

# **A Polycentric Approach to Climate Change**

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# Must We Wait for Global Solutions?

- Multiple debates about next steps re Kyoto Protocol signed by many except US in 1992
- Many proposals related to:
  - Cap and Trade—reduce overall emissions while letting “the market” work to get the rights to a smaller and smaller quantity of greenhouse gases (GG) to those who have the most demand
  - Tax GG across the board
  - Develop policies that do not “reward” those whose past emissions have “caused” the problem

# Difficult and Important Debates

- Responsible proponents on all sides
- One might have a reasoned foundation for backing one proposal or another—but others also have “reasoned” foundations, and the trade-offs in deciding which policies to adopt at a global level are substantial
- Further, working out the details of any of these broad proposals will be a challenge!

# We Need to Move Ahead!

- Continuing debate may make the problem worse
- Yes, we need global-level actions but there are substantial questions about how to move ahead
- Waiting makes the problems worse
- Not just warming – but also variability, extreme events, oceans rising, loss of coastal zones & Pacific Islands

# Questions

- Is the conventional theory of collective action the best theory for analyzing how to reduce the threats of massive climate change?
- As interpreted by many scholars:
  - Those using fossil fuels cannot reduce their actions without an external government requiring it
  - Accept the theories of Olson and Hardin
  - Global treaties – are thought to be the **ONLY** way!

# More Questions

- Are *only global* benefits generated from local efforts to reduce greenhouse gas emissions, or are potential benefits produced at multiple scales?
- Can actions being taken at less than global scale to reduce greenhouse gas emissions at least offer some levels of adaptation?

# Still More Questions

- Are large-scale governments usually better equipped to cope with collective-action problems that have outcomes that are large scale themselves?
- If multiple governments and other organizations (instead of a unitary authority) work to reduce energy consumption and greenhouse gas emissions, does that only produce leakage, or chaotic systems, and potentially counterproductive processes?

# The Last Question

- How might a polycentric approach be an improvement over relying exclusively on a global approach to cope with global climate issues?

# A Quick Overview of Collective Action Theory

- The actions of many individuals related to using GG emitting energy lead to global externalities
- Reducing use of energy is costly and generates benefits for many
- Some may free-ride on others—gain benefits without paying the costs
- No one wants to be a “sucker” and pay high costs and not get benefits—so resist paying costs
- We *all* may pay even higher costs, however, if emissions are not drastically reduced

# The Conventional View

- It captures the nature of the global externality from community (or larger units) demand for energy
- Illustrates that if no corrective actions are taken, that individuals and officials are led to use too much carbon-emitting energy
- This is what leads to the recommendation of needing global action to impose taxes or cap and trade in order to substantially reduce the amount of energy used

# Empirical Support is Weak

- Empirical support for conventional theory as a “universal” theory is weak
- Many local to regional problems are solved without relying exclusively on external public agencies to impose policies and taxes
- Extensive empirical studies show context makes a difference –
- When users perceive a real stake in the future they are more likely to participate & MONITOR
- We find monitoring is more important than formal ownership

# Need to Change Assumptions

- Re (a) the basic theory and (b) the scale of effects produced by actions taken at less than global levels
- Need to rely on behavioral theory— individuals do not ALWAYS seek short-term benefits for self
  - Building trust that policies makes sense *and* that others are following them is essential to get high levels of cooperation
- Nested externalities

# Behavioral Theory of Human Action

- Extensive research now supports a different theory of human behavior
  - Bounded rational but can learn
  - May learn norms
  - Context affects what norms and rules are used
  - Make it easier for individuals to reduce emissions

# Nested Externalities

- In addition to the externalities generated at a global level, relying on carbon-emitting energy by a family may generate “hidden costs” at a family level (or community level)
- Hidden costs for a family may involve significant health problems due to obesity and higher energy costs than needed if investments made in insulation, solar panels, and other ways of reducing GG emissions at the household (or at a firm level)

# If No Changes are Made

- Household will purchase  $X$  of carbon-emitting gases annually for heating & transport
- If an appropriate incentive  $Y$ , they would purchase less  $(X - Y)$ , which does reduce emissions
- If they accept responsibility for eliminating hidden costs to the family, they reduce carbon-even more  $Y+$
- How might this be done?

