs of a cap-and-trade market on the horizon not only made California’s protocol more attractive to buyers, it also drew the attention of a broader scope of potential landowner participants. Larger industrial timberland owners who had thus far been “keeping an eye over the fence,” according to one stakeholder, watched the opportunities opening in California’s forest offset market with greater interest (Interview 2, Land

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14 The Chicago Climate Exchange (CCX) was a voluntary GHG exchange market which included forest offsets. However, after an apex in 2007, when carbon traded at prices as high as $7.50 per ton, the program collapsed in 2008. CCX officially closed in 2010 after nine months of no trading activity, during which time the price of carbon hovered between $0.05 and $0.10 per ton. During this time California offsets were said to have regularly sold for $10 a ton.
Trust). Yet attention from a widening pool of actors also fueled critiques about the program. Concern surfaced that California’s early protocol favored a narrow group of participants, essentially large non-profit landowners who were willing and able to meet conservation oriented requirements, while also having forestlands sufficient in size and productivity to justify project expenses. As this observer points-out: “[Early conservation actors] were fortunate to have really a lot of production on the land they were working on. Their projects conveniently fit into the protocol. [And] they had the funding originally to pursue it” (Interview 3, Land Trust). A perspective emerged that while rigorous and perhaps superior to other models in market acceptance, California’s voluntary protocol might be too restrictive to satisfy a growing body of interested landowners. Though critical to launching a voluntary market for forest carbon in California, the limited nature of participation via these select demonstration projects set the stage for calls to improve the protocols and to expand their scope of landowner participation.

“Let’s open things up”: revising the original protocol to meet the expectations of diverse stakeholders

The passage of AB 32, the Global Warming Solutions Act of 2006, was a seminal legislative event with implications for the early forest offset protocol. This bill bound larger industries in California to mandatory GHG emissions reductions and signaled the likely use of a cap-and-trade market as a primary tool. This suggested a need to revise the
early protocol to make it compliance-ready. For some this presented an opportunity to alter core aspects of the protocol for newly-interested stakeholders—including forest industry, who took exception to specific aspects of the protocol perceived to preclude their market participation and carbon verifiers, who sought baseline revision and increased conservativeness. Whereas offsets from the early protocol had been used to satisfy corporate and personal social responsibility goals, a regulatory market would require offsets that could stand up as legal compliance instruments. For some, this raised the bar to a new level, demanding more careful attention to rigor and perceptions of legitimacy.

Under pressure from new interests, the California Air Resources Board (ARB), tasked with implementing AB 32, reconvened a larger and more diverse working group to rewrite the protocol (Figure 1, Workgroup Two). Sympathy was especially shown to questions of inclusivity:

That protocol didn’t include a lot of the timber industry people. And because of that nobody really accepted it at all. It was a ‘gold plated’ protocol that would make everybody happy on one side and nobody happy on the other side. (Interview 14, State Agency)

The perception that the early protocol satisfied one group of stakeholders while excluding another—namely the forest products industry—was central to the Air Resources Board’s decision to resurrect the original protocol and to reconvene a larger and more diverse working group. Specific instructions were given that participants of the new effort study ways to “expand its use, and consider how it could be used for private landowners, commercial landowners, as well as public landowners, and also consider how it might be
used outside of California” (Interview 8, Registry Staff). Thus a desire to “get more players in the game,” as one state agent put it, was central to the founding directive (Interview 14, State Agency).

Convened in 2007, the second working group again encompassed conservation-minded stakeholders, but added were voices from larger industrial interests, and carbon verifiers, capable of providing technical expertise. Self-interests were diverse and wide-ranging as these actors negotiated key elements of protocol revision, including baseline, permanence, and natural forest management (Table 2). The following sections review major debates and their implications for program design and engagement.

Table 2 Summary of changes in protocol components, focusing on Baseline, Permanence and Co-benefits via Natural Forest Management

<table>
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<th>Early Protocol</th>
<th>Cap-and-trade Protocol</th>
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| Baseline to determine Additionality | ▪ Appraisal methodology  
▪ Baseline of maximum allowable harvest under California Forest Practice Rules\(^\text{15}\) | ▪ FIA data sets allow for national expansion  
▪ Common Practice values as governor increases baseline conservativeness  
▪ Hybrid approach—start above or below Common Practice |
| Permanence Mechanism          | ▪ Conservation easement required                                                | ▪ 100 year commitment  
▪ Buffer Pool for reversals                                                      |
| Co-benefits via Natural Forest Management | ▪ Perception that even-aged management was excluded                              | ▪ Even-aged management explicitly included  
▪ Prescriptions on forest management added                                          |

\(^{15}\) This baseline method was known interchangeably as the “Option C baseline” and the “Regulatory Baseline”
Recasting the Baseline: overcoming credibility issues and bringing forests in at a variety of starting points

Among the many contentions, recasting the baseline was a particularly thorny endeavor. Land trust stakeholders continued to prefer the original baseline, which considered harvest levels that were legally allowable on given forestland. Yet others within the workgroup voiced concerns that the original baseline too generously awarded offsets, a claim that if credible might have jeopardized both the environmental integrity of the program and its market legitimacy. Fueling this sentiment was the fact that conservation-minded landowners, the primary participants in the voluntary market, were able to assume maximum harvest allowable by law under their baseline scenarios. For some, this seemed unlikely. One workgroup participant explained the criticism this way:

You could propose a baseline [with the early protocol] that was completely fictional with respect to your current operations, and also [with respect to] what you would ever actually do on a piece of land. So it had conservation organizations, land trust type organizations comparing their current, let’s stipulate “good management” of the forest and comparing that against: “Well, what if we maximized clear-cutting?” (Interview 23, Conservation NGO)

This criticism forced workgroup members to grapple with how to maintain incentives for the carbon storage benefits of mature forests without opening the protocol to doubts about additionality. A more conservative baseline might assuage critics and strengthen the program’s market appeal, but land trust defenders feared doing so would reduce landowners’ incentive to participate, leaving carbon-rich forests as “sitting ducks” for extraction.
Encompassed in this discussion was a debate about the value of older forests versus younger forests. The first baseline may have recognized the value of standing forests, but critics argued that it failed to incentivize the carbon sequestration potential of younger forests. Now expanded to include diverse stakeholders who owned and managed forests of a variety of age classes, Workgroup Two participants were at odds about how to prioritize these different climatological benefits. One participant explained the argument this way:

The debate is well, okay here’s an old growth Doug-fir forest. The carbon is already captured. There was some rub there, where maybe folks who were more interested in gathering and holding old forest structure would argue, well look the carbon that’s there is valuable. And [industry] would say: “Well yeah, that’s fine. We recognize that, but give me recognition for the carbon that we’re capturing, because we’re growing so many young trees.” Again, more of a little different philosophical view on how they handle their forests and what they owned. (Interview 12, Extension Agent)

Proponents of baseline revision—who aimed to “bring forests in at a variety of starting points”—also sought ways to make forest carbon sequestration compatible with other goals of forestry beyond conservation, such as management for timber production (Interview 22, NGO).

Reconciliation between these competing visions was reached through the promotion of a hybrid methodology, which combined two favored options while also adding a provision for conservativeness. A concept of “common practice” was developed based on

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16 This question was also known as the “rate versus stock” debate, as in “rate of photosynthesis” versus existing “stock” of forest biomass.
metrics for average forest biomass on private lands in the US. Developed using nationwide US Forest Service Forest Inventory Analysis (FIA) data, these numbers established lower limits to baseline modeling. Forests starting above this metric—potentially more mature, conservation type projects—could still get credit for what they might otherwise have harvested, but with the common practice number as a floor to lessen concerns about false additionality. On the other hand forests starting below this metric—potentially degraded lands or forests which had been recently harvested—could enter the market at whatever their current maturity level and gradually earn credit for growth after project initiation. One workgroup member explained the benefit of this two-fold model this way: “We were trying to think about incentivizing, and how do you incentivize people to maintain and increase carbon on the landscape?” (Interview 15, Forester). Critically, utilizing FIA data also made possible expansion of the program beyond California, in that it provided nation-wide stocking metrics which could serve as baseline scenarios. After nearly two years of significant debate, consensus on this issue was therefore viewed as a major achievement on several fronts.

_A New Permanence Mechanism: Removal of the Conservation Easement Requirement Expands Access for Some_

Permanence was also contested terrain during the workgroup process, sparking debate about how to appropriately ensure sequestered carbon was retained for meaningful lengths of time. The original method, which required landowners to place conservation
easements on their forestland, was staunchly defended by land trust stakeholders who viewed it as a truly permanent and therefore superior tool. However, critics voiced concern that this requirement foreclosed participation potential among landowners unable or unwilling to meet this requirement. As one forester explained:

The biggest obstacle [under the early protocol] was you had to have a conservation easement. So, most landowners were like, “Well I’m not going to do a carbon project if it’s going to force me to get a conservation easement,” because that’s a huge undertaking….You’re talking about at least a year long process of dealing with the conservation organization, and if you have a funder, in trying to deal with the funding agency…Those all take tons of time. (Interview 29, Forester)

In fact many viewed conservation easements as the single greatest impediment to forest carbon project development in the early methodology. The concern was not only that conservation easements required lengthy negotiations and funding complexities, but also that as permanent, conservation-oriented encumbrances, their appeal was very specific. Conservation easements might be common among land trusts and forestland investors, but they were rare among other categories of landowners and were particularly uncommon among large industrial landowners and tribes.17 Thus while land trust stakeholders maintained energetic support for the easement requirement, other workgroup participants viewed it as an impassible restriction.

