Our Baseline model of harvesting behavior: **How NCX uses forest inventory, satellite, and market data to predict "business as usual"**

Overview →

Generating high-quality carbon credits requires a credible, realistic baseline scenario: an estimate of both the carbon storage and the harvesting activities that would likely occur under business-as-usual (BAU) conditions. Setting a rigorous baseline is essential to demonstrating that an offset is in fact "additional"–that it creates a net climate benefit that would not have occurred in the absence of the project activities. This article describes how NCX uses forest measurements, satellite data, and market analysis to set a rigorous, property-specific baseline for each forest parcel.

In order to demonstrate that carbon offsets have true additionality, harvest deferral projects should only credit carbon that is genuinely at risk of being harvested. To determine the amount of carbon at risk on a given property, we employ our Baseline model, an acre-by-acre model that uses a combination of ecological, social, and economic data to map existing stocks, estimate future growth, and predict likely harvesting activity for the coming year. This model is built on our Basemap dataset, which uses remote sensing and field-based forest inventory data to estimate carbon stocks on every acre of forest, every year, for the entire continental U.S.

By incorporating location-specific data on forest condition, landowner demographics, and timber economics, we can predict landowner harvest behavior at very fine resolution across a wide range of conditions. The result is a baseline assessment of BAU that better accounts for variable environmental and social dynamics across the landscape.

How we set the baseline

To meet our high standard for additionality, our Baseline approach differentiates carbon at risk of being harvested from the total stock of carbon that already exists on the property (Figure 1).

Separating total carbon from carbon at risk is one of the things that sets us apart from other carbon programs. Other methods for developing acre-by-acre baselines have been developed, but they employ coarse regional averages of forest carbon stocks and harvest activity. These coarse measures do not accurately account for fine scale variation in forest conditions, nor for the local, time-specific harvest decisions actually taking place on the ground.

NCX's Baseline model calculates carbon at risk in tons of carbon dioxide equivalent (CO_2e) using 5 steps:

01 Estimate the *total property carbon*, using our Basemap product (tons CO_2e).

02 Predict the *likelihood that a harvest* will occur, based on factors such as forest composition, landowner demographics, and local timber prices (value from 0-1).

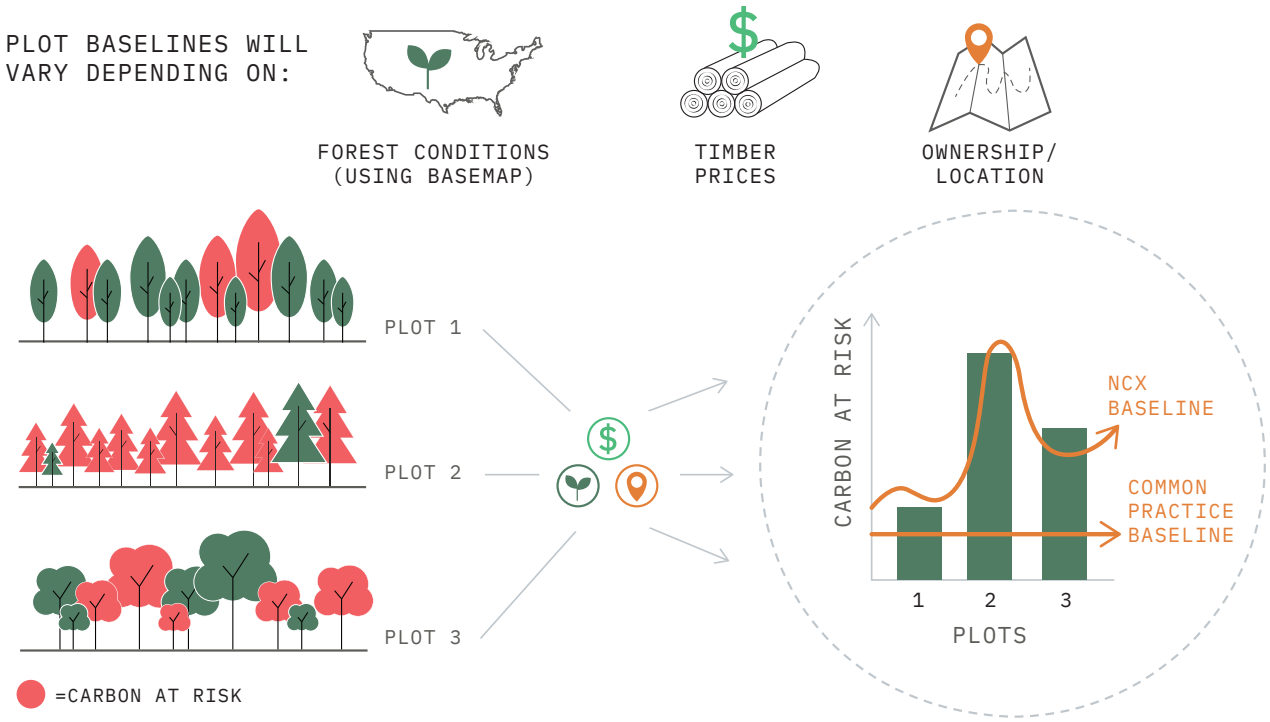
03 Predict the *proportion of carbon that would be lost* if a harvest took place, again using eco-logic, social, and economic data (value from 0-1).

04 Multiply 2 & 3 to estimate the *proportion of carbon at risk* (value from 0-1).

05 Predict *total carbon at risk* by multiplying 1 & 4 (tons CO_2e).

In addition to using coarse baselines, legacy carbon offset programs often use carbon stocks alone to assess BAU. By not separating out carbon at risk from the overall carbon stocks, this practice risks setting inaccurate baselines and producing carbon credits that overstate their real impact.

FIGURE 1. **Integrating ecological and social data to estimate "carbon at risk".**



Both our Basemap data set and our Baseline model are adaptable and iterative; as new datasets and expert knowledge become available, the predictions get even better. These models are embedded in our integrated approach to measurement, reporting and verification (MRV). The final step of ensuring additionality using our Baseline is to inventory and monitor participating properties throughout the harvest deferral to see what really happened on the ground. This dynamic modeling and MRV together help guarantee that our projects result in additional carbon credits and create real climate impact.

For more details see: NCX Carbon Guide | Baseline webinar