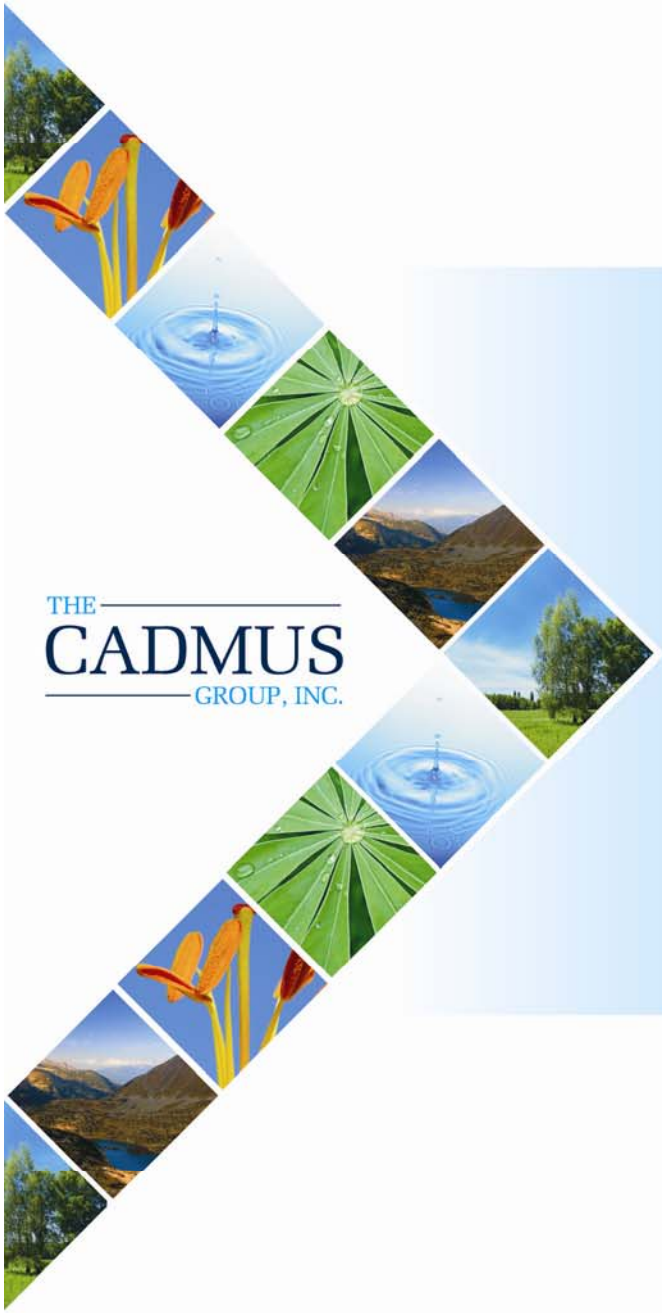

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Source Water Protection and Climate Change Mitigation: An Ecosystem Services View

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September 15, 2009

Overview

- Land based source water protection (SWP) is primarily focused on improving the yield of water purification ecosystem services
- Additional investments in SWP may have a positive impact on other ecosystem services valued by markets
- Carbon markets are emerging
  - Offset credit markets create opportunities for unregulated entities to reduce emissions and sell credits
- Challenges to participation exist, but engaging carbon markets may prove worthwhile for some water systems
  - Lower the cost or finance additional SWP
- Carbon markets are evolving rapidly, federal legislation will set a new standard

SWP capitalizes on ecosystem services to prevent contamination

Provisioning Services	Regulating Services
Crops	Air quality regulation
Livestock	Global climate regulation
Capture fisheries	Regional/local climate regulation
Aquaculture	Water regulation
Wild foods	Erosion regulation
Timber and other wood fibers	Water purification and waste treatment
Other fibers (e.g., cotton, silk)	Disease regulation
Biomass fuel	Pest regulation
Freshwater	Pollination
Genetic resources	Natural hazard regulation
Biochemicals, natural medicines, and pharmaceuticals	**Cultural Services**
	Recreation and ecotourism
	Ethical values

