Stakeholder Views on Monitoring in the Gulf of Mexico Region

Presented by
Katherine Romanak

Collaborators

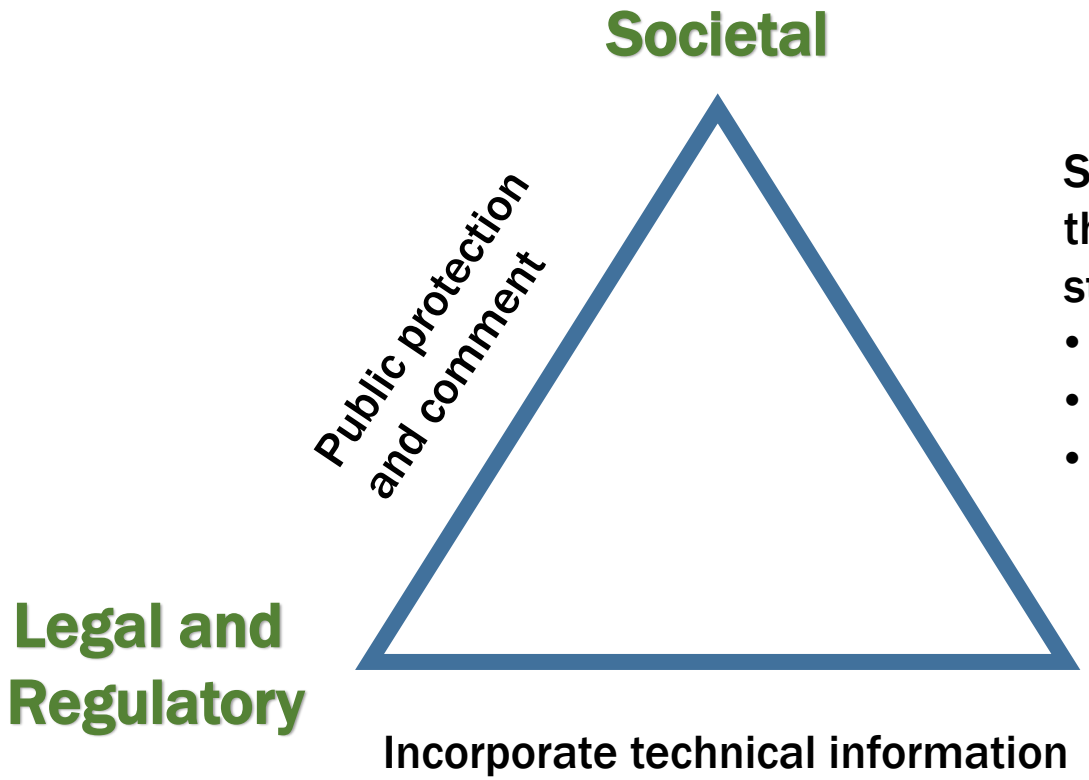
Lucy Atkinson,
Associate Professor,
Stan Richards School of Advertising & Public Relations,
The University of Texas at Austin

Dorothy J. Dankel,
Senior Research scientist,
SINTEF
Ocean & Adjunct Associate Professor,
University of Bergen

Katherine Romanak
Research Scientist
Gulf Coast Carbon Center
Bureau of Economic Geology,
The University of Texas at Austin

GCCC GULF COAST CARBON CENTER
BUREAU OF ECONOMIC GEOLOGY

Interplay Among the Components



Stakeholder interactions with the technical aspects of storage

- Assurance
- Understanding
- Acceptance

Stakeholder Perception Challenges

Technical Issues

- **Putting geologic scales into perspective**
  - **Time**
  - **Mass**
  - **Volume**
- **Understanding geologic mechanisms**
  - **Injection, Trapping Mechanisms**