Some within Workgroup Two also asserted that easements might not actually ensure permanence. Conservation easements had been selected early on as well-established tools

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17 Forestland investors include Timberland Investment Management Organizations (TIMOs) and Real Estate Investment Trusts (REITs).
for protecting forests, but as the program evolved some questioned whether they were sufficient to dealing with “reversals”—the voluntary or involuntary loss of forest carbon stocks due to wildfire, disease, wind, or over-harvesting. Conservation easements used the force of law to prohibit loss of forests, but they lacked insurance plans for dealing with losses in carbon stocks that could still inevitably occur. Many workgroup participants advocated for less focus on permanence tools that tried to protect forest carbon stocks and more on those that could “make projects whole again” if potentially inevitable losses occurred. Support gathered around a wholly new system which required landowners to regularly set-aside portions of earned credits in insurance accounts—known as “buffer pools”—which could be drawn on in the event of reversals.

Ultimately a majority of Workgroup Two members adopted the viewpoint that while conservation easements were compatible with carbon, they were not obviously supportive of it. A 100-year contractual obligation to maintain carbon stocks past the sale of the last credit was selected as a replacement.\textsuperscript{18} However this timeline was still recognized as a potential hurdle for many landowners. As one forester explained: “From a practical point, one hundred years was way too long [for some landowners]. From a business point of view, you go beyond 50 years, it’s kind of forever” (Interview 16, Forester). Thus while a significant boost in accessibility to some, for others the shift from a permanent easement to a hundred year commitment may have been a difference without a distinction.

\textsuperscript{18} While eliminated for IFM projects, a requirement for perpetual conservation easements was retained for Avoided Conversion projects, which are separately categorized and not considered here.
“Natural Forest Management” Revisited

Natural forest management, a vague and disputed concept from the early protocol, now needed clearer articulation. This provision required landowners to manage for a diversity of native species of mixed age classes and was meant to ensure the production of secondary benefits beyond carbon sequestration. For many—including land trust stakeholders who first developed this concept and environmental advocates who monitored protocol development from outside the process—providing these benefits was extremely important. As one environmental activist and co-benefit proponent explained: “If all you are getting is carbon out of your forest project, then it is just a one-to-one swap between your smokestack and your forest. And it is pretty hard to get too excited about that” (Interview 23, Conservation NGO).

Yet not all workgroup members were enthusiastic about natural forest management obligations. Concern existed among forestry professionals, in particular, that these constraints just “didn’t quite make sense” in the context of forest management (Interview 16, Forester). Asked one industrial forester: “If I can take a place and plant an exotic species and not cause any other [regulatory] problem by doing that, then why can’t I count that carbon? (Interview 18, Timber Industry). While some emphasized this tension between management for carbon and management for co-benefits, others argued more simply that these requirements introduced unnecessary complexity into forest-offset criteria. Appealed one workgroup member: “In a carbon protocol, let’s focus on carbon
and how to quantify it as rigorously as possible. Let’s not throw in other barriers’’ (Interview 25, Registry Staff).

Sentiments on natural forest management were mixed, yet a shared recognition prevailed that it served an important political function. Even workgroup members principally opposed to these requirements conceded this benefit. Concluded one workgroup member:

We still ended up with a “sheen,” an overview of co-benefits, however you want to describe that, that I’m not sure, from my own perspective, just from a straight accounting, business atmospheric effect versus atmospheric effect, make a difference. But of course, they make a difference in the political acceptance of the rigor of the protocol. (Interview 18, Timber Industry)

In fact workgroup members expressed awareness of a range of benefits provided by natural forest management provisions. Among them, their ability to increase the perception of environmental integrity on forest carbon projects was particularly valued. Feedback from forest offset buyers indicated that a strong environmental cachet could strengthen the credibility of forest offsets as they entered the marketplace and might also boost their appeal and monetary value over other carbon offset options. These were seen as important considerations, given that forest-based offsets impart risks on buyers which alternative offsets do not.19 Thus while more critical workgroup members expressed hope that the need for natural forest management constraints would lessen as the program

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19 Forest-based offsets pose are perceived riskier for buyers than alternative offsets, because while other offsets immediate destroy GHGs (e.g. dairy methane digesters), forest offsets work by storing sequestered carbon in forests, which are impermanent. Ongoing risk of carbon stock “reversal” is thus felt by some to challenge forest-based offset market attractiveness.
matured, recognition that they would likely help launch the protocol initially was widespread.

Even-aged Management Explicitly Included

Defining natural forest management also required consideration of which management practices would be permitted. The inclusion of even-age management, known popularly as “clear-cutting,” was a central question. Though common to industrial timber management, this practice is questioned by many environmental groups, and was generally considered excluded from the original protocol via the requirement that participants manage for a “diversity of age classes.” Yet industrial interests who participated directly in the workgroup process argued vocally for its inclusion because “the protocols aren’t going to work [without clear-cutting] because they’re going to exclude such a huge area of forestland ownership that your offset program’s going to just not have adequate offsets to be able to go forward” (Interview 21, Industrial Timber). Supporters of even-aged management also reasoned that since this practice furthered the program objective of sequestering and holding the greatest amount of atmospheric carbon, it ought to be included. Even-aged management practitioners reminded critics that IFM was meant to be integrated with management for timber, of which even-aged management was a legal and common tool.

The ultimate inclusion of even-aged management in the forest offset protocol appeased timber interests, but it complicated the 2009 nationwide extension of the
program. While the California Forest Practice Rules limited clear-cut sizes and mandated that trees grow to a certain age, other regions of the country had few such restrictions. The natural forest management rules were therefore amended to include similar limitations, though these changes posed problems for some non-California landowners. One workgroup member gave the example of the southeastern US pine industry, which harvests trees at a much younger age than the natural forest management guidelines, and “right, wrong, or indifferent, it eliminates them from being in this protocol” (Interview 18, Timber Industry).

**Discussion**

This narrative explored how participants of a large and diverse working group renegotiated key and contested aspects of program design in the production of an original cap-and-trade carbon protocol for Improved Forest Management. The multi-year protocol development process produced definitions of baseline, permanence, and natural forest management that changed over time, reflecting competing expectations from vested-interest actors seeking to create and legitimize a new market commodity (Figure 1; Table 2). We now return to the questions that guided this research, particularly: What lessons does this offer for environmental governance?
Neoliberalism: Diverse Stakeholders Create A New Market Commodity

The commodification of forest carbon is an extreme case of market creation: not only must trading infrastructure be built, forest offsets also require the careful crafting of a system of accounting capable of making an invisible thing “real” in the eyes of the market. These are challenges unique to intangible commodities, demonstrating the difficulties of converting ecosystem services into legitimate market goods. We asked: considering these challenges, why and how were forest-based offsets incorporated into California’s cap-and-trade system? Harvey proposes that carbon trading is favored by neoliberal states, because it encourages private enterprise via the marketplace with minimal infringements on personal freedom (Harvey 2005, 65). California could have mandated increased forest carbon sequestration without a market mechanism. Instead, commodifying forest offsets through the market created opportunities for vested-interest actors—such as land trusts seeking new conservation tools and timber industry pursuing additional revenue streams for timber management—without the onus of regulation. Our research identifies stakeholder interest in market opportunities as a key driver for forest offsets inclusion in cap-and-trade systems.

These stakeholders operationalized market creation with particular types of expertise, conforming approximately to the framework created by Bäckstrand and Lövbrand whereby three “meta discourses” underpin international forest carbon policy (Table 3; Bäckstrand and Lövbrand 2008). Strong similarities exist between their proposed
categories and the perspectives represented in the California market by timber industry (Ecological Modernization), verifier (Green Governmentality), and land trust (Civic Environmentalism) stakeholders who undertook protocol design. Yet we note important differences. First, Bäckstrand and Lövbrand specify ecological modernization as the sole legitimizing discourse, however our analysis suggests all stakeholder groups—though objectives for protocol design were different—helped legitimize forest offsets in the eyes of the market (Bäckstrand and Lövbrand 2008). Relatedly, while Bäckstrand and Lövbrand view Civic Environmentalism as a democratizing force, we suggest that delegation to nonstate actors via the workgroup process had a comprehensive democratizing effect, which added to perceptions of legitimacy. Finally, we assert that the combined efforts of these groups to legitimize, operationalize, and democratize forest offsets not only generated political support—as Bäckstrand and Lövbrand conclude—but explains much about how these novel and contentious good are successfully commodified and brought to market.

We argue that the marketplace itself required this particular mix of stakeholder representation, because each bolstered the strength of forest offsets as commodities. Timber industry stakeholders provided economic rationale, claiming forest offsets as the most efficient and effective way to mitigate climate change while still growing the economy. By suggesting a program based on broad landowner participation and robust offset supply, these actors furthered carbon sequestration’s potential to provide additional revenue streams compatible with timber extraction. Verifier and academic stakeholders operationalized the methodology, providing the technical expertise to develop and then
steadily improve upon a system of accounting to ensure credits were real, additional, quantifiable, and verifiable. Though increased baseline conservativeness and prescriptiveness, they helped overcome credibility challenges and created in California an exemplary program that could model for federal and even global policy. Finally land trust stakeholders—the original architects of the program and enduring workgroup contributors—promoted environmental integrity via the production of co-benefits, in spite of calls to prioritize maximum carbon sequestration. This raised the creditability of California’s forest offsets among skeptics, helped the program overcome legal challenges, and boosted forest offset appeal and value among investors.

