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INCENTIVE POLICY FOR FOREST CARBON

Although forest carbon sequestration programs have generally been conceived through the lens of offset crediting policies, the fundamental elements of robust offset programs disadvantage non-industrial forest owners, including family forestlands, community forests, and local public owners like counties and municipalities whose forest management objectives often align with additional carbon sequestration. The key barriers to forest carbon offsetting involve the policy choice to directly link polluters with sequesterers in a ton-for-ton transaction. Because a regulated polluter may be permitted to use the offset credit to release an extra ton of greenhouse gas pollution, offset credits need to be measured very precisely, represent a permanent emission reduction, and be strictly additional (i.e., it would not have occurred without the carbon incentive). Enforcing these requirements in complex and diverse biological systems like forests has led to elaborate (and exorbitantly expensive) forest carbon inventory, accounting, and certification schemes. The cost of compliance with these protocols has led to minimum viable project sizes of 3,000-5,000 acres depending on the productivity of the forest and its current condition. That rules out 99.9% of non-industrial forest owners. Even if they did pencil out, the vast majority of carbon funds directed to an offset project like this would be gobbled up by offset project developers, third-party verifiers, and market middle-men rather than going to the landowners actually storing the carbon.

As an alternative to carbon offsetting, a simpler incentive approach modeled off existing conservation programs should be considered. This would break the direct link between polluters and forestlands (but payments from polluters could still be used to reward carbon sequestering activities via a fund capitalized with carbon tax revenue, allowance auction set-asides, or other revenue sources). Two widely-subscribed and successful conservation programs applying this incentive model can be found in the USDA's Cropland Reserve Program (CRP) and Grassland Reserve Program (GRP). These programs provide an annual "rental" (incentive) payment to farmers who sign on to a 5-year contract to take erodible cropland out of cultivation (CRP) or restore native grass cover to marginal cropland (GRP). These programs recognize that, while permanent conservation might be preferred, real conservation benefits are still provided each year and the programs are much more accessible, enabling the participation of millions of farmers.

Applying this model to forests, a Forest Carbon Reserve Program could offer annual payments to forest owners for a 5- or 10-year commitment to maintain or increase their carbon stocks. Compliance could simply include annual review of any harvesting reported in State-required harvest permits/notifications and consideration of satellite imagery. Participation could, but does not necessarily need to, encourage third-party certification of a landowner's Forest Management Plan under easily accessible programs such as the American Tree Farm System or Forest Stewardship Council. Cost-share programs, such as the NRCS Environmental Quality Incentive Program (EQIP) and comparable State-level programs, may offer additional funding for targeted forest inventory and monitoring, or spot-checks by a natural resource agency could be baked into administration of the carbon incentive program. The EQIP example is already being applied in NW Oregon and western Washington under an NRCS Regional Conservation Partnership Program led by the Pinchot Institute for Conservation.

A forest landowner would receive an annual payment based on the amount of carbon in their forestland at the time of enrollment (which is relatively easy to estimate with well-established forest inventory techniques). The level of precision and accuracy could be set to minimize costs to participation while ensuring scientific rigor. Remotely-sensed data such as LiDAR may eventually replace or significantly reduce the need for field-based carbon assessment. This annual payment would essentially be a form of carbon "rental" in the same sense that the USDA CRP and GRP payments "rent" soil conservation. The landowner could exit the program after contract completion and no funding would have been spent for any ecosystem services not already delivered, and at no point is pollution being directly permitted because of the landowner's carbon-sequestering activity. This cleanly resolves the core challenges of "permanence" and "additionality" that have made carbon offset programs and markets exorbitantly expensive and inaccessible.

The payment rate or ranking for awarding of carbon agreements could be defined based on more factors than carbon alone, considering provision of habitat for T&E fish and wildlife species, local economic hardship (e.g., elevated unemployment or poverty in the county), areas with vulnerable mills, or in areas that supply drinking water. The Social Cost of Carbon (SCC) represents "the monetized damages associated with an incremental increase in carbon emissions in a given year" and is used here as a benchmark for valuing carbon reductions.[1] The value of carbon could be adjusted to maximize policy efficiency (e.g., by pegging it to a lower fixed or marked-based carbon price). In 2015, the SCC was $36 per metric ton of carbon dioxide-equivalent (tCO_2e). Instead of purchasing a permanent offset, the value of carbon sequestration achieved each year determined using a simple rental rate formula[2] would translate to an annual payment of $1.06 per ton of CO_2e stored in the forest for each year of the contract.

Notably, this incentive would also encourage longer timber harvest rotations, which yield more timber per acre per year than short rotations. This is elaborated in a separate brief, illustrating how a carbon incentive shifts maximal net present value to longer rotations.