Socio-emotional issues

- ***"Hollywood" view of risk***
- ***Lack of trust in industry***

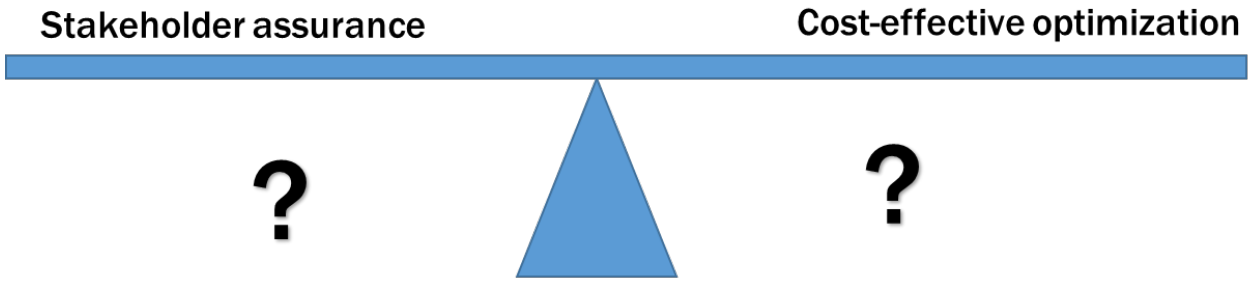
GCCC GULF COAST CARBON CENTER | BUREAU OF ECONOMIC GEOLOGY

Stakeholder Analysis -The Problem

- Stakeholder acceptance is critical for project success
- CCS is growing and more projects are being developed
- More people are dealing with the potential for projects near their homes, especially in the GoM Region
- For many, this is the first they have heard of CCS
- Environmental justice and Responsible Research and Innovation concepts are also gaining traction
- How to shape our outreach in the GoM region so that we learn from important societal conditions (Responsible Research and Innovation).
- greater insight on how to create successful outreach for projects.

Research Questions

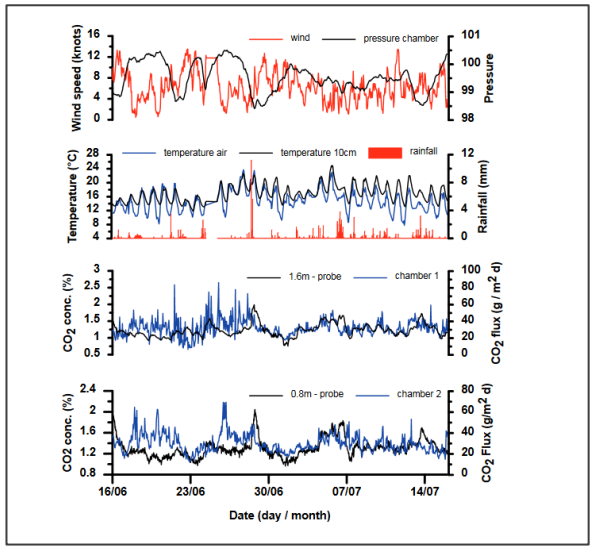
- What are the roles of technology and society in reassuring the public?
  - If environmental monitoring is for assurance, how are complex monitoring approaches viewed by the public compared to simple approaches?
  - Social norms - is the message received more positively when it comes from academia or a community member?
- Which ones are more likely to garner public support for CCS?
- Which ones are more likely to assure the public
- Would stakeholders go as far as participating in monitoring?



GCCC GULF COAST CARBON CENTER
BUREAU OF ECONOMIC GEOLOGY

Baseline vs Stoichiometric Approaches

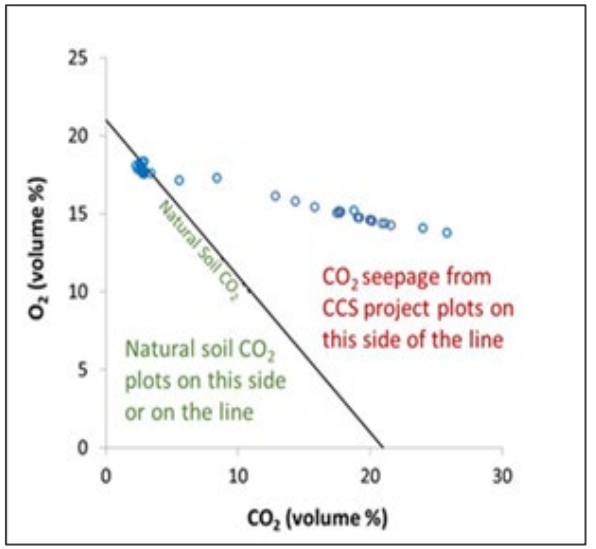
Complex



Jones et al., 2014, Energy Procedia, Volume 63, Pages 4155-4162

- 1-3 years of CO_2 soil gas and weather data
- Complex algorithms to determine thresholds
- Need time to determine leakage
- Methods inaccessible to lay stakeholders