An additional finding of this research is that while necessary, these discrete perspectives were not always in concert. Maintenance of high environmental ideals, the purview of land trust stakeholders, was resisted by timber industry representatives who saw them as barriers to participation and hindrances to offset supply. Conversely the possibility of opening the program to larger, industrial landowners offered the robust participation potential sought by state agents but it complicated the task of ensuring the production of co-benefits and brought a reaction from environmental advocacy groups outside the protocol negotiation process who, in particular, spoke out strongly against the inclusion of even-aged management. Finally, increasing conservativeness and rigor of the baseline strengthened the credibility of the program in terms of accuracy and additionality, but it reduced project viability by lowering profit potential, especially among smaller and more economically marginal landowners most targeted for conservation forestry. Thus while California IFM protocol development brought together
stakeholder groups of necessary expertise and interests, it also forced a difficult balancing between what were often rival objectives.

This case offers lessons on the neoliberal process of commodifying forest offsets, which inherently involves bringing non-market goods into the market for private benefit. This process alternated between state action (creating legislation, convening workgroups) and nonstate action (building protocols through negotiation among stakeholders), revealing that market construction was a combined endeavor that hinged on state as well as nonstate actors. Additionally, consistent doubts about the “realness” of forest offsets and debates about their place in climate solutions appear as weaknesses of these new commodities, which scrupulous attention to program design was unable to fully overcome. Despite its very careful construction, California’s market for forest offsets has many points of vulnerability, including uncertainty in buyer demand, susceptibility to legal challenges, and dependence on state policy for program continuance. This reveals a difficult fit between these very deliberately and carefully constructed commodities and the ideals of the inherent and self-sustaining neoliberal marketplace, and challenges the precept that goods and services are universally best managed through the marketplace.
<table>
<thead>
<tr>
<th>Discourse</th>
<th>Workgroup/Actors</th>
<th>Code Themes</th>
<th>Illustrative Quote</th>
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<tbody>
<tr>
<td>Ecological Modernization</td>
<td>Timber and Carbon Development Industries</td>
<td>Maximum program participation and offset supply for market success</td>
<td>“So at some point…[when] we’ve squeezed every ounce of carbon out of the economy, now how do we increase the economy? You know grow, and not increase the atmospheric CO2? That’s where the offset world comes in” (Interview 18, Timber Industry).</td>
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<tr>
<td>Green Governmentality</td>
<td>Verifiers, Science/Academia</td>
<td>Rigor and accuracy to ensure offsets are real, quantifiable, verifiable, and permanent. Effort to overcome potential for gaming Perception that California IFM protocol sets a “gold standard”</td>
<td>“If [the protocol] is not credible, people won’t engage with it…It all depends on the integrity and the technical rigor and underpinnings of the scheme.” (Interview 19, Verifier)</td>
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<tr>
<td>Civic Environmentalism</td>
<td>Land Trusts, Environmental NGOs</td>
<td>Safeguard environmental integrity of projects via requirements for co-benefits Eco-cachet provides market legitimacy Potential to boost value of forest offsets</td>
<td>“We started promoting [the idea that] if you’re managing to optimize carbon, you’re doing it in a way that is true to the ecosystem functionality, that you’re not turning it into a carbon farm.” (Interview 28, Land Trust)</td>
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Forest carbon markets are considered among the most promising PES opportunities (Corbera et al. 2009; van Kooten and Sohngen 2007). However, reports question whether landowners will have access to emerging markets and highlight program design elements as potential constraints (Galik et al. 2009, 2012; Gosnell et al. 2011; Gunn et al. 2009; Remucal et al. 2013; Russell-Roy et al. 2014). This research examined the stakeholder-driven California IFM protocol development process to test how methodological decisions may shape landowner engagement. Unsurprisingly, results show that vested-interest actors lobbied for design elements that increased their access to new carbon-based revenue streams, supporting the assertion of Engel et al. that stakeholders shape access via program design (Engel et al. 2008). The early protocol, written by land trusts, favored conservation-minded landowners and indeed supported project development on lands owned and managed by land trusts themselves. When new stakeholders took interest in the program, debates opened over policy-related questions about who and what California’s IFM protocol ought to incentivize. Diverse stakeholders represented, and contested over, clear realms of self-interest. Large industrial landowners, in particular, called for revisions requisite to their own market entrance, including removal of the conservation easement requirement and the inclusion of even-aged management. Design decisions frequently resulted in access related give-and-take, in which revisions that favored some workgroup members detracted from the participation potential of others, as
for instance in debates over whether to reward older forests versus younger forests with baseline criteria. We posit that the need to develop a strong market commodity—evidenced in the balancing between environmental cachet, rigor, and strong participation—fostered these compromises.

An additional finding of this research is that workgroup efforts to increase the technical rigor of the protocol, while important to strengthening program credibility, narrowed access to new carbon-based revenue streams. In particular, verifier preferences for a more conservative baseline with high monitoring standards, as well as requirements for a hundred year permanence contract, may limit economically marginal landowners, such as smaller, non-industrial landowners, with less access to upfront capital, limited technical capacity, and low inclination to assume restrictive land encumbrances. Here, we reiterate the precision vs. practicality paradox articulated by Gosnell et al. (2011). Despite evidence that small-scale landowners could provide significant carbon sequestration potential, our findings suggest that workgroup members privileged, perhaps necessarily, high market strength and credibility over wide and flexible participation (Pan et al. 2011). A less rigorous program was possible. Indeed forest carbon sequestration initiatives of lower accuracy are common globally, e.g. international REDD readiness efforts frequently waive additionality requirements and allow carbon stock monitoring via simpler mechanisms, such as aerial photography, rather than professional inventories and third party verifications (de Koning et al. 2011). Criteria such as these may prove adequate for non-market based programs, in which nominal payments are made to landowners through state agencies. However, we suggest that the regulatory nature of
California’s cap-and-trade program exerted different expectations on protocol design and required workgroup members to consider market reception of a novel commodity. This indicates that increased rigor and conservativeness in California’s compliance market may create a carbon-based revenue stream more accessible to industrial timber interests, for whom high transaction costs, long time horizons, and technical complexities are familiar considerations, while more marginal landowners remain on the periphery.

Finally we suggest that as a market mechanism, stakeholder selection was skewed towards those who specifically endorsed a state agenda for forest carbon commodification. Support for forest offsets is not universal. Prior research directed a variety of critical questions at international forest carbon programs (Bumpus et al. 2008; Corbera and Brown 2010; Lohmann 2009; Sandbrook et al. 2010). Similar critiques addressing California’s use of forest offsets were expressed in the popular press. We have not covered these in detail here, however we note that a spectrum of vocal critical perspectives engaged with IFM protocol development from outside the process. Actors ranged from those who sought stronger environmental protections to those who felt that at root, the commodity itself was illusory. Some critics played very active roles—attending meetings as non-participant observers and voicing specific concerns and objectives via public comment—but ultimately had only minor influence on protocol design. This is a reminder that workgroup participation was not a comprehensive assemblage: it came by invitation, and selection favored participants capable of providing the expertise, rhetorical support, and direct participation needed to launch a unique market good.
Conclusion

California is not unique in its effort to harness forests as sinks for GHG reduction. Programs exist globally to monetize forest carbon sequestration—both as compliance instruments for emissions trading systems (ETS) and vehicles for sustainable development, including the CDM and Reduced Emissions from Deforestation and Forest Degradation (REDD). Recent evidence from a World Bank carbon pricing survey found 18 distinct ETS currently in operation across 31 countries, with as many as 13 more under consideration (Kossoy et al. 2014). This suggests opportunities for policy-makers globally to draw lessons from California’s IFM protocol development, in their own considerations of whether and how to commodify forest carbon sequestration.

Specific design elements of California’s IFM protocol were frequently tailored to the forest inventory data sets, regulatory frameworks, and forest management practices of California—especially the baseline and natural forest management approaches—and thus may not translate well to forests in other geographic contexts, particularly those lacking detailed forest inventories and prescriptive regulatory frameworks. Permanence, too, may be dealt with differently in other geographic contexts. For example, areas where state, community, or tribal ownership of forest resources is common, may find simpler and more amenable permanence mechanisms than the 100 year contractual agreement devised in the IFM protocol. Yet other aspects of the IFM protocol are generalizable, including the targeting of managed forests and employment of performance standard baselines.
These features were selected in order to broaden landowner participation, which was viewed as limited under predecessor programs, such as the CDM. Current enrollment of 1.7 million forested acres from 75 IFM projects indicate these design features are working to promote participation. Global forest offset programs might therefore consider the benefits of extending forest carbon methodologies beyond tree planting and avoided deforestation, which have thus far been the convention in forest carbon schemes.