[1] SCC estimates were developed pursuant to Executive Order 12866 by the Interagency Working Group on Social Cost of Greenhouse Gases. The EPA webpage on the SCC was removed under the Trump Administration; find an archived version here: https://19january2017snapshot.epa.gov/climatechange/social-cost-carbon_.html

[2] Rental rate calculated as $SCC*(1-e^{-i})$ where *SCC* is the asset value (the Social Cost of Carbon), *e* is a mathematical constant (≈2.71828), and *i* is the annual discount rate (3%). Calculation based on Cacho, O. 2006. **Abatement and transaction costs of carbon-sink projects involving smallholders.** Presented at "Climate Change Mitigation Measures in the Agro-Forestry Sector and Biodiversity Futures." Trieste, Italy (16-17 October 2006). http://users.ictp.it/~eee/workshops/smr1811/cacho.pdf

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FOREST CARBON RESERVE PROGRAM (example for Oregon and Washington)

ELIGIBILITY:

Non-industrial forestlands, both private and public

Private landowners and entities meeting eligibility requirements for the NRCS Environmental Quality Incentives Program (EQIP), as well as public entities owning fewer than 20,000 forested acres, such as municipalities, counties, school districts, etc.

Forestlands must have had a stand examination completed

A basic stand examination characterizing the stocking, composition, and structure of each stand must be included with the application. Apart from forming the basis for stewardship planning, stand exams may also help identify any distinct forest health threats or conservation values relevant to forest management.

Forestlands must be potentially suitable for timber harvest

Commercial timber harvest is physically and legally feasible. Stands with fewer than 3 thousand boardfeet per acre (MBF/ac) of timber stocking on the eastside and 5 MBF/ac on the west-side are ineligible. For young or understocked stands below these thresholds, carbon incentives are presumably unnecessary to avoid near-term carbon losses due to the lack of a competing timber value. Stands that are inaccessible due to access hazards or steep and/or unstable slopes are ineligible.

Scoring and Ranking Criteria

Consistent with contemporary cost-share and conservation incentive programs, contracts will be awarded as funding allows on a competitive basis according to scoring and ranking criteria such as:

- **Applicant attributes:** **(i)** completed or updated a written Forest Management Plan within the past five years; **(ii)** successfully completed previous conservation contracts; **(iii)** has their primary residence in an economically distressed area (typically defined by an area's poverty rate and/or unemployment rate relative to a state or national average).
- **Land attributes:** **(i)** significant barriers to forest product markets exist, such as a 50+ miles road distance to the nearest mill accepting the primary species or size classes stocked; **(ii)** total forest or land area and/or total carbon storage in stand(s); and **(iii)** includes High Conservation Value forest, such as significant cultural resources, rare or otherwise important ecosystems, habitat for fish and wildlife, or the provision of critical ecosystem services (e.g., drinking water protection areas).

TERMS OF THE CARBON RENTAL AGREEMENT:

Five-year term. The contract between the landowner and the Conservation Agency may be voluntarily renewed.

No net loss of carbon during the contract–harvests permitted that remove less than five-year incremental growth. Annual rental payments are contingent upon the landowner's compliance with harvest notifications and other forest practices laws. Thinning, partial harvest, and prescribed burning are permitted during the contract period so long as landowner notifies the Agency and the volume of biomass removed does not exceed the permitted harvest level, which is estimated as the five-year periodic volume growth determined from standard yield tables or growth-and-yield modeling and specified in the contract.

Termination due to willful overharvesting. In the event of biomass removals exceeding the permitted harvest level, the contract will be terminated, and the landowner will be ineligible for future carbon rental payments or contracts.

Annual rental payments for carbon storage. The landowner shall receive an annual payment based on retaining the volume of forest carbon stored *as measured at the beginning of the contract period*. Carbon in live trees is included; dead trees and downed wood may also be included if they are recorded in Stand Exam(s); soil carbon storage is not expected to change substantially during the contract period and is not included. Initial carbon storage may be estimated from forest composition, age, and volume using lookup tables (e.g., Smith et al. 2006*) or directly by forest inventory plots. New carbon sequestered during the contract period is not included in rental payments, but may be reflected in subsequent carbon rental contracts.

Rental rate. For illustrative purposes, rental rates here are determined from the Social Cost of Carbon (SCC). This rate could be adjusted to maximize policy efficiency by benchmarking the value of carbon to a lower fixed or market-based carbon price. The 2015 SCC was $36 per metric ton of CO_2-equivalent (tCO_2e). The annual rental rate for a contract from 2015-2020 would be $1.06/$tCO_2e$ per year. *For context, a 25-year old Douglas-fir forest in the west-side Pacific Northwest with 262 tCO_2e/acre in all non-soil carbon pools (71.3 tons of carbon per acre converted to tCO_2e, from Table A22 of Smith et al. 2006*, p. 69) would receive a rental payment of $277 per acre per year from 2015-2020. For comparison, the USDA Cropland Reserve Program (for set-aside of erodible cropland) provided an annual rental rate of $72.61/acre for 23 million enrolled acres in FY 2016 as of September 2016 (https://www.fsa.usda.gov/Assets/USDA-FSA-Public/usdafiles/Conservation/PDF/sep2016.pdf).*

* Smith, J., Heath, L., Skog, K. and Birdsey, R. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. GTR-NE-343. Newtown Square, PA: USDA Forest Service, Northeastern Research Station. 216 p. http://www.nrs.fs.fed.us/pubs/8192