Managing an ecosystem for SWP has spillovers

- SWP manages the extent and function of an ecosystem
  - Leads to improved ecological condition
  - Yields improved water-related ecosystem services (outputs)
- Attributes may be managed differently depending on land manager objectives
  - Spillovers (externalities) may change
  - SWP will yield changes in other ecosystem services

Some spillovers are valued by environmental markets

Provisioning Services	Regulating Services
Crops	Air quality regulation
Livestock	Global climate regulation
Capture fisheries	Regional/local climate regulation
Aquaculture	Water regulation
Wild	rosion regulation
Timb	/ater purification and waste treatment
Othe	isease regulation
Biom	est regulation
Freshwater	Pollination
Genetic resources	Natural hazard regulation
Biochemicals, natural medicines, and pharmaceuticals	**Cultural Services**
	Recreation and ecotourism
	Ethical values

Carbon markets value *reductions* in CO2 through biological sequestration

Carbon markets are on the rise

- No national cap-and-trade system … yet.
  - Regional systems are blossoming
  - House has passed legislation
- Carbon markets could be big
  - In 2008, $92 billion in allowances traded in Europe
  - Obama Administration estimated $79 billion in auction revenue for 2012

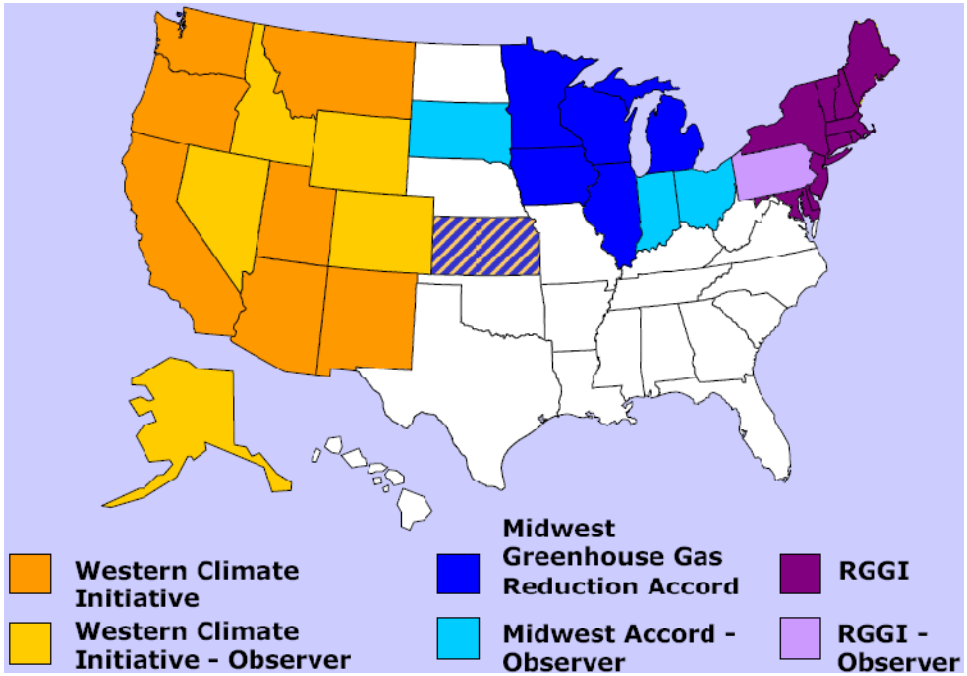
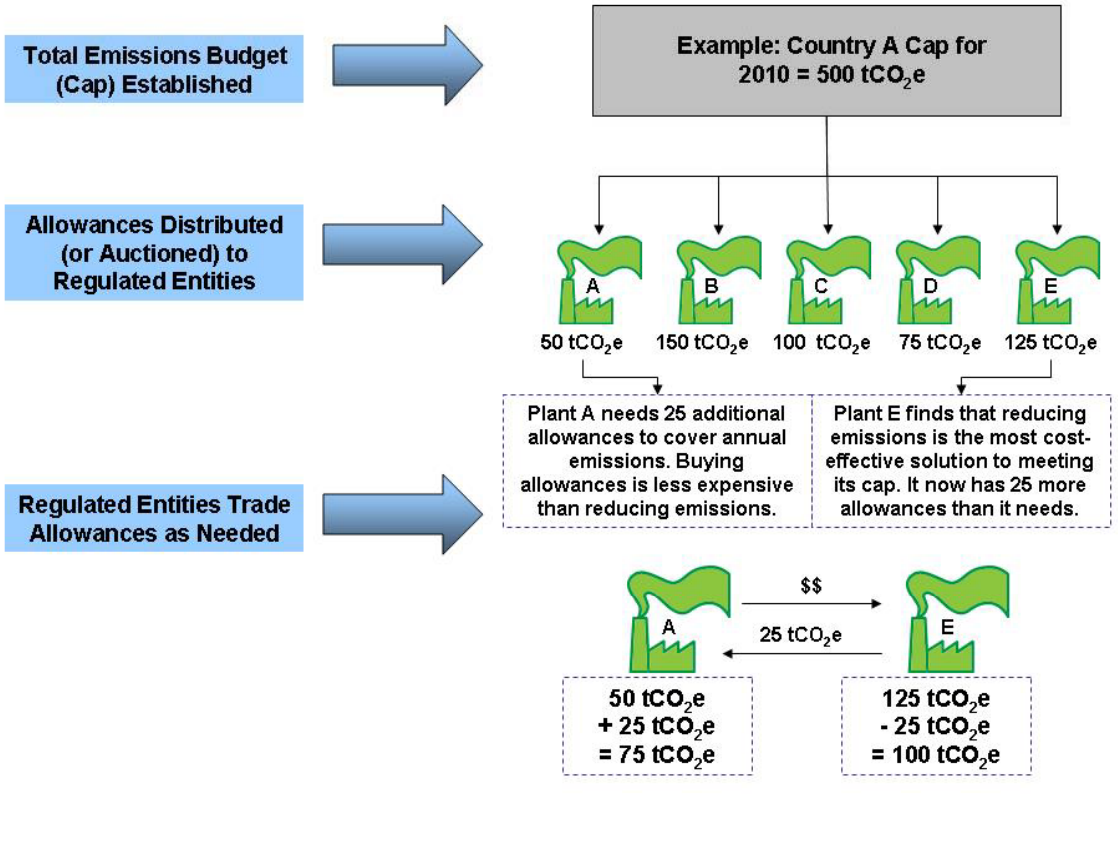


