

Section MA: Mitigation and Adaptation

Readings: Parts of Chapter 17, 18, 20

Learning outcomes

- know the definitions of mitigation and adaptation
- understand how ecosystems participate in mitigation, especially in agriculture and forestry
- describe ways humans can facilitate adaptation of plants/animals/ecosystems to future climate change

Mitigation options in agriculture



Figure B.3: Total technical mitigation potential (TTP) in Mt CO₂-eq/yr for each region by 2050 (using mean estimates). Note: based on the RCP scenarios though the pattern is similar for all SRES scenarios. Source: Green House Gas Institute et al., 2009.

(Current fossil fuel+cement emissions = 30,000 Mt CO₂/yr)

Mitigation options in agriculture

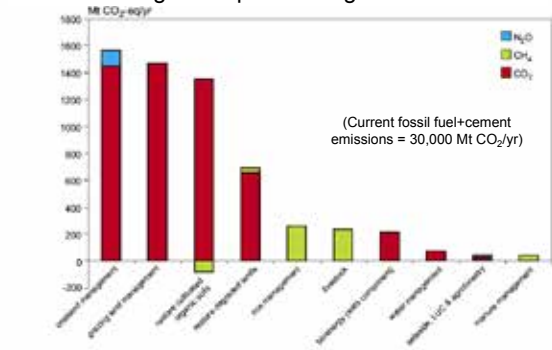
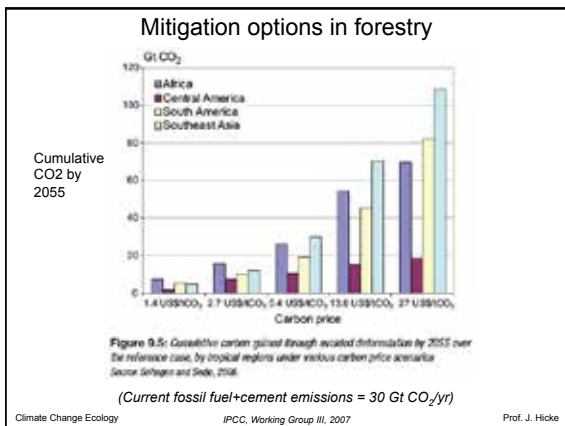
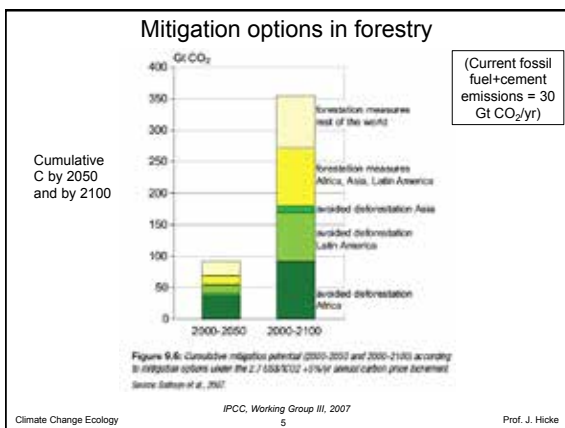


Figure B.4: Global technical mitigation potential by 2050 of each agricultural management practice showing the impacts of each practice on each GHG. Note: based on the RCP scenarios though the pattern is similar for all SRES scenarios. Source: Green House Gas Institute et al., 2009.

(Current fossil fuel+cement emissions = 30,000 Mt CO₂/yr)



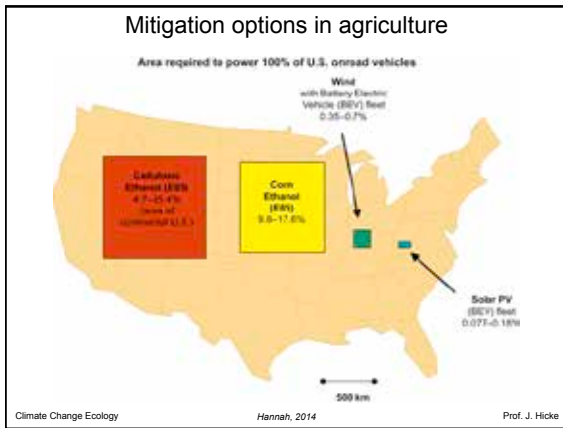


Mitigation potential of US forests

Item	Estimate (Tg C/yr)
Reference/context	
Forest growth	349
Forest sector C storage (includes harvested wood storage)	313
US CO2 emissions	1615
Fire emissions	67
Mitigation potential	
afforestation (1 Tg C/yr requires 262,000–1,133,000* ha of crop or pastureland suitable for tree growth)	1-225**
forest management (activities include longer harvest interval, increasing growth, establishing preserves)	29-105*
biomass energy	130-190

**size of 0.5xRhode Island-2xDelaware per 1 Tg C/yr
*depends on carbon price (\$18-183 per Mg C)

Climate Change Ecology McKinley et al., Ecological Applications, 2011 Prof. J. Hicke



Adaptation in wilderness areas

Climate change: Wilderness's greatest challenge

By Nathan L. Stephenson and Constance L. Miller

1. restraint (do nothing)
2. resilience (buy time)
 - facilitate an ecosystem's or organism's ability to rebound/recovery from a disturbance
 - remove other stressors (invasive species, human pressure)
 - thin forests to decrease drought vulnerability
3. resistance (buy time)
 - fuel breaks to stop wildfires
 - controlling insect outbreaks
 - drip irrigation
4. realignment (long-term change)
 - assisted migration
 - plant with species better adapted to new/future climate following severe disturbance
 - mixing genotypes from other regions (that may be more resilient/resistant)

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2009 CALIFORNIA CLIMATE ADAPTATION STRATEGY

California Climate Adaptation Strategy, 2009

www.climatechange.ca.gov/adaptation/strategy/index.html

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References

Climate Change Ecology

Climate Change Adaptation Strategies to Conserve California's Biodiversity

- Create a large scale well connected, sustainable system of protected areas across the State.
- Manage for restoring and enhancing ecosystem function to conserve both species and habitats in a changing climate.
- Adjust management actions as appropriate for threatened and endangered species.
- Prioritize research needs and pursue collaborative partnerships with the research community to ensure that the best available science is informing management actions.
- Re-evaluate existing policies and programs to incorporate climate change and seek regulatory changes as appropriate.
- Pursue endeavors that will support implementation of the strategies including funding, capacity building, collaborative partnerships, and education and outreach.
