Soil Carbon Sequestration:

The Role of Agriculture in Climate Change Legislation And Policy

3 Issues to be Covered:

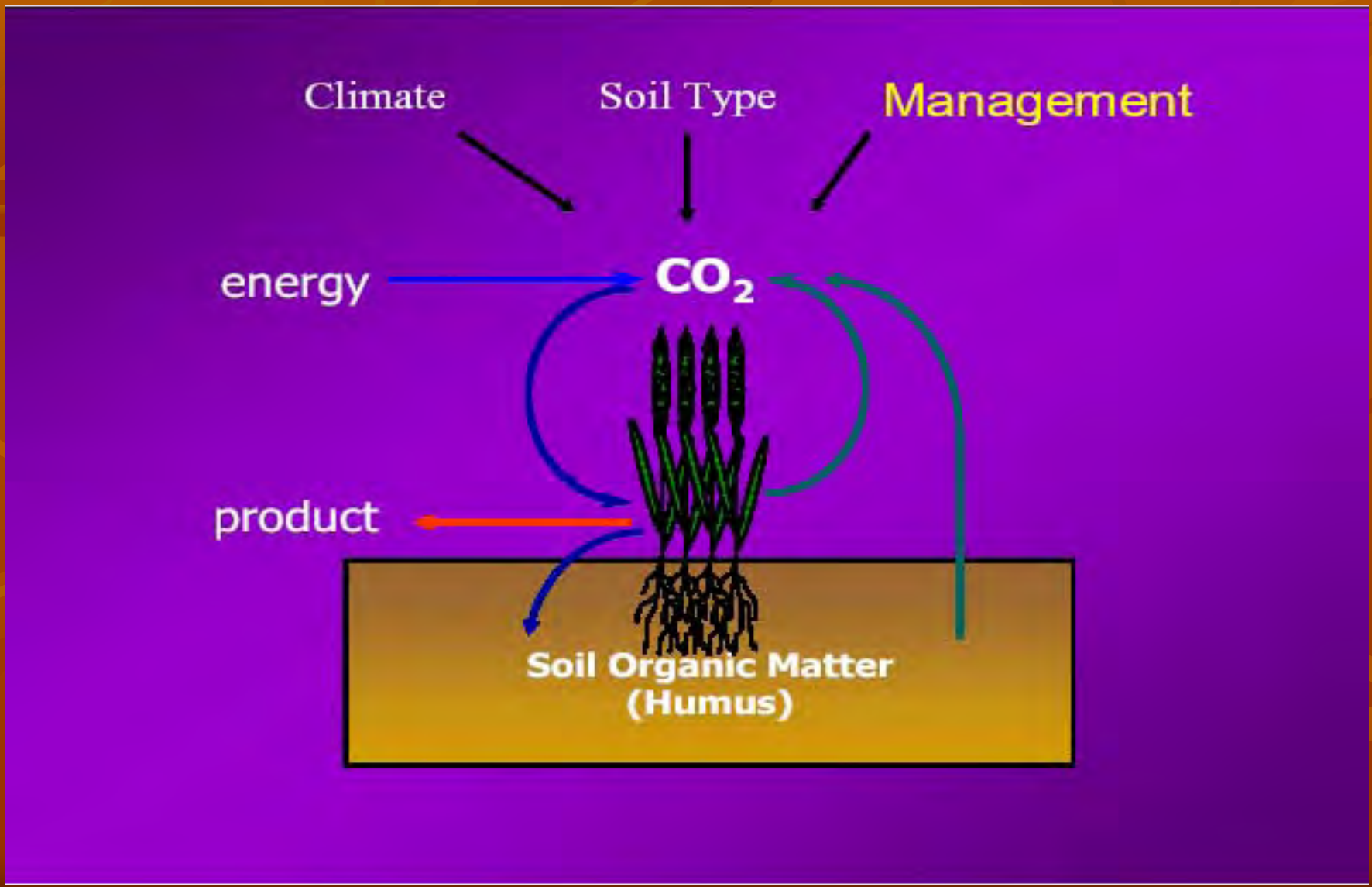
- Carbon Sequestration: The Basics
- Carbon Sequestration: The Politics
- Carbon Sequestration: Policy Options

C-Sequestration: The Basics

Q: What is soil carbon sequestration?