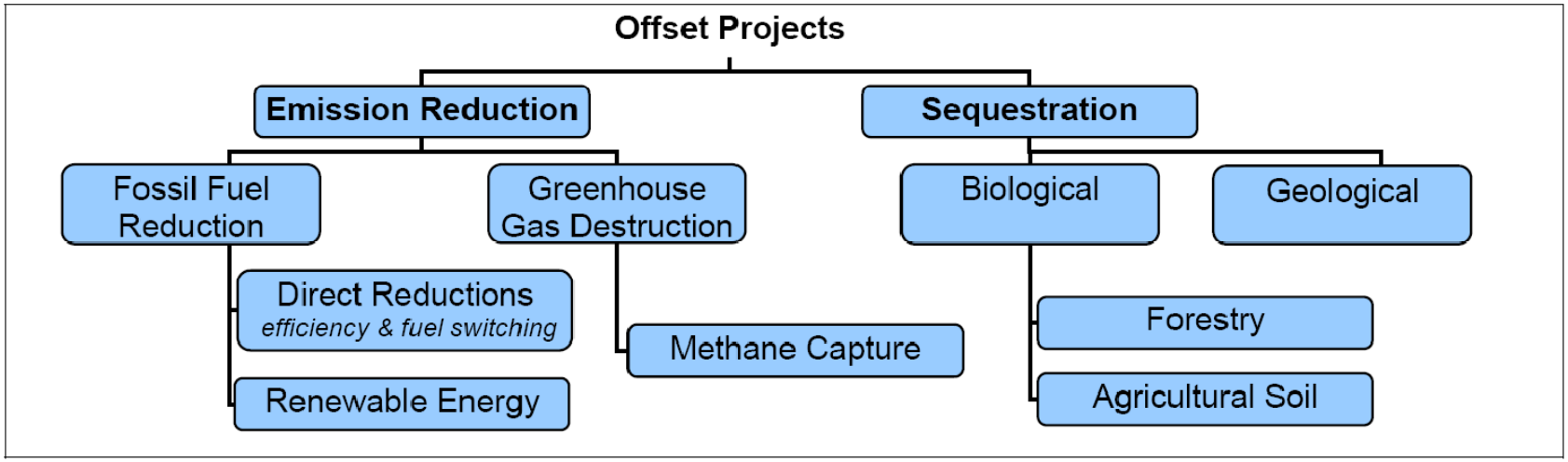
Image Source: Pew Center, 2008

Cap-and-trade carbon market



When there are insufficient credits emitters can achieve compliance by purchasing offset credits

