http://www.arb.ca.gov/lispub/comm/bccomdisp.php?listname=forestghg07&comment_num=22&virt_num=22

Comment 22 for Forestry Greenhouse Gas Accounting Protocols (forestghg07) - Non-Reg.
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Subject: comments on Forest Protocols
Comment:

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Re: CARB Consideration of the California Climate Action Registry Forest Protocols

Dear Chair Nichols and other members of the Air Resources Board:

I am writing your board to clarify some of the scientific and technical issues related to the proposed California Climate Action Registry Forest Protocols that appear to have been raised in discussions leading up to the California Air Resources Board□s deliberations on endorsement of the Forest Protocols. I do so as a scientist that has been involved in studying the issue of carbon stores in forests for over 20 years. During this time I have published scores of peer-reviewed papers on this subject, developed models of the processes involved, taught undergraduate and graduate level classes, presented findings in national and international scientific conferences and symposia as well as public and government briefings, and been involved in the development of national level research plans to study carbon dynamics. I am considered to be an expert in this arena and my advice has been sought out by fellow scientists, government agencies (state and federal), private land owners, consultants, NGO□s and many others. In fact I was asked to provide guidance on the Forest Protocols when they were initially being developed.

Below I list some important points regarding specific issues that appear to have been raised.

Carbon Sequestration by Younger versus Older Forests

It is very disappointing to find that arguments are still being made that younger forests are better for climate mitigation than older ones. The mistaken basis for this argument is that

younger forests store carbon at faster rates than older forests. There is a grain of truth to the assertion that forests at a relatively young age do have the potential to take up more carbon than older forests. But it is also true that forests younger than this optimum age also take up less carbon. Indeed immediately after disturbance very young forests are releasing carbon as the dead material caused by the disturbance (including timber harvests) decomposes. Averaged over the entire period between disturbances, the average flow into a forest equals the amount going out as long as the same type of disturbance is repeated. This finding has been repeatedly demonstrated in scientific examinations of this issue. The key is therefore not the rate of carbon uptake or release at any particular time, but the average amount stored over time. I am not aware of a single scientific study in which the average carbon store of a forest disturbed by clear cut harvesting at a long interval is smaller than one disturbed at a shorter interval. Not a single study, and I just performed a literature search on this very issue. In addition to the interval between disturbances, another important factor is the amount of carbon removed by each disturbance. Timber harvest, clear cutting in particular, removes more carbon from the forest than any other disturbance (including fire). The result is that harvesting forests generally reduces carbon stores and results in a net release of carbon to the atmosphere.

Another mistaken notion is that the Forest Protocols should focus on rates of uptake and not changes in stores or stock changes. Scientists refer to these rates of carbon uptake and release as fluxes. One must measure all the positive and negative fluxes to understand the overall balance (much like in a bank balance in which one must account for all the sources of income and expenses for it to make sense). Simple mathematics tells us that as long as all the relevant fluxes in and out of the forest are measured the answer will be the same as if the changes in stocks are measured. The only difference is that measuring changes in stocks is far easier and cheaper than accounting for all the fluxes. Scientists measure fluxes to understand the mechanisms, but there is no need to do this to determine the net change in carbon stores. A net increase in stores is related to a positive flux into the forest, a net decrease a negative flow out to the atmosphere, and no change means the flows in and out are equal. Both methods are scientifically valid.

Accounting for Wood Products

In the Forest Protocols wood products are treated as an optional carbon store. I believe this is completely appropriate for several reasons. While it is true that some of the carbon harvested from a forest is stored for a period of time it is not the case that this material is stored forever. Similar to other forest-related pools, it is the balance of inputs versus outputs that determines whether the wood products pool is increasing or decreasing. Not all harvested carbon results in storage into longer term pools. A considerable amount, estimated by the guidelines to be 40%, is released to the atmosphere during manufacturing and initial use. The remaining amount suffers losses during use from fires, decomposition, and other factors. We know this because about half the wood products that are produced today are used to replace the ones that have been in use. I believe the Forest Protocols addresses these issues adequately by providing reasonable conversion factors, manufacturing losses, and product life-spans that are based on previous peer-reviewed scientific studies.

Setting aside the specifics of how forest products could be tracked, there are several

reasons to make forest products optional at this time. First, is that even when this store is included it only comprises a small fraction of the total forest system stock of carbon. Again, based on a recent literature review, less than 20% of the total forest system carbon story is held in forest products. The average fraction is likely less than 10%. Second, unlike carbon in the forest itself, it is impossible to specifically account for where forest products end up. Therefore there is no way to confirm the carbon stores are actually present. At least with a forest one can visit the actual site of storage. Third, it is difficult to demonstrate the new forest products meet additionality requirements: some of the new material replaces old material and hence there is no real additionality. Granted the new harvest may help to maintain current stores in forest products and that is accounted for under the proposed Forest Protocols. Fourth, the project supplying the raw material has a limited ability to control the various products that are produced and how and where they are used, which means that the exact contribution to forest products pools is highly uncertain. At best the average storage rates can be computed until a better way (probably incurring a great deal of expense) to track the actual uses and life-span of products is developed.