More importantly, this case study sheds light on the political process by which vested-interest actors contested over access to new carbon-based revenue streams. We suggest this clarifies the complex process of PES program design, in which actors make design decisions which determine the scheme’s environmental benefit, legitimacy and market reception, and the scope of landowner participation potential. Methodologies for forest offset programs globally will certainly require design adjustments for particular forest types, regulatory frameworks, land management contexts, and tenure systems; however, policy makers must nonetheless contend with who and what to incentivize while negotiating appropriate balance points between broad participation, technical rigor, and environmental integrity, in ways similar to IFM protocol development stakeholders.
Chapter Two: Forest Offsets and the California Compliance Market, Bringing an Abstract Ecosystem Good to Market

Introduction

Forest carbon offsets are new and unusual goods, only recently introduced as policy tools for atmospheric greenhouse gas (GHG) reduction. Little is known about their production process, i.e. how these ecosystem services are commercialized or for whose benefit. Previous analyses explored early forest offset experimentation in small, nascent markets, located in the Global South (Brown and Corbera 2003; Corbera and Brown 2010). However, launch of a California regulatory market for improved forest management (IFM) offsets—i.e. generated on forests likely subject to additional management practices, such as timber harvest—expands their production to untested geographic and forest management contexts. This paper employs a commodity chain analytic framework to trace the steps, actors, and benefit flows inherent to forest offset production for California’s cap-and-trade market, in order to assess how these goods are developed, sold, and permanently maintained. We also collected data from all projects in the market to February 1, 2015, and used project metrics to illustrate landowner participation in the commodity chain, clarifying access to benefits during these early and uncertain days of market experimentation.
A central finding of this paper is that forest-based offsets have particularities which shape access to benefits, including the need to render intangible things “real” for market legitimacy, high degrees of risk and uncertainty, and the novelty of previously untested market goods. These limit access to benefit flows for some (e.g. landowners lacking access to capital and expertise) while creating opportunities for others (e.g. technical experts and project financiers) and skew market participation towards landowners with high upfront profitability and preexisting program compatibility, by casting doubt on market durability. Results advance commodity chain research by testing the launch of a new market good and demonstrating empirically the complexities of policy-created commodities, such as ecosystem services. This contributes to global policy discussions, which currently favor market-based climate solutions (Brown and Corbera 2003).

This paper first considers how analyzing access along the commodity chain lends understanding to the production of forest offsets, then reviews how these complex goods have been framed in previous literature which evaluated forest offsets as vehicles to achieve additional forest management objectives, such as reducing fragmentation, supplementing timber revenue, and providing acquisition finance dollars. Following this we consider a) the steps and relationships involved in bringing forest offsets to market and b) participation trends in early market operation. We conclude with lessons learned from the launch of a novel good and suggest future analysis of the market as it evolves.

Analyzing Access along the Commodity Chain
Commodity chains are interlinked exchanges through which goods or services pass from extraction through production and end-use (Ribot 1998). Commodity chain analysis is a critical tool used to understand how and for whom such pathways operate. A central precept is that structural and relational “access mechanisms”—such as access to capital, technology, knowledge, identity, social relationships, and access to decision-makers—constrain and enable benefit flows, in ways independent from resource rights (Ribot 1998; Ribot and Peluso 2003).

Previous analysis found the disjuncture between resource rights and ability to benefit particularly relevant for forest offset production, due to complexities that render landowners dependent on third party experts (Corbera and Brown 2003, 2010; Thomas et al. 2010; Leconcq and Ambrosi 2007). These included the need for functional and spatial abstraction in order to render biological services tradable and fungible in markets, difficulty measuring terrestrial carbon, forest impermanence, inability to verify without-project baseline scenarios, controversy over environmental integrity, and high degrees of risk due to regulatory and project performance uncertainty (Leconcq and Ambrosi 2007; Thomas et al. 2010; Castree 2003). Case studies of early forest carbon project development under the Clean Development Mechanism, developed in response to international climate mitigation treaty signed at Kyoto in 1997, found universal use of technical experts to measure, account, verify, and sell forest carbon offsets, leading to high development costs, complex contractual arrangements with third party project

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20 We refer to UNFCCC derived forest carbon sequestration programs including the Activities Implemented Jointly (AIJ) and the CDM, in addition to voluntary schemes initiated for state and corporate social responsibility.
developers (e.g. NGOs, logging companies, and state agencies) and funding organizations (e.g. the World Bank), and a diversity of revenue, risk, and responsibilities assigned to participating landowners (Corbera and Brown 2010; Thomas et al. 2010; Corbera and Brown 2003).

These attributes led researchers to question equity of access to forest carbon offset benefits. Corbera and Brown conclude that: “Forest carbon project negotiations take place between diverse stakeholders with different power, knowledge, information, and even languages…Thus, negotiation process can easily be dominated by more powerful players” (2003, p. S54). Concerns included social and economic equity imbalances, property rights complexities, land tenure change, geographic disparity in project location, the ability of third-party non-rights holders to benefit from carbon revenue—such as NGOs—while landowners lacking appropriate access mechanisms may face difficulties in market entry (Corbera and Brown 2010; drawing on Ribot and Peluso 2003). We build on these findings by asking: How will the complexities of forest offset commodification shape production in a large, regulated, IFM context in the Global North?

Evolving Forest Carbon Markets within the US

Forest carbon markets purport to facilitate additional benefits beyond carbon sequestration, such as reduction of deforestation and forest fragmentation, encouragement of sustainable forest management, and forest restoration. Yet landowner willingness to participate in such programs is highly unknown. Initially the inception of wide-ranging voluntary carbon offset standards in the early 2000s fueled analysis of how this non-
extractive forest revenue source could support economically marginal landowners, such as small, non-industrial landowners (Wayburn et al. 2000; Best and Wayburn 2001). Yet research indicated inability among small landowners to meet rigorous requirements for accounting, monitoring, and permanence (Fletcher et al. 2009; Wade and Mosely 2009; Charnley et al. 2010; Fisher and Charnley 2010; Markowski-Lindsay et al. 2011, Thompson and Hansen 2012, Miller et al. 2012). Market inaccessibility led some to conclude that many landowners would need assistance from state extension offices or carbon financiers to access forest carbon markets (Markowski-Lindsay et al. 2011; Gossnell et al. 2011; ESFF Report 2010). Others suggest a need for “niche markets…[in order to] facilitate ethically motivated investments” for non-viable forest carbon projects (Corbera and Brown 2003, p. S54).

Marginal landowners’ forest offset market access seemed further diminished by emergence of California’s cap-and-trade market as the only program operating in a regulated environment. Compared to other methodologies in the voluntary context, California’s forest carbon protocol (hereafter “the protocol”) was found to have a conservativeness, costliness, and prescriptiveness that boded poorly for average landowners (Galik et al. 2009 and 2012; Gunn et al. 2011; Remucal et al. 2013; Russell-Roy et al. 2014). Caldwell et al. grant that for this market: “carbon projects are not viable for all landowners and impose significant constraints on land use” (2013 p. 60).

However forestry professionals emphasized compatibility between California’s IFM protocol and more traditional timber management strategies, suggesting carbon-based income could work especially well on commercialization of less marketable timber types
and forest tracts and stabilization of return on investment during economic downturns (Jenkins 2013, Caldwell 2014). Some pointed-out the prevalence of project development among land trusts owning large tracts of forestland (defined as several thousand acres minimum), depicting carbon revenue as an innovative conservation funding source (Wroblicka 2014). This suggests tensions between marginal landowners who might benefit most from carbon revenue and feasibility of market entry. Emerging also is the possibility that carbon-based income can be integrated with more traditional timber revenue streams among larger landowners, both for-profit and non-profit. This research therefore asks: Who is participating in California’s innovative offset market? What can we learn about landowner and forest management contexts of forest offset production in early stages of market emergence?

**Methods**

Qualitative interviewing and document analysis provided important sources of data for this research. First, we conducted thirty-seven in-depth, semi-structured interviews between fall of 2013 and spring of 2014, lasting one to one and a half hours each, with timberland managers, professionals involved in bringing offsets to market, and forest protocol design stakeholders (Table 1). Interviews were audio recorded, transcribed, and coded using the methods of Corbin and Strauss (Corbin and Strauss 2012). Data was organized and analyzed using qualitative data analysis software, ATLAS.ti (Friese 2012). Second, we tracked IFM project development through February 1, 2015, by reading all project design documents listed with Approved Offset Registries and entering key project
metrics into a Microsoft Excel spreadsheet (n=69, Table 2). Analysis from this data informs our review of early market participation (Section 3).
Table 1, Interviewee breakdown

<table>
<thead>
<tr>
<th>Interviewee Label</th>
<th>Number of participants</th>
<th>Participant Breakdown</th>
</tr>
</thead>
<tbody>
<tr>
<td>Timberland Managers</td>
<td>11</td>
<td>NGOs n=6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Forest Industry: n=3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tribal: n=2</td>
</tr>
<tr>
<td>Forest Carbon Project Development</td>
<td>16</td>
<td>Consulting Foresters: n=7</td>
</tr>
<tr>
<td>Professionals</td>
<td></td>
<td>Carbon Developers: n=6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Registry: n=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Verifier: n=1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>State: n=1</td>
</tr>
<tr>
<td>Protocol Development Stakeholders</td>
<td>10</td>
<td>Workgroup Participants: n=6</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stakeholders outside the Workgroup: n=4</td>
</tr>
</tbody>
</table>
Getting the Good to Market: “The road to credits is long and uphill”

Figure 2, Forest Offset Commodity Chain

The forest offset commodity chain reveals the steps and actors involved in quantifying sequestered forest carbon (Figure 1). While the ecosystem service itself is intangibly produced and stored in the forest, accounting claims purporting to approximate the carbon sequestration benefit are rendered into salable units via technically rigorous
authentication steps e.g. inventory, verification, registration (see Castree 2003 on legitimizing institutions). Consulting foresters engaging with this commodity chain typically work locally near project properties and are thus far limited to a minority operating in Northern California. Alternatively, carbon developers source and develop projects nationally, based on identification of properties with high forest offset viability. Forest carbon verifiers are highly specialized environmental claim auditors, limited to several approved firms; however, heightened demand for verifier services has led to increased use geographically dispersed agents who undertake forest carbon verification for contract. Partnerships are common among these actors, for example consulting foresters often conduct technical work for carbon developers. Some actors play multiple roles, such as consulting foresters who undertake both project design and verification, provided these services do not overlap. The following sections explore these steps and relationships more fully through access mapping as articulated by Ribot, including a) identifying actors involved in production b) reviewing benefit distribution and costs and c) discussing access mechanisms (1998).