A: It is the process of plants removing carbon from the atmosphere, via photosynthesis, converting it to organic carbon in stems, leaves, and roots, and storing that carbon in the soils as decomposed organic matter.

C-Sequestration: The Basics



C-Sequestration: The Basics

Q: Is carbon sequestration real?

A: Yes, it is real!

Soil scientists have tested agricultural soils for organic matter – and thus, carbon content – for decades in this country….not because of global warming, but because soil carbon/soil organic matter is a measure of soil "health."

C-Sequestration: The Basics

- Soil conservation policy in U.S. stems from devastating erosion of the 1920's & 1930's
- Several actions in 1920's increased MW state vulnerability to drought, incl. disc plowing, reduced soil conservation measures, & farming on depleted lands and soils

C-Sequestration: The Basics

Lessons learned from the 1930's drought:

- USDA Soil Conservation Service (now NRCS) began to stress soil conservation measures, created soil conservation districts, removed sensitive lands from production
- These proactive measures greatly reduced the vulnerability of the MW to the 1950's drought, even though a larger area was affected

C-Sequestration: The Basics

1945: Soil and Water Conservation Needs Inventory (CNI)

1977: National Resources Inventory (NRI)

- survey of “natural resource conditions and trends”
- 800,000 sample sites
- Assesses conservation program benefits, soil quality
- Sample sites in all counties and parishes of 50 states, and in Puerto Rico, Virgin Islands, DC
- now transitioning to an annual survey

C-Sequestration: The Basics

"The most practical way to enhance soil quality today is to promote better management of soil organic matter or carbon. In short, we need to go beyond managing for "tolerable soil loss" and manage for C (carbon)."

--USDA, Natural Resources Conservation Service (NRCS)

C-Sequestration: the Basics

Q: Is carbon sequestration beneficial?

A: Yes, it is beneficial --- but not only for agriculture: for the environment, for farmers, and for society.

C-Sequestration: The Basics

Soil carbon/organic matter improves soil:

- Tilth (structure)
- fertility & productivity
- water & nutrient holding capacity

Soil carbon/organic matter reduces soil:

- Erosion
- Nutrient run-off
- Minimizes effects of floods and droughts

Soil-C Sequestration

Q: Is soil carbon/organic matter beneficial?

A: Air & water quality and agricultural productivity improve.

- Dust, allergens, pathogens in air decline
- Sediment and nutrient loads in surface water decline as runoff decreases
- Ground and surface water quality improve because better structure, infiltration, and soil biology make for a better filter

C-Sequestration: The Basics

Increased soil carbon/organic matter content improves air and water quality by reducing erosion and run-off of nutrients.

HOWEVER: 1.8 billion tons of soil are still lost from U.S. croplands annually. If all cropland were managed for carbon, soil loss would decline by 1.29 billion tons – a savings of $8.2 billion annually.

3 Issues to be Covered:

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C-Sequestration: The Politics

1997 – S. Res. 98 – "Byrd-Hagel" Resolution

1998-99 – Senators Kerrey, Lugar, Harkin, Baucus, Roberts, Wyden hold 3 "sinks" events of significance:

- Senate Sinks Briefing – staff, administration
- Members meeting with senior administration officials (White House, USDA, State)
- Members meeting with administration, ag commodity groups

C Sequestration: The Politics

- 1999-2000 – USDA/Farm Bureau hosts a series of meetings on climate change and agriculture

- 2000 – Ag groups release letter to USDA Secretary Glickman at The Hague COP-6 negotiations:

  "…it is important that the current negotiations provide the greatest possible flexibility for the U.S. to fully and immediately account for carbon sequestered through agricultural activities."

C-Sequestration: The Politics

2000 – Senator Lugar states at a joint hearing of the Senate Foreign Relations Committee and the Agriculture Committee that "I would vote for the Kyoto Protocol if farmers would get paid for carbon."

2001 – President Bush withdraws from the Kyoto Protocol.

C-Sequestration: The Politics

2001-2002 – Multiple bills on sequestration, including stand-alones, farm bill, energy bill

2003 – S.139 – McCain/Lieberman Climate Stewardship Act

- Ag carve-out
- Ag provisions a factor for ag-state members

C-Sequestration: The Politics

2004 and beyond: Political considerations

- International picture: Kyoto, no Kyoto?