Simple



- One-time characterization of soil gas
- Simple data reduction with clear graphical threshold
- Real time answer
- Methods easily understood by lay stakeholders

Survey Sample

- American adults aged 18 and older
- Data collection by global market research firm YouGov.
- Living in Texas and Louisiana (west GoM, O&G prevalent). Florida (east GoM, O&G not prevalent)
- States were chosen because they are close to existing or proposed CCS facilities- both onshore and offshore.
- An attention check was included to screen out inattentive subjects. Midway through the survey, one question asked them to select “somewhat agree” as their response.
- Only those who responded correctly were included in the final sample of 997 subjects (Texas = 328; Louisiana = 336; Florida = 333).
- Our sample was 44% male and 56% female.
- The average age was 47
- High school graduate (40.3%).
- 56.7% white, 18.6% Black or African American, 20.3% Hispanic, remainder were Asian, Native American or a combination of two or more races.

Novel Segmentation Approach

- We did not approach our public as uniform or singular.
- Used audience segmentation approaches to understand how different audiences process and respond to different messages

T test Variable	Higher Science Orientation n=471 (47.2%)	Lower Science Orientation n=526 (52.8%)
Science Values (1.00)	M = 4.44	M = 3.29
Need for Cognition (0.37)	M = 3.63	M = 2.94
Science Media Consumption (0.81)	M = 3.17	M = 2.03
Climate Change Beliefs (0.46)	M = 4.53	M = 3.24

Note: all $p<0.001$

T-tests and chi-square tests confirmed the experimental groups did not differ according to age, gender, ethnicity, education, income or political ideology.

GCCC GULF COAST CARBON CENTER

BUREAU OF ECONOMIC GEOLOGY

Clustered Variables

- Attitudes toward science.
  - Sample items include “Science and research play an important role in my life”, “In general, I trust science”, and “Science should have no limits to what it is able to investigate.”
- Climate change Beliefs.
  - “Climate change is a serious problem” and “CO_2 that is emitted from power plants and industrial sources has been scientifically linked to climate change”
- Need for cognition.
  - Sample items include “I would prefer complex to simple problems” and “Learning new ways to think doesn’t excite me very much”
- Science media consumption.
  - Frequency with which subjects consumed science-oriented media content (science documentaries, science-themed entertainment shows, or science blogs)

Stakeholder Population Hypothesis

High Science Orientation

- Prefers complex messages and effortful cognition
- Consumes science media

- Trust more rigorous complex approaches?
- Feel safer with complex monitoring because it seems more rigorous?
- Trusts the scientist?
- Self assurance to participate in monitoring?

Low Science Orientation

- Trouble with complex messages
- Little science media consumption

- Prefers simple approaches?
- Feels safer with approaches they can understand?
- Trusts the scientist?
- No self assurance to participate?

GCCC GULF COAST CARBON CENTER

BUREAU OF ECONOMIC GEOLOGY

Preamble CCS Explainer

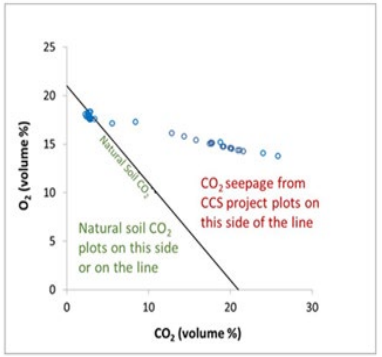
We'd like you to think about carbon dioxide gas (or CO_2). There are many sources for CO_2, but one source is industry such as generating power, making cement, iron and steel.

Capturing and storing the CO_2 has been proposed as one way to reduce the impact on the earth's atmosphere from CO_2 that is emitted from power plants and industrial sources. This technology is called carbon capture and storage. Carbon capture and storage is a process where the carbon dioxide is trapped, transported and injected into rocks miles below the ground surface deep underground. The stored CO_2 is then unable to affect the atmosphere.