**Step 1: Partnering-up, Assessing Feasibility**

The novelty and complexity of carbon project development means that almost universally this process involves long term relationships with third-party experts. Some in-house development among larger industrial and conservation landowners has occurred, particularly among California timber interests. However, most landowners depend on partnerships with specialists who transmit knowledge of market opportunity, assess
project feasibility, and perform technical work to bring projects to market. Models vary with implications for project financing, revenue potential, and route to market. Consulting foresters operating on a fee basis sometimes provide these services. Alternatively, for-profit carbon developers (hereafter “developers”) are inserting themselves in the process, soliciting landowners with higher stocked forests via outreach and education, providing upfront financing, and delivering “turn-key” services in exchange for equity shares in future offset sales.21

Consulting foresters sometimes applied terms like “snake oil salesmen” and “carbon cowboys” to developers. However distinctions were typically made between developers who emerged in the 2000s, purportedly seeking to capitalize on new market opportunities with little knowledge of forestry, and those now in practice, who learned the process and reportedly provide competent services. Foresters frequently saw benefit to partnerships with these latter actors, highlighting their production of technically competent projects, comprehensive management of a complex and drawn-out development cycle, and financing of steep up-front costs. Forest industry participants, too, emphasized the benefit of risk-sharing in a novel, non-traditional marketplace. Explained one:

The owner of the company, I’m sure, viewed this as an emerging market, right? I mean, it’s still somewhat hard to explain to guys who are used to nice packages of wood, labeled, counted, and measureable, that I’m selling a product that’s somewhat intangibly stored out there in the forest…The idea of taking a business model of a company whose view is, ‘I’m selling you a thousand board feet,’ to ‘I’m

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21 Equity sharing involves contractual agreement to share revenue for a given duration. Terms are closely guarded and individually negotiated, however interviews suggested five years with 25-35% profit sharing approximated a typical contract.
Yet concern for overpayment via equity sharing contracts was also common. One forester explained this point in the context of a fluctuating carbon price:

You can’t forecast what you’re signing-up for [with developer contacts]. What does it mean to give up 30% of my carbon? Well, two years ago it meant $7 carbon, now it’s $10.50. In six month it might be $15. We would say if you can afford it, you should not structure a deal that way, because it’s not to your benefit. (Interview 29, Forester)

Many landowner-developer partnerships begin when developers proactively offer to conduct forest offset feasibility testing, often through cold-calling lists of landowners aiming to gain access to their forest inventories. In these cases, prospective projects are assessed against very specific criteria—landowner ability to commit to a 100 year contract, willingness to comply with protocol maintenance and monitoring requirements, and revenue potential in excess of development costs (see also Kerchner and Keeton 2015). Participation is possible at any stocking level, however only those with higher stocking than national average for a given forest type (known as “common practice”) earn upfront revenue. According to developers, as little as 5-10% of investigated projects are profitable enough to justify development expenses, and those that do are often still...
stymied by onerous program constraints, market uncertainty, and opportunity costs.\textsuperscript{22} One forester explained his landowner’s reluctance to proceed, based on these issues:

\begin{quote}
At the end of the day…they said “What on earth are we getting involved in this thing for? It just doesn’t pay us any money. And we’re committing for a hundred years? And we’re submitting to all this oversight and regulation and everything else?” So they yanked their project. And that’s part and parcel to the process. It’s not really comparable to cutting down the trees. (Interview 24, Forester)
\end{quote}

Thus the opportunity costs of forest offset production compared to timber harvest was frequently viewed as a major deterrent to market participation.

\textit{Steps 2 and 3: Project Design, Inventory, and Verification}

Project design involves fitting carbon projects to the requirements and accounting prescriptions established in the forest protocol, a document described as “very complex,” “tough,” and “demanding” by foresters. This critical and costly step determines both quality and quantity of salable offsets over the life of the project.\textsuperscript{23} However ambiguity of the protocol was said to complicate project development by requiring compliance with a “moving target,” according to one forester (Interview 24, Forester). Similarly, a practice of interpreting the protocol “like case law,” in which discretionary decisions made by registry and ARB staff repeatedly shifted program rule interpretation, was said to introduce risk into the project development process:

\begin{footnotesize}
\begin{itemize}
\item[22] Project viability was said to be highly variable, e.g. a 500 acre property could be profitable, while a 200,000 acre property might not be, depending on stocking level, growth potential, and other factors.
\item[23] Kercher and Keeton estimate project design cost at $29,000 (2015, p. 75).
\end{itemize}
\end{footnotesize}
Landowners and project developers and technical consultants make decisions about how to proceed and then ARB decides to put out a guidance document that changes the way you understood, and that everyone understood, what the protocols and the regulations said. So you could find yourself making a mistake. (Interview 29, Forester)

Such interpretive decisions frequently alter accounting practices, i.e. the treatment of project-level stocking data, as collected through boots-on-the-ground measurement. These inventories are cornerstones of offset quantification were described as intensive and costly, needing higher levels of statistical confidence than inventories for other forest management contexts. Explained one forester:

[With timber inventories] the need to know with a level of accuracy is less [because] an estimate of timber gets trued-up when you take the logs to the mill. With carbon, what you’re selling is your inventory. There’s not any solid thing that you’re taking to anybody else. They’re buying the creditability of your inventory. (Interview 8, Forester)

Preexisting robust inventory data, which larger landowners often maintain, was viewed as an asset for carbon development. However, even larger landowners described insufficiencies here and called meeting inventory confidence the “single biggest challenge” to project development (Interview 20, Forest Industry). Smaller landowners, too, recounted having to redo inadequate inventories at increased costs. The preponderance of carbon inventories with significant numbers of plots—which increases costs both initially and over the lifetime of projects, as plots are re-inventoried—was said
to push inventory design innovation in order to meet statistical confidence most efficiently.24

Inventory verification is a critical stage in preparing offsets for market, through which purportedly non-biased actors review all aspects of project design, inventory, and quantification methodology, and attest to the validity of carbon sequestration claims. This step involves many actors—including landowners, technical consultants, carbon developers, and registry staff who serve as auditors—and can take from several months to over a year. Developers report typical costs of around $35,000 for this process, making it the costliest and therefore riskiest step, because it comes before salable credits are awarded.25 Successful verification is not guaranteed, but hinges on the quality of project inventory data. Like other aspects of project design, verification criteria and related costs evolved as field-testing led to protocol changes meant to increase rigor. Explained one forester:

In [the early protocol] verification was more qualitative, you know a review of inventory methodologies, and less quantitative—so less going out to the forest and checking to see that the measurements that were being reported were indeed accurate. So now it continues to be a big challenge for projects today, passing verification.

Frequently these changes were promoted by verifiers themselves, based on personal experiences with early forest carbon verifications.

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24 Consulting foresters quoted inventory costs between $18,000 and $23,000, but noted significant variation according to inventory design and intensity. Kercher and Keeton list $15,000 for inventory cost (2015, p. 75)
25 We note that Kercher and Keeton list $25,000 as the cost for initial verification, and suggest this reflects earlier prices of forest carbon verifications, before verifiers “realized what was involved” (Interview 29, Forester).
Steps 4 and 5: Registration and Market Sale

With successful verification, offsets are officially awarded and “registered,” i.e. entered into public databases called offset registries. Registration functions as a final authentication stamp on forest offsets as salable goods, signaling their availability to potential buyers. Unsurprisingly, interviewees frequently emphasized the importance of registries in legitimizing forest offsets, noting their role developing protocols, approving project registry listings, auditing verifications, and ultimately awarding and maintaining offsets as traceable goods via the registry.26

Foresters and developers described registration as a rewarding finale to a development cycle that could take one to two years with costs upwards of $200,000, because it enabled market entry and first time revenue receipts.27 However the complexity and importance of terms negotiated here led interviewees to call market entry one of the most challenging aspects of development. One concern was that lack of a formal exchange desk necessitated involvement of new actors, such as “brokers” who bundle offsets together for emitters via privately negotiated transactions, for which they receive offset proceeds. Carbon developers play roles here too, connecting sellers to brokers for fees. Consulting foresters noted that, although they could complete other steps of the development process independently, they relied on developers to actually sell offsets. Explained one: “There’s no marketplace….That’s why I’m sort of wooing

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26 Registries issue Registry Offset Credits (ROCs) which can be transacted in the marketplace. However most offset purchasers wait until ROCs are replaced with Air Resource Board Offset Credits (ARBOCs), which is a final administrative step taken by ARB.
27 Note Kercher and Keeton estimate total project development costs of $105,000 (2015, p. 75); this is within range, but on the low side of our findings.
[carbon developers]: ‘Hey we might have some credits we need to sell here. You guys might want to look for a buyer’” (Interview 24, Forester). Foresters commented too on developers’ roles marketing offsets in a competitive marketplace, by applying cachets like “wild carbon credits” and “charismatic forests” to promote co-benefit potential among buyers. However, it was unclear whether all landowners required this service. One industrial landowner indicated that his company already had a “high profile” from FSC certification and asked: “Why do we need to pay a guy to bang our drum? We probably don’t,” (Interview 20, Forest Industry).