- AFBF – economics, fuel prices
- Coops – economics, coal
- Commodity groups

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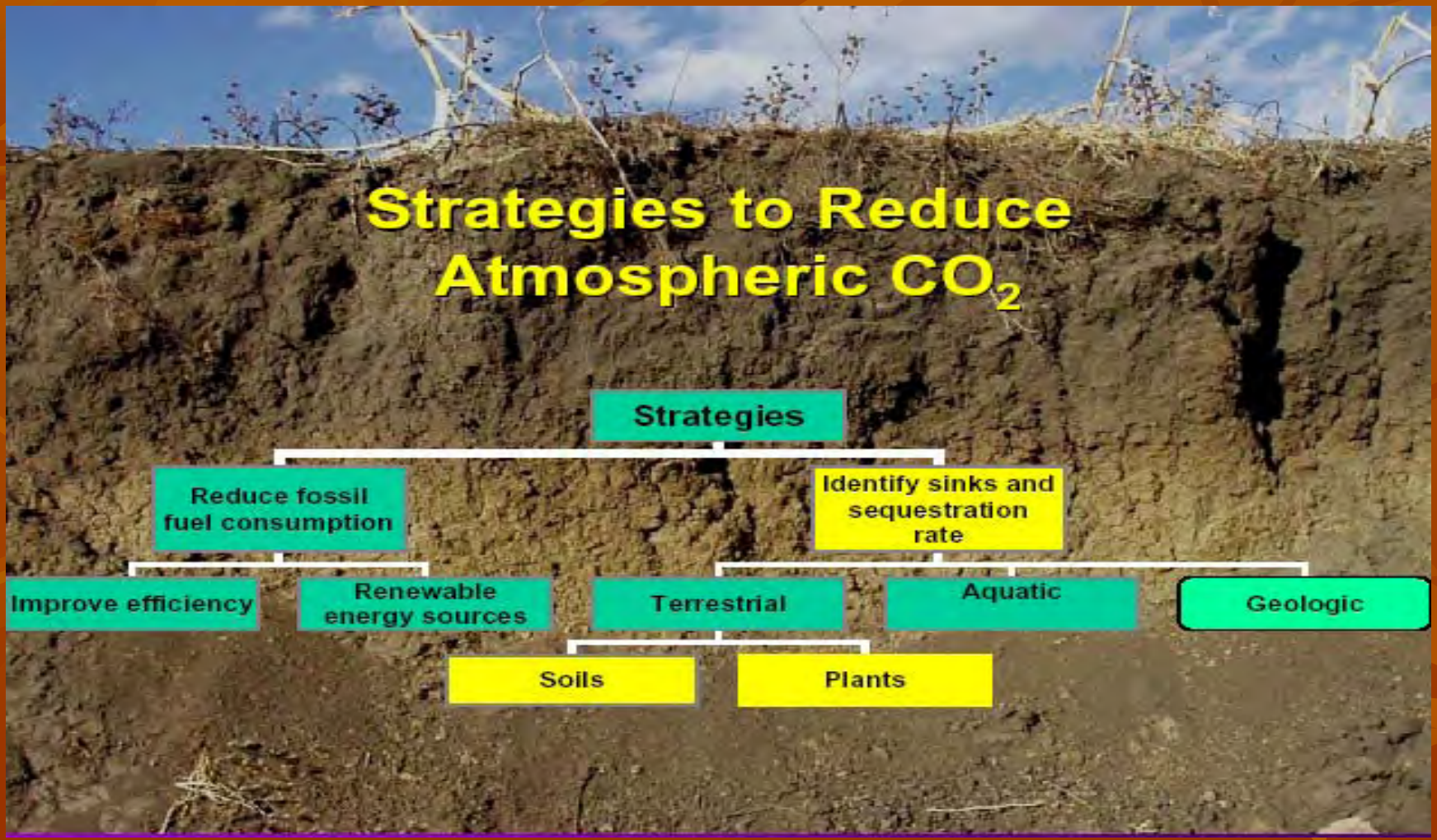
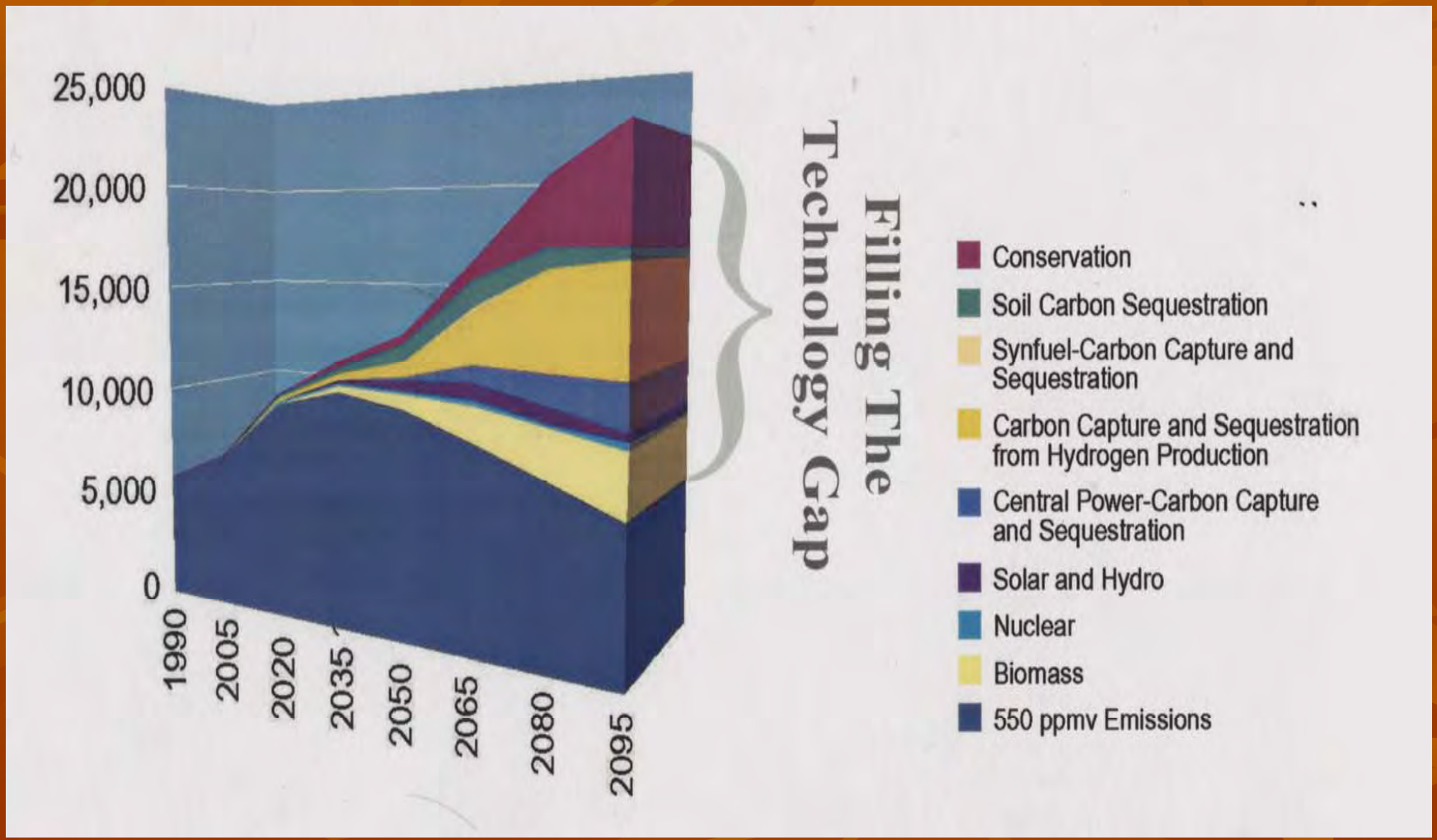
C-Sequestration: Policy Options