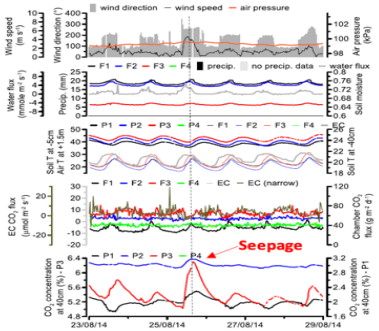
CO_2 occurs naturally in the sediments of the earth. There are several ways to tell the difference between CO_2 that is natural and CO_2 that might seep or release slowly from a CCS project. We want to hear your opinion on these different methods for detecting seepage.

2x2 Experiment

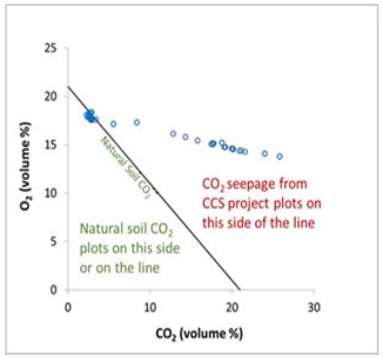
Simple Monitoring Academic Social Norm



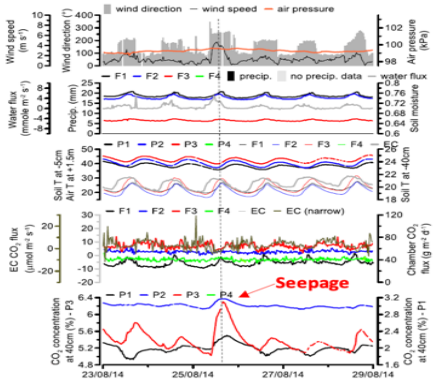
Complex Monitoring Academic Social Norm



Simple Monitoring Community Social Norm



Complex Monitoring Community Social Norm



GCCC GULF COAST CARBON CENTER
BUREAU OF ECONOMIC GEOLOGY

Key Variables

1. ***Message elaboration***. Rates their engagement with the message about the monitoring system
2. ***Attitude toward the monitoring approach*.** "Using this CO_2 monitoring approach would be a fun experience" and "Using this CO_2 monitoring approach is a smart idea"
3. ***Perceived ease of use***. "I think the CO_2 monitoring approach would be easy to use" and "Learning how to use the CO_2 monitoring approach would not be a problem" ($M = 3.16$, $SD = .97$; $\alpha = .88$).
4. ***Perceived usefulness***. "Using the CO_2 monitoring approach would improve my understanding of CCS" and "The CO_2 monitoring approach would make CCS less confusing" ($M = 3.37$, $SD = .98$; $\alpha = .89$)
5. ***Self-efficacy***. "I would be confident about using this CO_2 monitoring approach" and "Using this CO_2 monitoring approach would not challenge me" ($M = 3.21$, $SD = 1.04$; $\alpha = .87$).
6. ***Behavioural control*.** "I have sufficient knowledge to use this CO_2 monitoring approach" and "I am capable of using this CO_2 monitoring approach" ($M = 2.87$, $SD = 1.13$; $\alpha = .90$).
7. ***Intention to use***. "I would like to see the real-time data as it comes in" and "I would be interested in having the CO_2 monitor on my property" ($M = 3.35$, $SD = 1.08$; $\alpha = .82$).
8. ***Support for CCS*.** This was measured with a single item asking subjects how strongly they would support or oppose a carbon capture and storage project being constructed within 15 miles of their home with the CO_2 monitoring approach they read about ($M = 2.76$, $SD = 1.17$).

Results

High Science Orientation

- Social norms had no influence (academic vs community)
- Simple monitoring influenced outcomes positively

Low Science Orientation

- Social norms were the primary influential factor
- Simple monitoring was favoured over complex.

Simple monitoring approaches were preferred in both populations- the ability to understand an approach was favorable over a rigorous complex approach.