Creating and selling offset credits to reduce costs/generate revenue



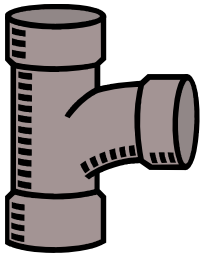
Source: Adapted from USGAO, 2008

Multiple barriers to protection, varied opportunities for PWSs

Invest in SWP

Invest in Treatment Technology

Invest in Distribution Infrastructure



Water Safe to Drink

Not all bio-sequestration is equal

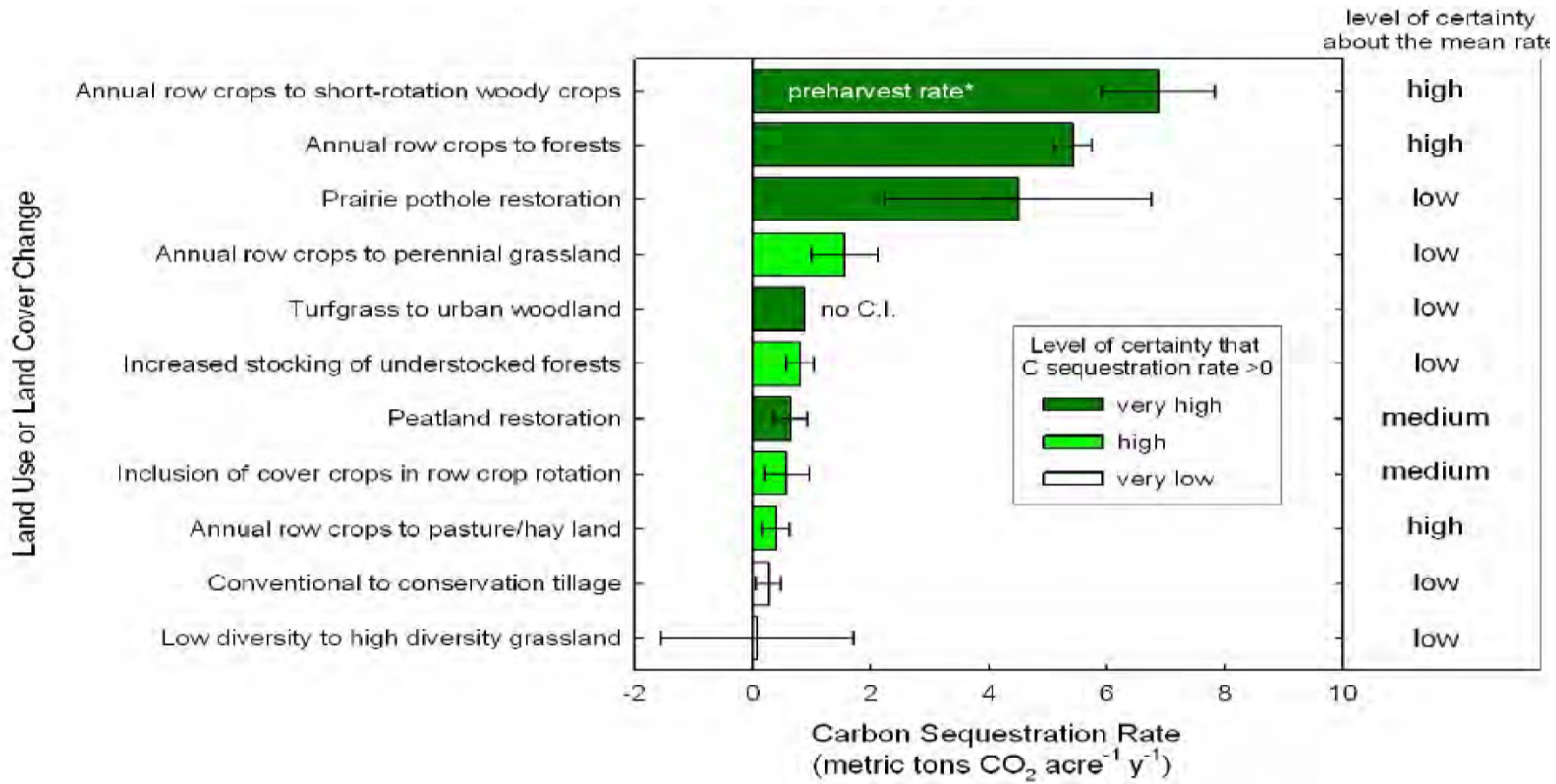


Figure 6.1 from MTCSI, 2008.
Note: Bars show 90% confidence interval.

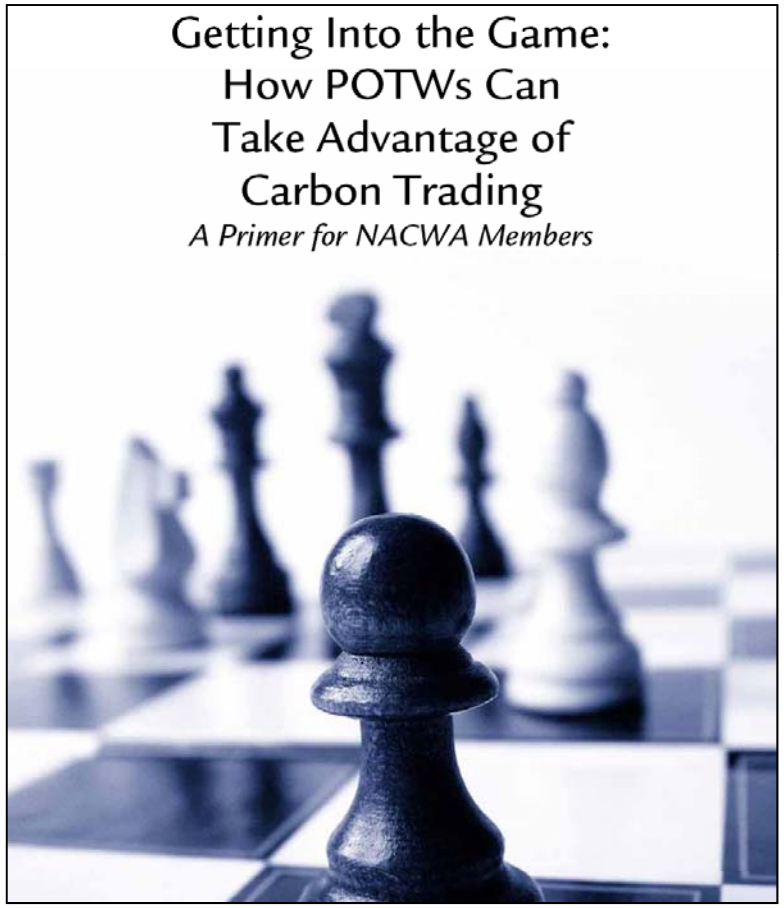
Hypothetical scenario for source water protection

