The Efficient Adaptation and Institutions

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Policy Questions

- What is efficient adaptation?
- What should be done?
- Who should do the adaptations?
- When should they occur?
- Where should they be done?
- What are the institutional barriers to efficient adaptation?

What is efficient adaptation?

- Change in behavior in response to climate change that makes society better off.
- Examples: avoid running in hot weather, buy air conditioning, change crops, adjust water management, control disease causing pests

Objective of Adaptation

- Long term: maximize net benefits (benefits minus costs) as local climate changes
- Short term: maximize net benefits given current climate
- The purpose of adaptation is not to eliminate residual damages (climate-proof the economy) at any cost- this could easily make matters worse not better

Where Should Adaptation be Done?

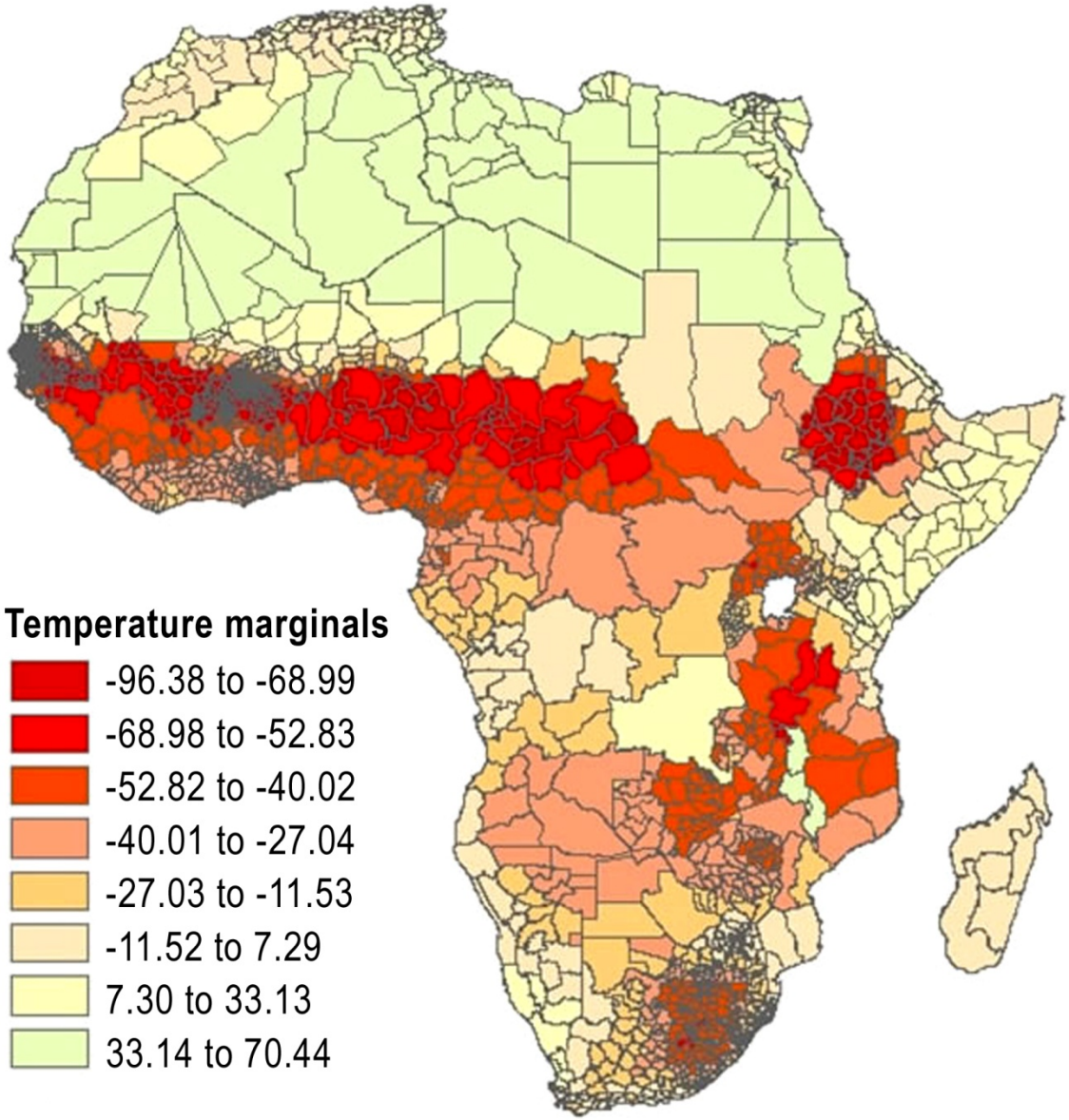
- Everywhere, but priority to places where climate change is having largest impact (low latitudes)- more people- more sensitive-lowest income
- Not necessarily places with largest climate change (north pole)
- Climate change includes shifts in mean temperature and precipitation but also shifts in variance and extreme events

What sectors are at risk?

