Aggregation Approaches in the Voluntary Carbon Market: *Three ACR examples*

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American Carbon Registry

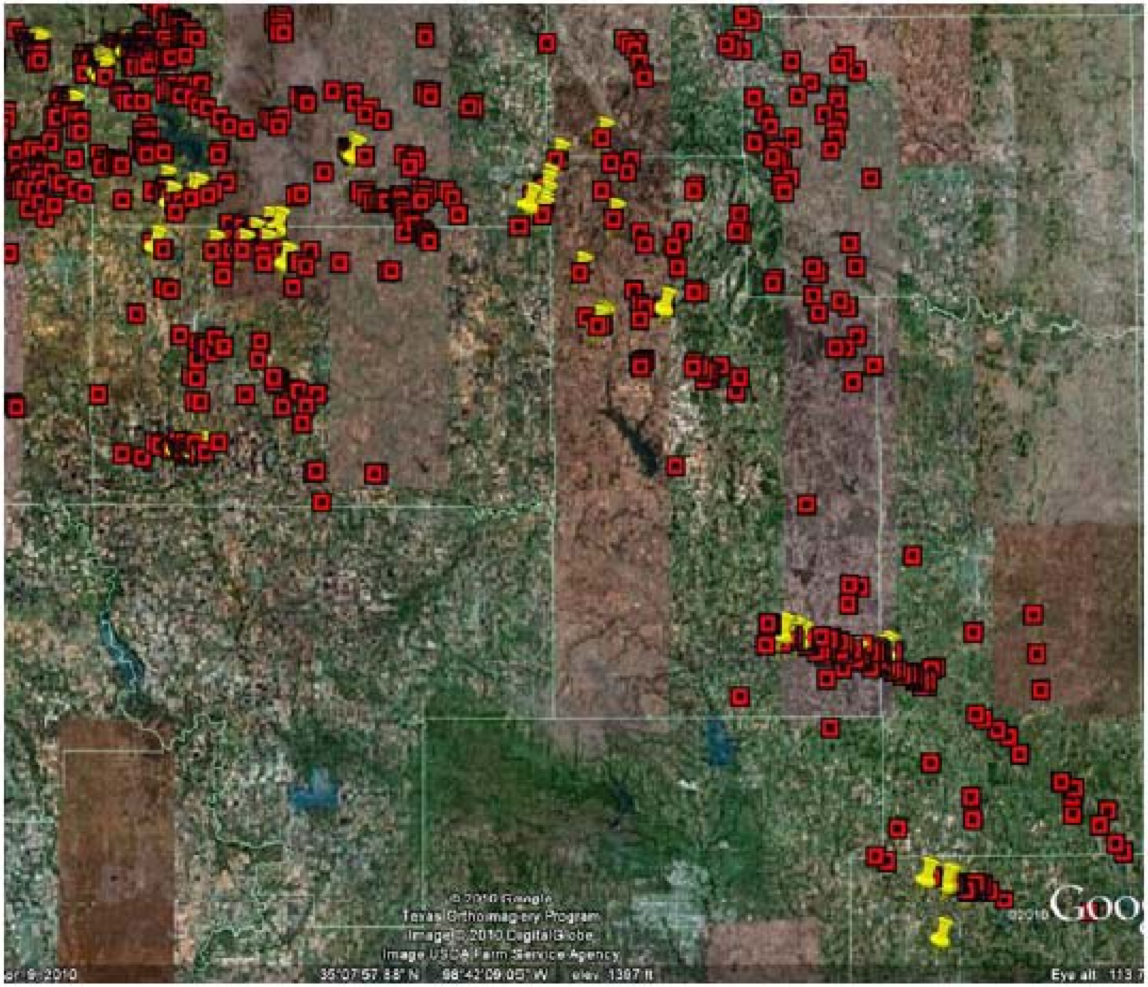
- First U.S. GHG registry, founded 1996 by Environmental Resources Trust
  - 32 million tons CO_2e VERs issued to date
  - 2011: 2.9 million tons sold, retired and contracted, average price $5.51
- ACR functions:
  - Develop and approve protocols
  - Review and register projects
  - Oversee independent validation & verification
  - Transparent tracking of transactions and retirements
- Part of Winrock International
  - Strong focus on forest carbon (A/R, IFM, REDD), agriculture (N management, rice), livestock and grazing