Strategy in market entry was a common theme among interviews. Most participants mentioned the importance of timing, i.e. determining when to sell offsets amidst fluctuating and poorly forecasted prices. This appeared especially true for initial sales, which frequently provide landowners with a lump-sum for past forest growth which dwarfs future earnings potentials.28 According to one actor, the appeal of this windfall can cloud landowner judgment with long term implications:

The biggest oversight [I’ve seen] is where the [land] trust or the tribe just can’t see past the dollar signs of market entry. They do the math on the back of a matchbook and say, “You could have 2.5 million credits coming in the market at $11.50 and wow, that’s payday… Well, you might sacrifice 20-30% of that payday if you go into the market wrong, and you don’t get to go back and say, “No, no, give me those credits back that I sold you for $7. I really want to sell them to you for $10 now. (Interview 1, Forester)

28 Initial offset generation averages 57 offsets per acre (with some projects exceeding 100 offsets per acre); while ongoing credit generation potential is projected by developers to be far lower, at 0-3 credits per acre per year (http://www.climateactionreserve.org/resources/presentations/, accessed April, 20, 2015).
Most agreed on the significance of offset generation in year-one, mentioning both profitability and importance for meeting long-term project costs. Several foresters noted implications for projects without full ownership of their credits, such as those in equity sharing agreements with developers. Explained one:

The bulk of your credit generation is coming in that first year. You get that first year flush, and that’s your nest egg. You should be taking that and investing that money, so that you can pay for monitoring and all the stuff down the road….If you’re losing 25% upfront…that’s really tough for the life of that project. (Interview 37, Forester)

Strategy is employed not only for timing and revenue considerations, but also for distributing risk and responsibility via customizable purchase contracts. These specify accountability for voluntary reversals (losses in forest stock due to over harvest or premature project termination) and invalidation (finding of regulatory violation or quantification error by the Air Resources Board (ARB)). Developers indicate these agreements frequently assign risks to offset producers, versus offset purchasers, perhaps in an effort to mitigate buyer risk from impermanence, i.e. the reality that forests are vulnerable to threats against their carbon stocks, widely viewed as an “Achilles Heel” of forest offset production. The option to shorten offset invalidation windows through double or triple verification, and the ability to underwrite offsets with an innovative insurance product, offer ways to reduce risk. However landowners must weigh potential benefits of these strategies (such as increased profit and reduced personal culpability) against increased production costs.
**Step 6: Permanent Maintenance—A Commodity Chain that does not end with the market transaction**

Permanently maintaining forest offsets is a long-term responsibility that deserves added emphasis. Significant and ongoing landowner commitments begin almost directly post offset sale, including mandatory annual monitoring and reporting and regular re-inventory and verification requirements, obligations projected to cost upwards of $250,000 net present value over the life of the project. However who will perform this technical work and under what contractual arrangements is yet undetermined. Foresters speculated that smaller landowners were particularly ill-equipped for, and perhaps “naïve” about, ongoing technical requirements. Some discussed the role carbon developers could play, though with ambivalence. Several voiced concerns that landowners would be “left in the lurch” by developers once contracts expired, while others viewed them as obvious resources for long-term management, even if specific models were uncertain. Explained one proponent:

[Developers] have based their businesses on providing these services, so presumably they’ll be around for a while, whereas I’m just sort of here doing it as a consultant. I’m not trying to convince anybody I’m going to be their long-term carbon manager…I’m helping getting them going, but these things have to be institutionalized some-how or another. (Interview 24, Forester)

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Permanent maintenance of forest offset is also the stage at which reversal and invalidation risk will be felt most acutely. Indeed, reversal by wildfire has already claimed one carbon project on industrial forestland in California.\(^3\) A high profile invalidation by ARB among ODS offsets, early into market operation, suggested also that this particular risk was more real than rhetorical. Reversals stemming from landowner management decisions are also possible, due to overharvest, non-compliance with program requirements, or negligence. Interviewees referred to these penalties as “substantial” and “concerning,” and stressed uncertainty in how violations will be treated in practice. Questioned one: “If you don’t do fire suppression, are you negligent if you have a fire? Or if you don’t thin your stands and reduce your fuel load, are you negligent or did you just not do something?” (Interview 29, Forester). Other aspects of forest management are also unclear. Interview data suggests most initial participants are economically motivated actors who pair carbon sequestration revenue with timber production, yet how these landowners may respond to shifts in wood products markets, or protocol revisions that impose new baseline scenarios or forest management restrictions, is unknown. Similar questions surround procedures for property sales and landowner succession, both described as theoretically allowed but “untested”. Cap-and-trade market uncertainty post 2020, after which regulatory demand ceases without renewal of controversial legislation, adds perhaps the most conspicuous layer of risk and uncertainty to the offset production process.

\(^3\) This occurred in the Rim Fire of 2013, on SPI’s Cherry Lake project.
Early Market Participants: Who is Benefiting?

We now review IFM project development trends and distinctions for California’s cap-and-trade market through January, 2015, to illustrate landowner engagement with the commodity chain in early days of market emergence. First we considered comprehensive project metrics, organized by landowner type (Tables 2, 3, 4); then, we analyzed three prominent but distinctive landowner categories—conservation, industrial, and non-industrial private forestland owners (NIPFs)—to clarify alternative models and motivations for market participation.

Project Metrics

IFM regulatory project metrics reveal robust participation compared to earlier voluntary forest offset programs, across a range of landowner categories. Conservation landowners predominate by number of projects, while forest industry and NIPFs were also prevalent (Table 2). Timberland investment management organizations (TIMOs), tribes, and wide-ranging “others,” a category demonstrating forest offset niche attraction, also entered the market.31 Majority participation is concentrated in Northern California, although northeast and southern regions are also represented (Figure 2). Nearly all projects are stocked above national averages and are large in acreages, yet size varies significantly. NIPFs and Others are frequently less than 10,000 acres; forest industry projects are typically logical management units of 15,000-20,000 acres; TIMO projects are largest,

31“Other” includes properties owned by investors, hunt clubs, a church, a mountain residential community, a sculpture garden.
occasionally exceeding 100,000 acres (Table 2). Inverse relationships exist between acreage and credit earnings per acre, whereby smaller projects earned significantly more offsets per acre than larger projects, suggesting a need among smaller projects for greater profitability per acre in order to offset project development costs (Table 2).

Employment of experts in forest offset development was unilateral, though diverse. Developer involvement was most common among tribes, NIPFs, and Others and was more common outside of California; consulting foresters were typical among NIPFs, strictly within California; and in-house development, among forest industry and larger conservation landowners, specific to California (Table 3). Management for timber occurred across all landowner types, though was not universal. No-harvest properties exist as a minority (n=7), and are mostly small, conservation properties. Frequently timber management was combined with working forest conservation easements, except among forest industry and tribes, for whom easements are rare. Most projects employ selection harvest techniques, though even-aged management also occurs, particularly among forest industry. Finally, we note tenure change, i.e. acquisitions of former industrial timberland by conservation landowners and tribes, and to a lesser extent among TIMO, Other, and NIPF categories (Table 4). Data suggests availability of public acquisition dollars for some, namely conservation landowners and tribes (Table 4).

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32 We note large conservation landowners (>2,000 acres) mostly developed projects in-house, while small conservation projects (< 2,000 acres) typically used developers.
The following sections clarify commodity chain engagement among three landowner types—conservation, forest industry, and NIPF—based on combined project metric and interview data.

**Table 4, Project Acreage, stocking, credit earnings, and location**

<table>
<thead>
<tr>
<th>Landowner Type</th>
<th>Acres Sum</th>
<th>No. of Projects</th>
<th>Avg. Acres</th>
<th>Stocking/FIA Average</th>
<th>Average Credits/acre</th>
<th>CA</th>
<th>Non-CA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conservation</td>
<td>206,642</td>
<td>19</td>
<td>10,873</td>
<td>1.47</td>
<td>51</td>
<td>42%</td>
<td>58%</td>
</tr>
<tr>
<td>Industrial</td>
<td>549,016</td>
<td>15</td>
<td>36,601</td>
<td>1.35</td>
<td>25</td>
<td>80%</td>
<td>20%</td>
</tr>
<tr>
<td>NIPF</td>
<td>52,065</td>
<td>11</td>
<td>5,207</td>
<td>1.48</td>
<td>96</td>
<td>82%</td>
<td>18%</td>
</tr>
<tr>
<td>Other</td>
<td>52,725</td>
<td>12</td>
<td>5,273</td>
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</tr>
<tr>
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<td>543,231</td>
<td>7</td>
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</tr>
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<td>1.83</td>
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</tr>
<tr>
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<td>1,528,083</td>
<td>68</td>
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<td>1.45</td>
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<td>57%</td>
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</table>
### Table 5, Use of Conservation easements, harvesting for timber, development model

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<th>Harvesting for Timber</th>
<th>Developer Use</th>
<th>Consultant Use</th>
<th>In-house</th>
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<td>45%</td>
<td>55%</td>
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<tr>
<td>Other</td>
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<td>67%</td>
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<td>71%</td>
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<td>42%</td>
<td>0%</td>
<td>29%</td>
</tr>
<tr>
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<td>0%</td>
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<tr>
<td>Total</td>
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<td>22%</td>
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</table>
Table 6, Tenure Change, Funding

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<th>Tenure Change</th>
<th>Public Funding</th>
<th>CA</th>
<th>Non-CA</th>
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</thead>
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<td>42%</td>
<td>58%</td>
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<td>0%</td>
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<td>20%</td>
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<td>82%</td>
<td>18%</td>
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<tr>
<td>Other</td>
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<td>17%</td>
<td>0%</td>
<td>42%</td>
<td>58%</td>
</tr>
<tr>
<td>TIMO</td>
<td>71%</td>
<td>29%</td>
<td>0%</td>
<td>14%</td>
<td>86%</td>
</tr>
<tr>
<td>Tribal</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>75%</td>
<td>25%</td>
</tr>
<tr>
<td>Total</td>
<td>51%</td>
<td>26%</td>
<td>16%</td>
<td>57%</td>
<td>43%</td>
</tr>
</tbody>
</table>
Conservation Organizations

Predominance of conservation landowners is partly due to their early adoption. Some California land trusts were key architects of a voluntary forest offset market which preceded California’s cap-and-trade program, providing political and methodological support before undertaking project development on properties they managed (Schmitz and Kelly). Motivations were not always economic, but included a desire to demonstrate the potential of a non-extractive revenue source for sustainable forest management.