C-Sequestration: Policy Options



C-Sequestration: Policy Options

- Agricultural soils represent one of the best sinks for c storage in the global carbon cycle (soils = 2nd largest sink)

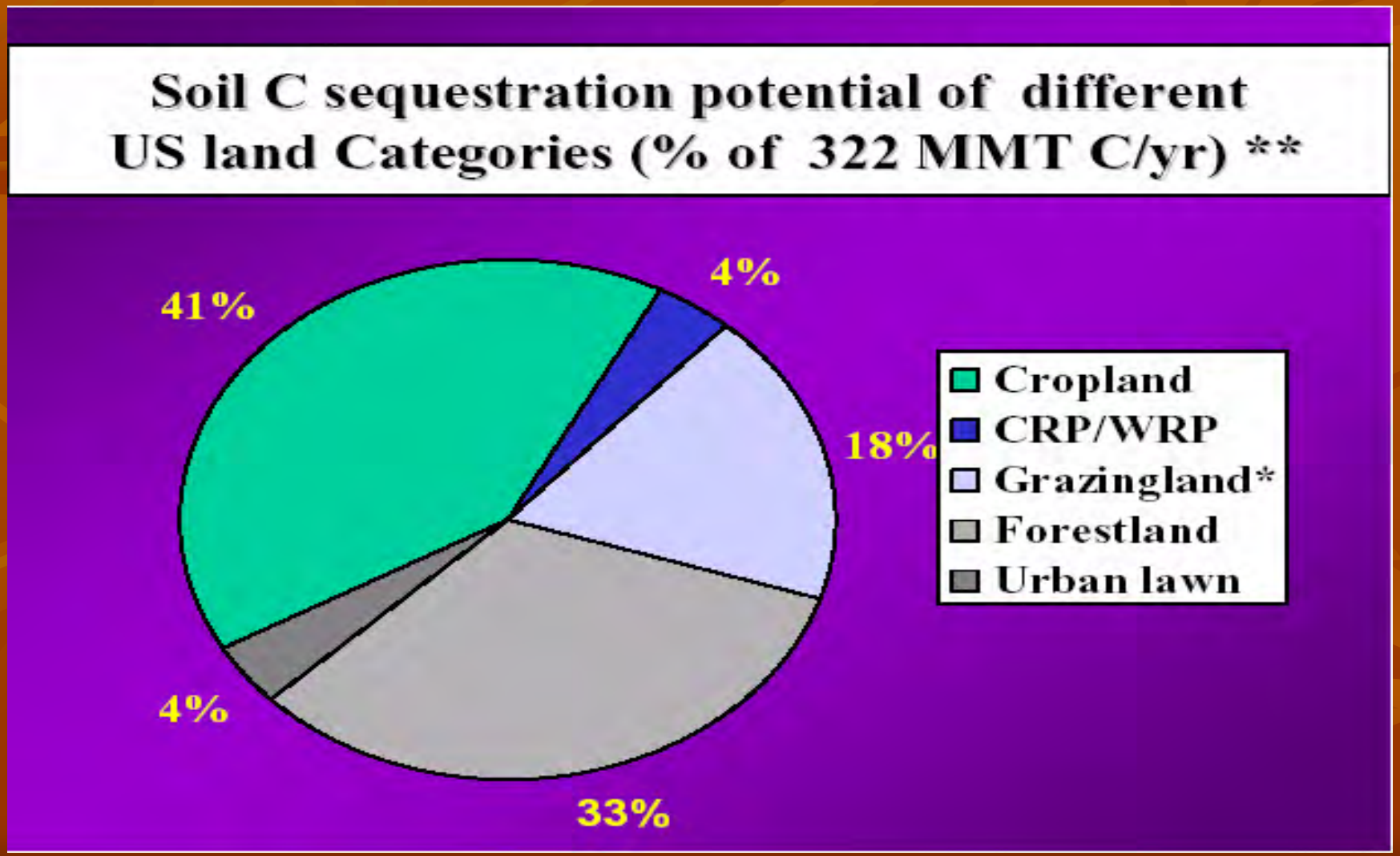
U.S. GHG inventory: Agriculture and forestry are a "net sink" equivalent to about 15% of total U.S. gross emissions.

C-Sequestration: Policy Options

Of this “net sink” (15% of U.S. gross ghg emissions), forests account for 91% of total sequestration, and ag soils account for 8% of total sequestration.

In soils, the sink effect is due to improved management practices on cropland and grazing land, especially conservation tillage, and CRP.