Benefits of aggregation

- Reduce transaction costs by spreading fixed and semi-fixed costs across more acres or more tons
- Achieve required sampling precision with fewer plots per landholding
- Diversify risk of some types of reversals
- Provide greater flexibility in contractual arrangements and reversal risk mitigation
- Reduce uncertainty in protocols using process-based models
- Mechanism for standardized crediting, especially as aggregates increase in scale
- Mechanism for new approaches to additionality

Retrofitting pneumatic controllers (Chesapeake Energy)

- Five states, 2,700 individual controllers
- Single boundary, baseline, crediting period
- Practice-based performance standard for additionality
- Statistical sampling to set baseline and project emission rates



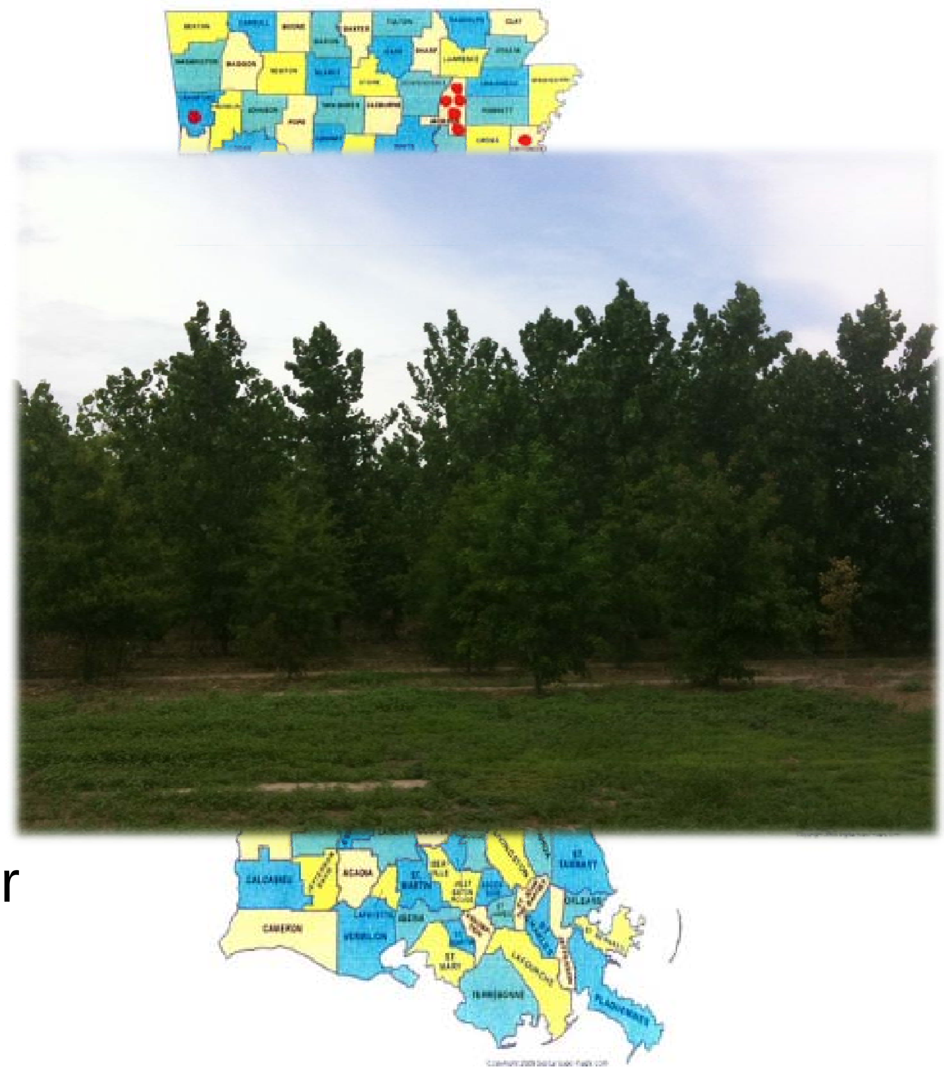
Red	=	Facility with Mizer Retrofit
Yellow Pin	=	Baseline Measurement