Stated one early entrant: “We didn’t know what the returns would be, but…we felt it was worth the risk of taking on the additional expense to provide that model. (Interview 2, Land Trust). Conservation landowner participation continued into the regulatory market, with land trusts and conservation acquisition groups nationally entering the market (Table 2).

Conservation landowners all viewed forest offset revenue as a means to achieve conservation agendas, although a range of strategies were employed. Land trusts frequently applied offset revenue to land management activities on properties already under their ownership, particularly in an era of reduced state funding. Explained one: “There is value in the property we have…Let’s make it work for us, and enhance it at the same time, not be begging at the troughs of government agencies for grants” (Interview 3, Land Trust). Alternatively, one land trust used offset revenue to fund easement purchases, an innovative model which presumably avoids the difficulties of securing
public or private dollars upfront.\textsuperscript{33} Thirdly, offset revenue was also used to fund conservation acquisitions, e.g. four such purchases in Northern California were negotiated based on offset revenue potential as a state loan repayment source.

Carbon offset production demonstrates substantial utility for conservation landowners; yet market entry also had challenges. Many recalled the detriments of early adoption, including added expense to project maintenance as the early protocol underwent frequent interpretive changes. Evidence also exists that offsets generated from the earliest protocol were harder to convert into regulatory credits (via a process known as “early action”) and potentially less marketable in a compliance setting, due to methodological distinctions. We note too that while not universal, a critical perspective scrutinized conservation projects, emanating from both competing market participants and popular press, with the potential for reduced market confidence. Controversy concerned a) purported non-additionality of conservation landowners who typically increased their stocks even without program participation b) accusations of “double-dipping” whereby conservation projects were allegedly paid twice to conserve, first through state funding via grants or easement revenue, then through offset sales and c) concerns that carbon related conservation acquisitions were based on inflated appraisal values, and thus made poor use of taxpayer dollars.

\textsuperscript{33} Here, the land trust developed carbon projects based on timber rights alone, with offset revenue flowing partly to the land trust and partly to landowners via annual dividend payments.
**Forest Industry**

Forest industry was absent from California’s voluntary offset market; however promise of regulatory demand via GHG reduction mandates increased their interest in the program. Initial protocol design was unfavorable to would-be industry participants. However, California forest industry lobbying eventually led to substantial changes which facilitated their involvement—e.g. inclusion of even-aged management, credit for harvested wood products, removal of the conservation easement requirement, and provision for early termination. Forest industry is now contributing significant acreage to the program, though strictly within California, where program requirements are reportedly compatible with the state forest practice rules, which require management for sustained yield production (Table 2).

Industry participants depicted market entry as a business decision, based on the price of carbon and consideration of opportunity costs. Yet reserve was common: many characterized the market as immature and indicated policy changes or unfulfilled buyer demand could yet deter their participation. However all saw offset production as compatible with timber management, owing largely to credit for harvested wood products. Stated one:

The investment we make every year is to increase stocking and keep them well spaced so they grow fast...[Therefore] we will have increasing carbon *and* increasing harvest. So we're not likely to ever get into the negative calculation that somehow we reduced harvest to create more carbon. (Interview 18, Forest Industry).
Explained another: “We’d have some expectation of here’s the base, anything below that increment we’re selling [offsets], but then above that, over time and space we’ll continue to manage that property [for timber]” (Interview 21, Forest Industry).

Yet significant controversy surrounded market entry of industrial actors, particularly among environmental advocacy groups who took exception to offset production on timberlands managed for even-aged stands, also known as “clear cutting.” Some filed legal challenges on grounds of dubious additionality and environmental integrity. Interviewees noted this as a constraint to industrial market participation, suggesting it cast doubt on the program and caused some would-be industrial participants to stall market entry. While initial challenges to inclusion of even-age management were resolved, many noted debates may resume, with particular potential for future protocol revisions to yet alter program inclusion of even-aged management.

**NIPFs**

Small NIPF-owned projects are noteworthy exceptions in a market dominated by economies of scale. Projects are markedly high stocked per their forest type and large in acreage compared to nationwide NIPF counterparts, who frequently own less than 100 acres (Table 2; Butler and Leatherberry 2004). All are in Northern California on mixed-conifer forest types. Most are family owned, with eight indicating multi-generational attachment to the land. Evidence suggests some proactively initiated project development through consulting foresters, while others were solicited by developers who identified their properties as viable for market participation. Data suggests some NIPF participants
saw offset revenue as a way to provide an endowment for management and protection of their forestlands, though motivations are likely diverse and deserve further inquiry.

Discussion

Employing the commodity chain analytic framework articulated by Ribot, this manuscript traced empirically the steps and relationships involved in forest offsets production for sale into California’s cap-and-trade market (1998). Then, project metrics and trends illustrated the commodity chain, clarifying access to benefits during early days of market emergence. We now return to the research questions, particularly: what does this reveal about commodification of abstract ecosystem goods?

A Policy Dependent Commodity

Forest offsets depend on state policy to define, quantify, and assign value to them as market goods, exemplifying the highly regulated commodity chain articulated by Ribot, i.e. influenced at all intervals by external (political and non-political) forces (1998). We assert policy dependence powerfully shapes offset production, particularly through the need to render invisible goods “real” in the eyes of the market via rigorous and costly “legitimizing institutions,” e.g. inventory, accounting, modeling, verification (Castree 2003; Corbera and Brown 2010). Such processes are common to commercialized ecosystem services, which must be quantified and authenticated. However we contend that the regulatory nature of California’s cap-and-trade program heightens legitimacy stakes, by necessitating offsets that can stand up as legal compliance instruments. This
requires conformity with a complex protocol, inventory data of unprecedented intensity, and rigorous third-party verifications requiring narrow and specialized expertise. This not only complicates forest offset production, but weakens their strength as market commodities. We cite lawsuits challenging additionality, participant accusations of gaming, ongoing accounting debates, and invalidation risk as evidence that legitimizing institutions are not wholly successful. In spite of rigorous, costly, and expert facilitated production, forest offsets remain hard to verify accounting claims whose validity is continually questioned.

Policy dependence also inserts risk into production and maintenance of forest offsets, repeating Leconcqu and Ambrosi (2010). California’s forest offset program may have especial risk, in that regulatory market participation imposes significant encumbrances with purportedly rigorous state enforcement. Inordinate contract lengths of 100 years past the sale of the last offset with continual and costly maintenance, monitoring, and reporting are unprecedented obligations, contrasting sharply with previous forest offset programs. Participants in California’s regulatory market make serious commitments, forgo flexibility to respond fully to alternative resource revenue possibilities, and assume responsibility for carbon stock reversals, in a time of high political uncertainty. Risk-reduction strategies, including partnering with expert specialists for increased production competence or finance partnership, use of insurance products, and completion of additional verifications, indicate a search for innovative risk.

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34 Citizens Climate Lobby and Our Children’s Earth Foundation v. California Air Resources Board, filed in 2012 and currently on appeal.
35 CDM has 20-50 year contracts (Corbera and Brown 2010), while voluntary markets contracts are as short as five years (citation).
mitigation tools. Yet some risks are hard to moderate, including uncertainty of the market past 2020, the likelihood of policy revisions which alter profitability and participation potential, and fluctuations in forest offset price and demand. These are attributes of policy-dependent commodities felt most acutely for early adopters, who bear-out a shifting political landscape and uncertain market reception.