# Heating of Buildings

- Building use 40% of the primary energy supplied in the US
- More than 70% of all generated electricity is primarily for heating, cooling & lighting
- About 20% of all energy used by buildings can potentially be saved by correcting faults (malfunctions and unnecessary operations)
- Gershensfeld in *Science* 2009

# ***PNAS* (2009) by Dietz et al**

- Households could reduce GG Emissions by 20% within 10 years if adopt many household efforts
  - Weatherization
  - Low flow showerheads
  - Efficient water heaters -- & reduce hot water temperatures for shower & wash
  - Improved appliances
  - Fuel efficient vehicles
  - Thermostat setbacks when not occupied, etc.
- Dietz et al., *PNAS* **106**, 18452–18456 (2009)

# Community Efforts

- One strategy is various types of community campaigns like the Sacramento Municipal Utility District or the Berkeley FIRST

# Sacramento Municipal Utility District

- Non-profit utility prepared its own plan to reduce energy use to save money and GG
- Started to take random samples of customers and rate them on their energy use compared with that of neighbors
- Bill compared household use with a random sample of others and a sample of most efficient neighbors



A desire to keep up with neighbors is spurring conservation.

**Source: Utilities Turn Their Customers Green, with Envy**

by Leslie Kaufman, *New York Times*, January 30, 2009

[http://www.nytimes.com/2009/01/31/science/earth/31compete.htm?\\_r=2](http://www.nytimes.com/2009/01/31/science/earth/31compete.htm?_r=2)

# Changed Behavior

- More than earlier efforts that used financial rebates for buying energy-saving appliances
- Tried “smiles” and “frowns” but made some homeowners who got “frowns” and had large families particularly mad—so stopped that refinement
- Those who do well—sometimes also promise to do even better

# Berkeley FIRST

- Financing Initiative for Renewable and Solar Technology
- Trying to overcome the hurdle of making somewhat large investments to retrofit existing buildings
- Citizen gets estimate from contractor
- City examines this and, if approved, gives citizen a 20-year loan to pay up front
- Loan is paid over via property tax bill every year
- New program—first chunk of funds already taken but planning substantial increase in funding

# Another Important Question

- Will large-scale governmental policies always correct externalities well?
- The answer is ambiguous
- Sometimes—yes—Montreal Protocol—but many factors in favor of that working
- Other times—no—Examples abound re EU fishery policies in Baltic
- Canadian Dept of Fisheries—ignored fishers warnings re cod—and fishery collapsed

# Potential Problems with Multiple Actors

- Leakage between locations
  - Project shifted from location X to location Y due to climate project in X. No reduction in emissions
  - Indigenous farmers may be forced to leave some areas as a result of REDD policies—but emissions may not go down and costs could go up substantially
- Market leakage—Price + due to reduced supply—leads to increased production of timber—counterproductive

# Other Problems

- Inconsistent policies—potentially costs over one international efforts
- Inadequate certification—increased need for ecological certification and findings that some consultants are very poorly trained
- Free riding
- Many problems do exist

# Lessons

- (1) Complexity of causes of climate change;
- (2) Challenge of acquiring knowledge about causes and effects in a world that is changing rapidly;
- (3) Wide diversity of policies can lead to reduced emissions but might also enable opportunistic efforts to obtain a flow of funds by appearing to reduce emissions while not having a real impact, or worse, effectively increasing rather than decreasing emissions; and
- (4) that all policies adopted at any scale can generate errors, but without trial and error, learning cannot occur.

# A Polycentric Approach

- History of concept of polycentricity related to large-scale metropolitan areas
- Scholars did theoretical analyses that they thought showed this to be chaotic and more costly than consolidated metropolitan areas
- V. Ostrom, Tiebout, and Warren (*APSR*, 1961) raised theoretical questions that it was important to look at polycentric SYSTEMS rather than assuming multiple units were chaotic

# Extensive Empirical Studies

- Urban policing—including 80 metropolitan areas study found:
  - Small agencies much better able to deal with immediate response services requiring local knowledge as well as more general knowledge
  - Polycentric metropolitan areas with large-scale crime lab, training, and jails combined with smaller-scale direct service producers most effective

# Improved Forest Conditions

- Our large collaborative network – IFRI – now has centers in Bolivia, Colombia, Guatemala, India, Kenya, Mexico, Nepal, Tanzania, Thailand, Uganda & US
- Based on intensive studies of forest conditions, governance arrangements, and socio-economic conditions – over time
- Improving forest conditions is one of the strategies that is important for global climate change

# Broad Formal Status of Forest

- Is not associated with improved conditions
- Some government forests are improving while others are degraded
- Same with private & community
- Multiple IFRI studies consistently find that when the users of a forest do have some rights to forest products (an interest in the future), more likelihood of their monitoring
- User monitoring is consistently found to increase forest regeneration rates

# Instead of ONE Global Remedy

- Need to apply polycentric theory to develop:
  - Complex, multi-level political-economic-social systems to cope with
  - Complex, multi-level ecological systems
- Current research on ecosystem services is getting technologically more sophisticated, but local knowledge and local commitment are also important components of effective policies

# Locals Must Be Involved

- Policies made at International & National level do require local and regional actions AND enforcement
- THUS, must be polycentric!!
- So, let's not wait just for a global solution!

**QUESTIONS?**