Aggregation guidance in ACR Forest Carbon Project Standard

- Geographic dispersion and large number of landowners may reduce reversal risks
- Baseline inventory and monitoring: 90/10 precision target applied at aggregate project level
- Verification also at aggregate level; risk-based approach with not all properties necessarily visited
- Aggregator takes on 40-year commitment to MRV and reversal risk mitigation; flexibility in landowner contracts
- Programmatic project (PoA):
  - Baseline scenario, additionality, geography, eligibility conditions specified up front; new lands added in phases
  - Multiple start dates and crediting periods

Programmatic aggregated afforestation (GreenTrees)

- 6,300 acres enrolled, 4,800 planted to date
  - Rolling start dates, crediting periods and minimum term
  - Single baseline - all Lower Mississippi marginal croplands
  - Single planting plan - bottomland hardwoods and cottonwood interplant at 604 tpa; cottonwoods thinned for biomass
  - Aggregator commits to ACR for MRV and risk mitigation over project term



Lessons to date

- Geographic dispersion has allowed aggregators to defend a smaller risk buffer deduction
- Similar lands, baseline land use, planting design, and stratified sampling make it possible to achieve precision at scale with a large number of small landowners
- ACR-aggregator agreement that allows flexibility in landowner contracts and risk mitigation is **key** to adoption
- Aggregation rules complement flexible risk mitigation options to allow aggregator to reduce landowner exposure to C market risks
- GHG program does end up with residual risk – minimal (?)
- Could this work for compliance forestry crediting?

Aggregation to reduce model uncertainty

- Some protocols use process-based biogeochemical models to predict spatially and temporally variable N_2O and CH_4 fluxes
- Aggregation of multiple owners not required, though likely; but multiple fields / acres required to reduce model structural uncertainty vs. measured validation data
  - *Fertilizer*: minimum 10 individual fields ; *Rice*: minimum 5 fields or 1,000 acres
- More fields means lower uncertainty discount
- Greater the scale of uptake, better any model (Tier 1, 2 or 3) will do at predicting variable fluxes

Lessons from aggregation in agricultural projects

- Reduce costs of project development and verification
  - But better "front end" DNDC interface tools needed to make data management feasible for aggregators
  - Could such tools also reduce errors and facilitate verification?
  - Data links, remote sensing, iPad apps, photo documentation…
- Who should aggregate? Some distrust and lack of understanding, reluctance to share data and slim profits
- CIG rice: plenty of participants and acres, but profit margins slim and "early adopters" issue evident already
- CA tomatoes: a couple large pilot participants but are reluctant to commit 10 different fields, depending how defined – chicken and egg problem until proven

Back-of-envelope estimates for rice GHG reductions

- Assume:
  - 0.2 – 1 tCO_2e/acre reductions (DNDC-based estimates for Midsouth for early drain, straw removal, reduce winter flood, etc)
  - Small, medium and large aggregated projects
  - Prices $5, $10, $20 (voluntary market vs. possible California approval)
  - Verification costs increase only slightly with size
  - Aggregator takes on all project development cost and risk so requires 50-50 profit sharing
- 1,000 acre project yields no revenue to producers even at higher C prices
- Larger projects yield revenue to producers -- $10/acre for early drain at $20 carbon

Conclusions

- Clear transaction cost benefit
- Aggregation + quantification methods:
  - Reduce uncertainty and discounts when models used
  - Achieve precision thresholds via stratified sampling
  - Allow practice-based payments with performance-based credits
- Aggregation + reversal / invalidation risk mitigation:
  - Reduce some reversal risks
  - Important to pair with flexible contracting and risk mitigation
  - Can this work in compliance market?
- Aggregation + additionality:
  - Possible solutions to early adopter issue via proportional additionality or simply uniform payments
  - Facilitates standardized baseline setting and intensity metrics

Further information

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