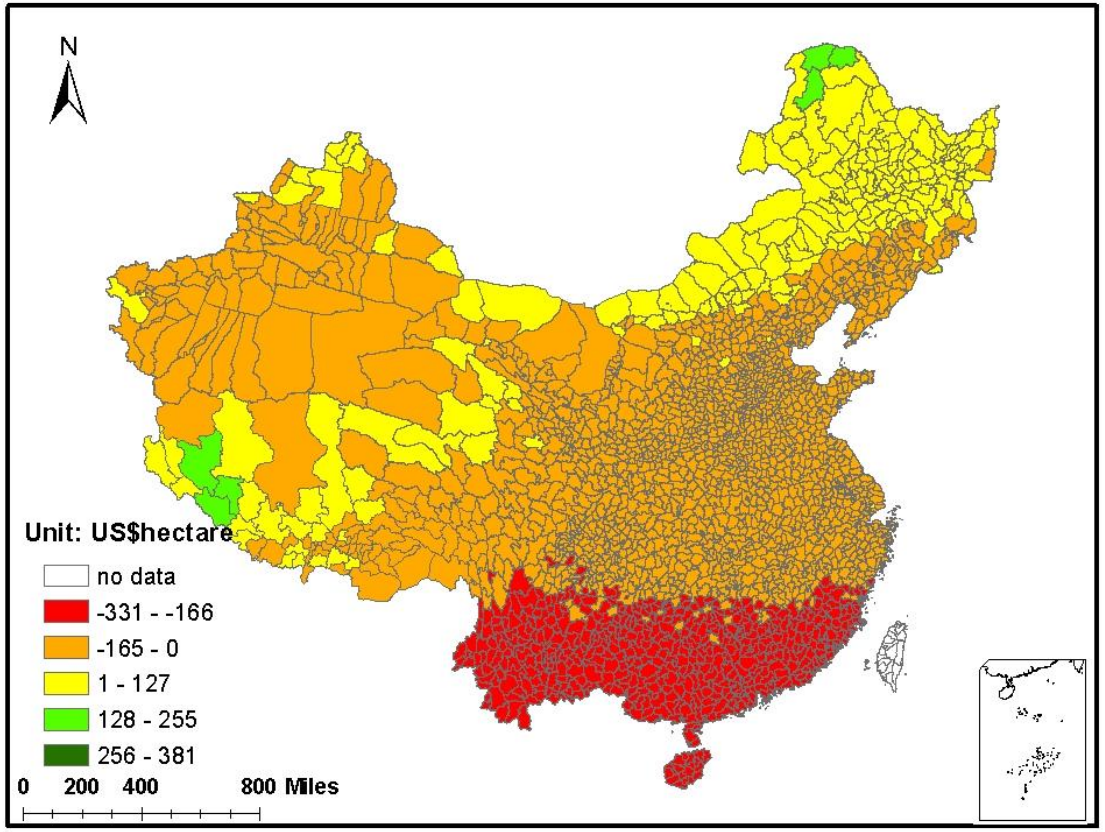
- Market: agriculture by far the largest, energy, water, coastal, and forestry
- Nonmarket: ecosystem change (species loss, shifting systems), disease, heat stress, cold stress, recreation