Use of default biomass coefficients

While it would be ideal if one could directly measure all the carbon in a forest this is not practical at this time. Instead one must relate the size of the trees and other items to the amount of carbon they store. By making very detailed measures of dimensions of each object (e.g., each tree) one can compute volumes and coupling that with measurements of carbon content per unit volume of each object one can very precisely determine carbon stores in many kinds of forest pools. Unfortunately that would be a very expensive process. A more economical approach is to develop biomass equations from a subsampling of trees or other objects. However, this too is has considerable expense and requires technical training. For those unable to develop or afford project specific biomass equations, the Forest Protocols provide default biomass regression equations that are reasonable and sound. These default equations were developed by respected and leading scientists in the field of forest inventory (Richard Birdsey, Linda Heath, Jennifer Jenkins and David Chojnacky) and were based on a nationwide literature search using many thousands of diameter measurements from a wide selection of many North American tree species. The equations were peer-reviewed, published by the USDA Forest Service, and have become a national standard for scientific study.

I see benefits other than economic ones in using the standardized default equations. It places everyone on equal footing and allows for standardized checking of results. While the absolute carbon store may be systematically over- or underestimated by these equations, these biases are greatly reduced when the net change in stocks is considered. I see nothing whatsoever preventing landowners from developing site specific biomass equations that are more accurate than the default ones. The only restriction is that the equations are approved by a third-party certifier, a step that is essential to assure a credible program.

Use of growth and yield models

At the start of any project, it is logical to project the potential increases in carbon stocks. Projects unable to at least predict a positive increase in carbon stores should not be considered viable. Projections are ideally based on results from similar kinds of projects,

but given the early stages of forest carbon management, these data rarely exist. A viable alternative is use models to estimate potential project benefits. The Forest Protocols specify a number of timber growth and yield models including CACTOS (California Conifer Timber Output Simulator), CRYPTOS (California Conifer Timber Output Simulator), FVS (Forest Vegetation Simulator), SPS (Stand Projection System), VFP (Visual Forester Professional), and FREIGHTS (Forest Resource Inventory Growth, and Harvest Tracking System). I will not comment on the merits of these specific models, however, I do note they were pre-approved by the California Climate Action Registry and the California Department of Forestry and Fire Protection which would seem to be the appropriate institutions to conduct a model evaluation and approval. If the models have a shortcoming it is that they are largely focused on the live part of the forests and do not include the other forest carbon pools. Still it is unlikely that forests will increase overall carbon stores if the tree stores are decreasing; therefore these models are a logical starting point.

As with other aspects of the Forest Protocols, projects are given flexibility to develop their own projection models so long as they have been reviewed by technically competent peers, are parameterized for the specific conditions of the project, are used within the scope for which they were developed and evaluated, and are clearly documented. Frankly I do not understand why anyone would trust a model that was not reviewed, was parameterized for a developed for or was not documented. That would be completely illogical. The Protocols also correctly point out that a sensitivity analysis should be performed and that the models should be periodically reviewed. Clearly it would be impossible to understand any model unless one understands the various uncertainties associated with it. Periodic review is required because models change as does the science they are based upon. The Forest Protocol requirements of annual reporting and direct sampling of forest carbon (over ten year intervals) ensure that the model projections are compared with ground-level data. By coupling models and data one can more accurately forecast future changes in carbon stores. Besides, the measured changes in carbon stores are what actually happened, projections just what might have happened.

Requiring Confidence Level be Determined

While it is true carbon is carbon, not all carbon stores projects are equally credible. There are two facets to this issue. The first is whether the project plan itself is viable. The Forest Protocols deal with this issue by requiring information on the location, climate, likely disturbances, longevity, proposed activity and other factors that might influence the storage of carbon. Projects failing to meet these requirements should not be considered viable. The second is that those potentially viable projects demonstrating actual increases in carbon stocks should have more value than ones that do not. As projects are likely to use a range of sampling methods, the Forest Protocols correctly uses the degree of statistical confidence to modify the estimate

of carbon stocks. These are used as deductions to provide a conservative estimate of the most likely carbon store in a project.
This is entirely appropriate given underestimating stores causes less potential environmental damage than overestimating the stores. While this approach emphasizes the effect of sampling errors (there are other kinds that are not considered), it is a completely rigorous and technically sound way to factor in the quality of the carbon store estimate. Given the sliding scale of deductions the managers of a project can decide if the gains in carbon related to reducing uncertainty outweigh the costs of increased sampling. Therefore this sliding scale discount approach provides flexibility to landowners while ensuring a high level of confidence in forest carbon estimates.

Thank you for taking the time to consider these comments concerning several scientific and technical aspects of the California Climate Action Registry Forest Protocols. I hope my input clarifies several potential misunderstanding and leads you toward the logical decision of endorsing the Forest Protocols as a voluntary early action measure.

Sincerely,

Mark E. Harmon
Richardson Chair and Professor
Forest Science

Attachment: www.arb.ca.gov/lists/forestghg07/22-ca_air_quality_board-forest_prodicts_protocols-harmon-letterhead.doc

Original File Name: CA air Quality Board-forest prodicts protocols-harmon-letterhead.DOC

Date and Time Comment Was Submitted: 2007-10-17 15:40:02