GCCC GULF COAST CARBON CENTER

BUREAU OF ECONOMIC GEOLOGY

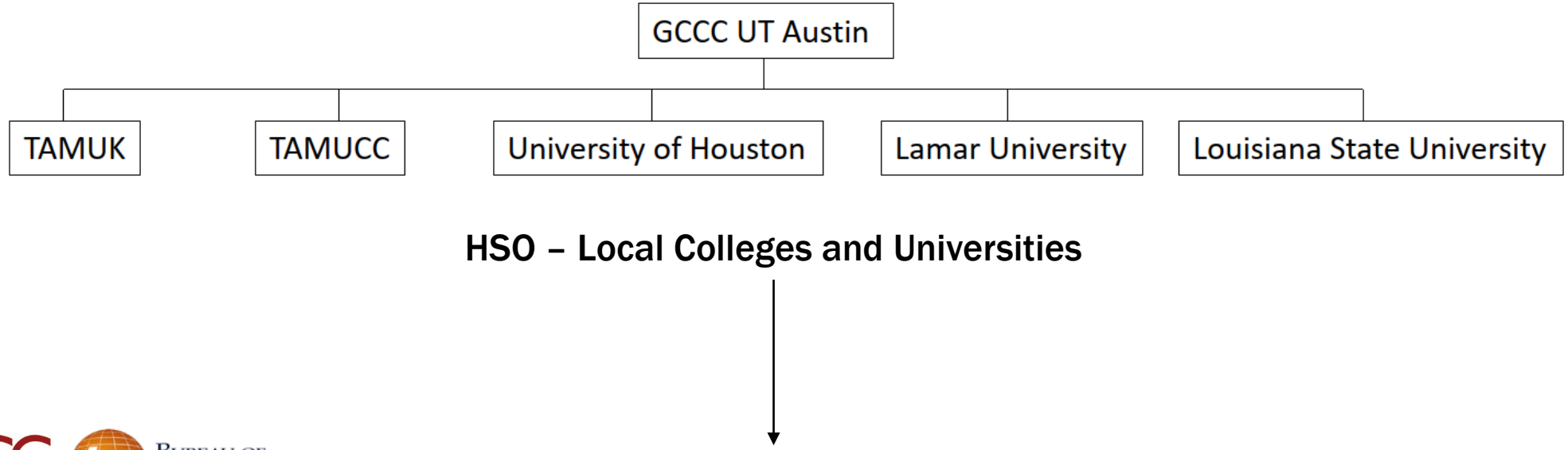
Conclusions and Recommendations

- Beliefs about monitoring and CCS are statistically different among people with high science values and those with low science values within the sample population.
- Focus on simple approaches because it speaks to both groups
- Important to engage community leaders in stakeholder outreach.
- Find a community leader with HSO
- Can place messaging in science media to reach HSO
- The public should not be treated as a single entity, the public is diverse so we must account for this in communication so segmentation is important.
- Society must act and social science collaboration can help! Penetration of technical into political and social sphere.
- Analysis of multiple variables is ongoing
- Sister survey will be given in Norway and results compared

In Response…

TXLA CMC
Texas-Louisiana Carbon Management Community

- Texas Louisiana Carbon Management Community - “TXLA-CMC”
- PI-Susan Hovorka, DOE Funding: $2.5 M



GCCC GULF COAST CARBON CENTER
BUREAU OF ECONOMIC GEOLOGY

Thank You

Katherine Romanak
Gulf Coast Carbon Center
Bureau of Economic Geology
The University of Texas at Austin

katherine.romanak@beg.utexas.edu

http://www.beg.utexas.edu/gccc/

This project, ACTOM, is funded through the ACT programme (Accelerating CCS Technologies, Horizon2020 Project No 294766). Financial contributions made from; The Research Council of Norway, (RCN), Norway, Ministry of Economic Affairs and Climate Policy, the Netherlands, Department for Business, Energy & Industrial Strategy (BEIS) together with extra funding from NERC and EPSRC research councils, United Kingdom, US-Department of Energy (US-DOE), USA. In-kind contributions from the University of Bergen are gratefully acknowledged. Anna Oleynik is funded through the Academia agreement between Equinor and the University of Bergen.