- Traditional source water protection
  - Purchasing 1,500 acres over 10 years (10% increase)
  - Reforesting land.
  - Estimated $7.5 million ($5,000/acre)
  - PROBLEM: Insufficient funds
- By selling carbon offsets, the system could recover up to 53% of project cost
- May have implications on a system's investment strategy

Sequestration Rate	Percent savings off $7.5 M estimated project cost	
	Low Price ($3.00 tCO2e)	High Price ($12.00 tCO2e)
Low	1.3% ($0.1M)	5.3%
Medium	6.7%	26.7%
High	13.3%	53.4% ($4.0M)

There will be many opportunities and many challenges

- Navigating a new market is not easy
- Currently
  - Farmers unions are supporting farmer participation
  - NACWA is providing information to POTWs
- Long-term … ?
  - Waxman-Markey establishes major role for USDA



Conclusions

- Land based SWP is primarily focused on improving the yield of water purification ecosystem services
- Additional investments in SWP may have a positive impact on other ecosystem services valued by markets
- Carbon markets are emerging
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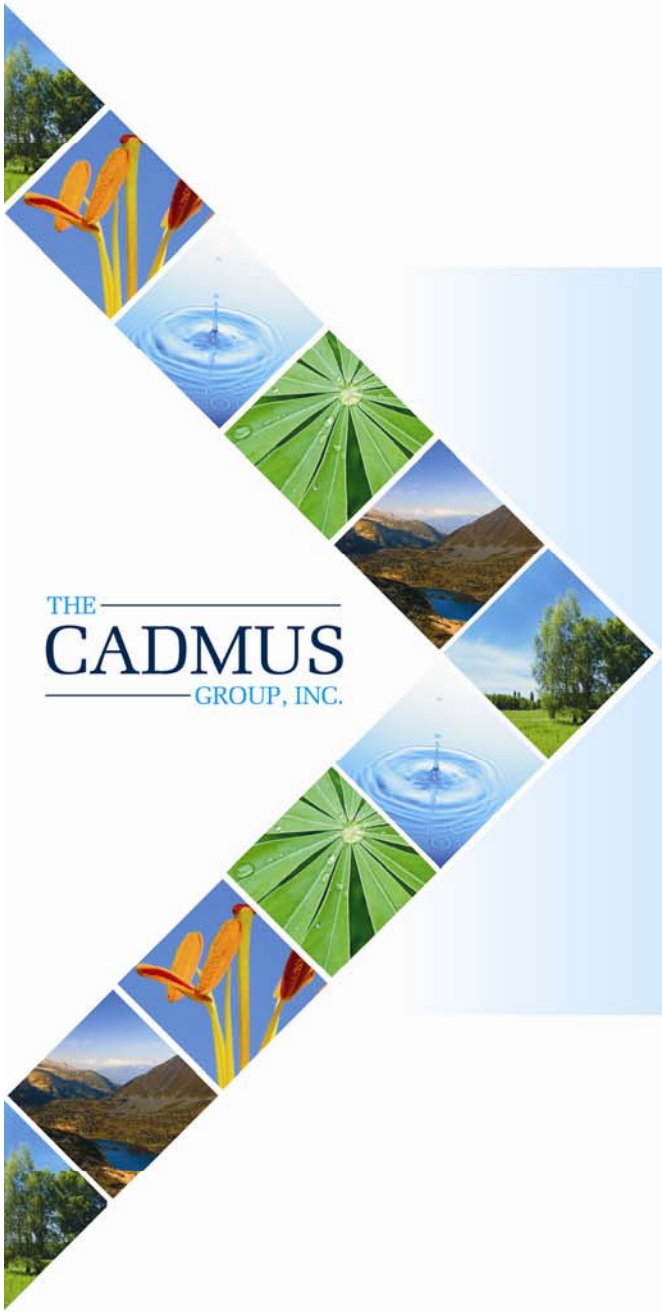
Questions

- What examples help illustrate the water purification and carbon sequestration link?
- Would the surface and ground water benefits gained through engaging in carbon markets be worth the trouble?



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