Adaptation is Local

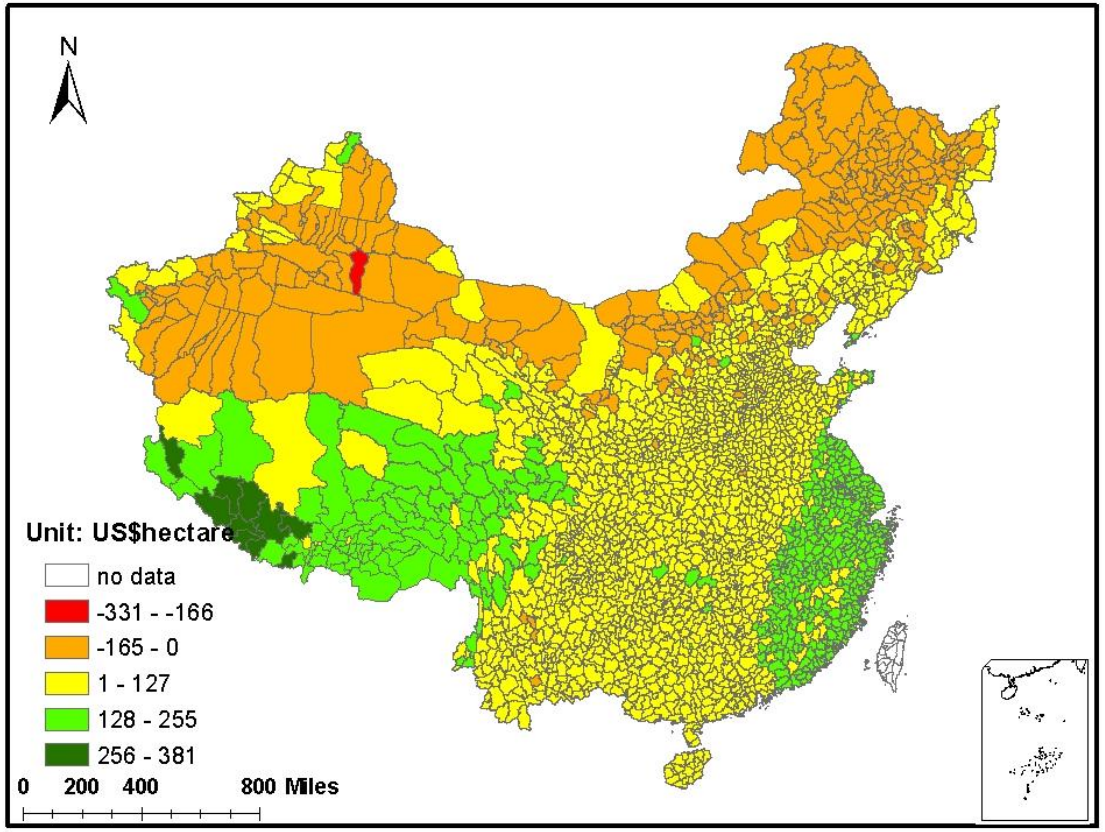
- Adaptation must adapt to local conditions.
- Adaptations will not be the same within continents and often even within countries
- Because local climates are not the same, climate will not change uniformly across the planet, and other conditions are not the same from place to place


Temperature marginals
-96.38 to -68.99
-68.98 to -52.83
-52.82 to -40.02
-40.01 to -27.04
-27.03 to -11.53
-11.52 to 7.29
7.30 to 33.13
33.14 to 70.44

Marginal temperature effect on rainfed farms in China



Marginal temperature effect on irrigated farms in China



Timing

- Done too soon, raises cost and can be ineffective (protective wall long before it is needed is more expensive, new crop for 2100 climate may not grow well today)
- Done too late, damages can be large (as if there is no adaptation)
- Because adaptation actions must wait for potential damages, the bulk of adaptation actions need to be done in the second half of this century

Private Adaptation

- Autonomous
  - private benefit for actor
  - self interest to perform
  - will be done without help
- Examples:
  - Shifting from crops to animals
  - Switching crop and animal species
  - Changing timber species

Does private adaptation require new institutions?

- Private adaptation will occur wherever free markets exist
- Private adaptation will be flawed in imperfect markets
  - Common property
  - Externalities
  - Monopolies

Common Property

- Requires collective action to protect as individual users will not efficiently adapt
- Overharvest common forests or fisheries, overgraze grasslands, overutilize water resources
- Climate change will make these current problems worse by making these resources more scarce
- Need more private rights to these natural resources

Externalities

- Secondary ozone pollution formation will require tighter regulations on emissions
- Flooding will require land use regulations and flood control
- Government institutions in charge of these issues need more economic input in decision making

Public Adaptations

- Benefit many (jointly consumed)
- Require coordination (government)
- Examples
  - Conservation
  - Coastal planning
  - Technical change

Does public adaptation require new institutions?

- Public adaptation will occur wherever governments are efficient
- Some may argue this might require a complete revision of all public institutions
- Particularly grievous when governments have failed or in civil war
- Least developed nations are especially likely to need help engaging in efficient public adaptation

Examples of public adaptations

- Public health responses to potential illnesses and heat stress
- Retreat options for marshes and mangroves against sea level rise
- Flexible conservation zones for species migration to new habitat

Severe Weather Events

- Can adapt now to hurricanes, droughts, floods because current problem
- Severe events likely to cause more damage in the future as economy grows

Eliminate additionality

- Although unfair to expect climate change funds to pay for development
- Focus on additionality hampers efforts to adapt- Most adaptation projects also involve development
- Recommend new focus on integrating adaptation and development

Mitigation and adaptation projects

- Do not confuse adaptation and mitigation
- Providing assistance for mitigation does not help a poor country cope with climate change

What adaptation can be done now?

- Fund climate-related projects that have good benefit cost ratios given current climate
- As climate changes, identify new projects suited for the climate at that moment
- Fund planning and research to anticipate future projects
- Improve public management and markets for natural resources (land, water, fisheries)
- Help least developed countries develop and become less dependent on climate sensitive economic sectors- namely agriculture