**Market Trends**

Forest carbon markets have been viewed as vehicles for wide-ranging forest management objectives, including sustainable timber management, conservation forestry, and management for timber harvest (Best and Wayburn 2001; Wroblicka 2014; Jenkins 2013, Caldwell 2014). Launch of California’s cap-and-trade market presented a first-time opportunity to assess actual participation in a regulatory market for improved forest management. This paper asked: who is participating in early days of market formation? Unsurprisingly, conservation landowners are prevailing participants, confirming earlier assertions (Wroblicka 2014). Market participation demonstrated a variety of utilities for these landowners, providing a revenue source for lands already under conservation ownership/management, a mechanism to fund new easement purchases, and a means to access additional land state acquisition dollars. Furthermore, high prevalence of conservation easements among non-conservation market participants, particularly NIPFs
and Others, suggests forest carbon market participation may encourage lasting
conservation legacies amid broader market participants.\footnote{Foresters explained that conservation easements “make sense” for offset market participants, because they provide additional revenue streams for similar management objectives and can increase credit generation by lowering reversal risk ratings.}

Alternatively, forest industry participation is also strong, a phenomenon unknown to
earlier voluntary forest offset programs (Jenkins 2013, Caldwell 2014). We cite later
emerging but prominent participation by California forest industry, landowners
possessing the size, technical capacity, and time horizons needed for offset project
development. These projects demonstrate a new model for carbon sequestration based on
intensive timber management and production of durable wood products—contrasting
with carbon sequestration based on growth of older, larger trees—which challenged
public understanding of how forests effect climate benefit. We assert that program
application to managed forests, the promise of regulatory demand and higher prices, and
protocol revisions favoring industrial landowner market entrance, facilitated first-time
timber industry involvement in forest offset commodification. Future analysis will reveal
how market entry among these atypical actors evolves as the market matures, clarifying
implications for co-existent and competing commodities, such as wood products. Also
unknown is the degree to which forest industry participation will expand beyond
California borders, where it is uniquely compatible with existing forest regulatory
frameworks.

A comprehensive description of all market participants is beyond the scope of this
paper. However, these examples highlight important early participation trends, including
the results of an uncompetitive price of carbon compared to competing forest products. This limits participation to landowners with the highest preexisting compatibility with program rules, e.g. conservation landowners and forest industry in California, which is mandated to grow stocks via sustained yield production. Thus it is unsurprising that early participants are those whose forest offset revenue does not require management changes which would reduce other revenue opportunities. Secondly, uncertainty in market demand and duration privileges participation among properties with high upfront profitability, e.g. those that offset development costs in year-one participation. Lower-stocked lands that gradually earn revenue as forests grow may have significant climate benefit and profitability over project lifespans; however, they are unlikely to enter a market unguaranteed past 2020. Many forest types, management contexts, geographic regions, and landowner demographics are therefore absent from this market. We suggest greater surety of market endurance and carbon price competitiveness are two factors likely to expand market participation to currently non-viable projects, such as NIPFs, and those inclined to forgo alternative revenue possibilities for forest offset production.

**Access Mechanisms**

Market trends reveal that forest offset participation has greater engagement among some actors than others, demonstrating the theory of access articulated by Ribot and Peluso (1998). We now consider dominant mechanisms which enabling and constrain access to benefits from this novel ecosystem good.
Knowledge, Capital, Technical Capacity

Forest offset market participation is a highly specialized niche. Echoing Ribot and Peluso, we assert that many landowners have rights to timber, yet few will benefit from offset revenue; on the other hand, some without timber rights are finding ways to benefit (2003). Third-party involvement in commodity production is common; however, we suggest particular attributes of forest offsets as ecosystem services increases expert dependency, including novelty, cost, technical complexity, and high risk and uncertainty. Knowledge, capital, and technical capacity are therefore key access mechanisms, constraining participation among average landowners, while enabling it among specialized actors who undertake forest offset development professionally (see Ribot and Peluso, p. 170). These service providers are numerous and involved at all points along the commodity chain, including consulting foresters, verifiers, registry staff, and brokers. Especially prominent are carbon developers, who currently provide turn-key development for nearly half of all projects, and select services (such as marketing and sale of credits) for significantly more. Involvement of developers in some aspect of offset production is thus nearly universal. This phenomenon may owe to the emerging nature of the market, which increases the need for outreach and reduces the likelihood that knowledge and technical capacity have been transmitted to landowners themselves. We note also that while developers serve as key facilitators of access—enabling market engagement particularly among small landowners and tribes—they also reduce benefit flows to resources holders and introduce property complexities, with consequences for long term offset project financial viability and land management flexibility that are yet unknown.
Market maturation will reveal both the prevalence and significance of these key actors in future forest offset production.

Identity

Landowner identity is a prevalent access mechanism for forest offsets, demonstrated via iniquities in protocol compatibility, social credibility, and offset marketability and value. Protocol requirements favored some landowners over others, beginning with conservation landowners, through early components requiring perpetual conservation easements and uneven-aged management. Indeed, land trusts and conservation acquisition organizations were exclusive market participants for the voluntary offset market. Many benefited too from availability of state funding for land acquisition and/or project development costs and secured purportedly lucrative contracts for corporate social responsibility offset sales, indicating identity factors combined to facilitate early market entrance among select conservation landowners, while restricting it among others, such as industrial timber managers.

2007 protocol revisions aimed specifically to facilitate participation by industrial landowners; however, credibility issues constrained their market entry. Critical reception among environmental advocacy groups who opposed inclusion of even-aged management led to negative popular press coverage and threat of legal action against ARB, purportedly halting project development among at least one industrial landowner. This indicates identity based constraints for these atypical ecosystem market participants. We note forest industry project development resumption in 2009, which met little
response from earlier opposition groups, suggesting the importance of offset producer environmental cachet may diminish with market maturity.

Yet the relevance of landowner identity is still strong. As a wide range of offset producers generate salable offsets, identity-based marketing is occurring. Boasts one developer in its web content for offset buyers: “Many of our projects protect charismatic, high conservation value forests in California and other states, often owned by family forest owners and Native American tribes”.37 Use of promotional narratives in selling forest offsets is common; however, we posit that program application to diverse forest landowners and management contexts, from no-harvest land trusts to industrial even-age managers, increases potential for value stratification among forest offsets. Relevant too is the fact that forest offsets must compete with non-forest offsets, which lack many of the challenges of forest offsets, e.g. impermanence, uncertain quantification, scrutiny over “realness” and environmental integrity. Persistence in tying forest offsets to particular projects through identity-based marketing, in spite of rhetorical abstraction, may signify efforts to boost value and attraction in a competitive market. This presents a paradox whereby landowners with the capacity to produce substantial quantities of technically sound offsets, e.g. large industrial landowners, may benefit least from environmental cachet. We suggest future analysis test more fully the relationship between identity deployment and value differentiation among diverse offset producers and forests as the market matures.

Access to Decision-Makers

Access to decision-makers is strongly associated with landowner access to market entry. We underscore the ability of stakeholders with political capital and access to protocol development to shape program participation rules, in ways that first favored conservation landowners (early stakeholders), then shifted to allow project development among industrial landowners (later stakeholders), particularly through credit for harvested wood products and removal of the conservation easement requirement. However other spaces also served as decision-make access points. For example, tribal landowners report effectively negotiating wide-ranging special accommodations necessary for their market entrance through registry and ARB staff, from outside official workgroup participation. Similarly, a practice of interpreting the protocol “like case law,” opened sites of access and influence for foresters and carbon developers, who described lobbying registry and ARB staff for decisions key to the viability and profitability of their projects, such as whether to include conservation easements as legal requirements for baseline scenarios and where to draw boundaries for assessment areas.

Reiterating the claim of Ribot and Peluso, we conclude that ambiguity in program requirements, combined with the state’s role in program implementation, empower the state as the ultimate access mediator (2003). Protocol development stakeholders had strong influence over program design, however once ARB adopted the protocol, it moved squarely into state jurisdiction. Key decisions, such as whether to include even-aged management, hinged on the voting preferences of ARB board members, not on
workgroup representation. Future protocol revisions, too, will come from ARB staff, while interest group influence is relegated to public comment. Forthcoming decisions may be key, including whether to raise baseline scenarios among existing participants as national forest stocking levels rise and whether to continually include even-aged management, amidst persistent controversy. We also note invalidation as a state tool to overturn offsets—even once third party verified—based on criteria said to be poorly defined and subjective. We reiterate, too, forest offsets’ dependence on political decisions for value and market demand, with pricing highly influenced by availability of competing compliance instruments, such as allowances, and the effectiveness of additional initiatives of AB 32, known as “complimentary measures.” Finally, regulatory market demand ceases in 2020 without legislative renewal of a much-disputed bill. Politics is thus the final access arbiter for this policy dependent commodity.

**Conclusion**

Emergence of an innovative forest offset market for California’s cap-and-trade program began a technically complex, costly, expert dependent commodity chain. This analysis traced the steps and relationships employed in rendering forest carbon accounting claims “real” for market legitimacy, as well as landowner engagement with the commodity chain in risky days of market emergence. Results indicate the empirical outcome of an experimental policy prescription, and may inform policy-makers elsewhere considering ecosystem markets as tools for climate solutions.
Yet this commodity chain is in its infancy. Questions remain, including how offset production may evolve as the process grows more institutionalized, how participation may shift with market maturity, and what realities may shape project management and maintenance for enduring 100 year contracts. Political factors are relevant too, including possible inclusion of international (REDD+) offsets in the market, protocol revisions that alter profitability and management requirements, and the prospect of federal GHG mandates, which could alter or preempt state-level legislation. Future research should test shifts in both production process and market access for these novel commodities amidst an evolving landscape of political popularity and market acceptance.
References


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http://www.climateactionreserve.org/how/protocols/forest/


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Greenhalgh, Daviet, and Weninger.

Appendix

Participant list, role description, stakeholder category

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<th>Interview Number</th>
<th>Role</th>
<th>Stakeholder Group</th>
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<tr>
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<td>Land Trust Representative</td>
<td>Workgroup One Participant, Environmental Stakeholder</td>
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<td>Carbon Project Developer</td>
</tr>
<tr>
<td>4</td>
<td>Registry Staff Member and Carbon Project</td>
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</tr>
<tr>
<td></td>
<td>Developer</td>
<td></td>
</tr>
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<td>Registry Staff Member and Carbon Project</td>
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