C-Sequestration: Policy Options



C-Sequestration: Policy Options

Practices that increase soil C sequestration on croplands:

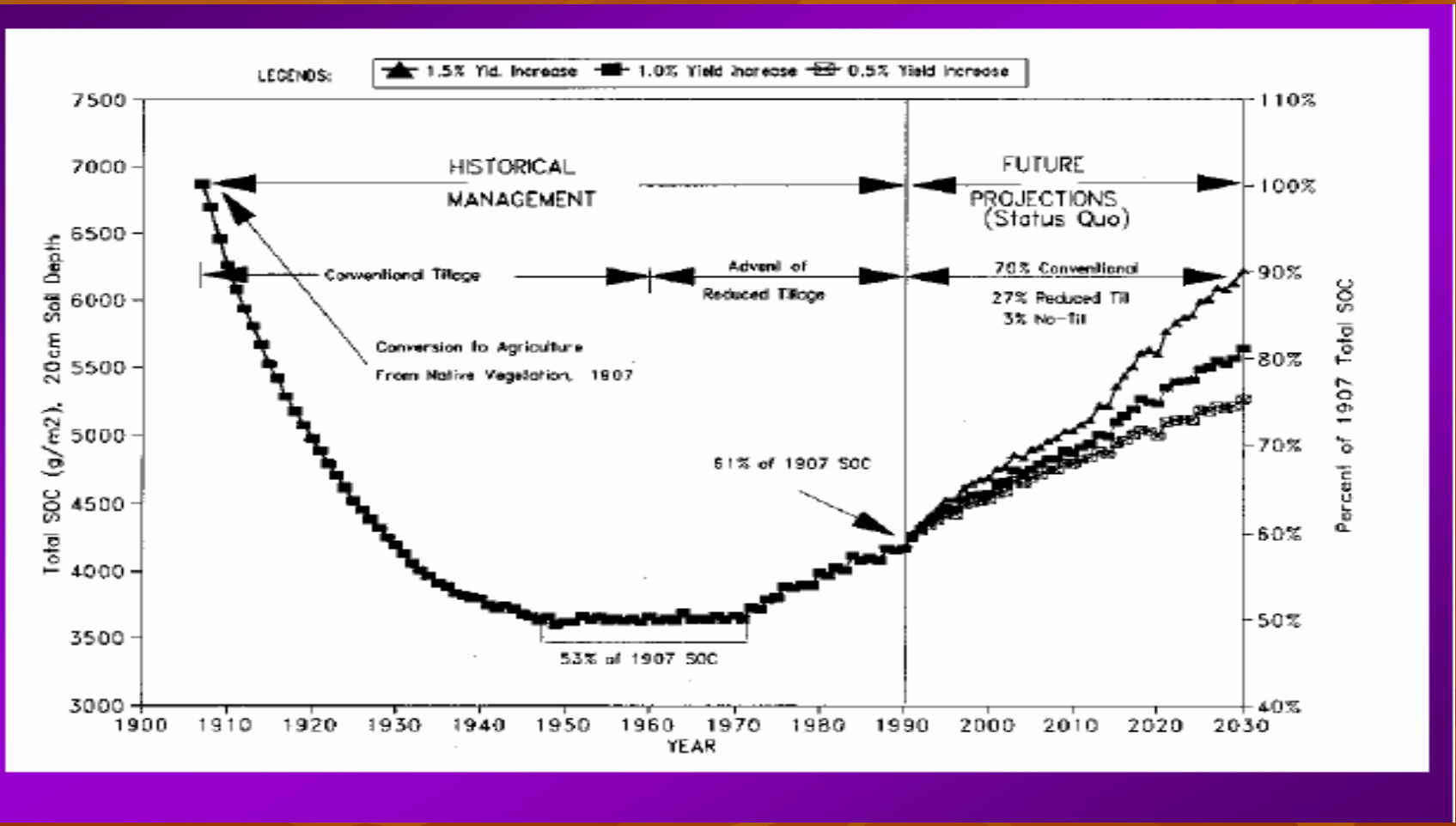
- Conservation and restoration programs (CRP, WRP, conservation buffers)
- Conservation tillage and residue management
- Improved cropping systems (fertilizer management, crop rotations and cover crops, summer fallow elimination)

C-Sequestration: Policy Options

What is the potential for c-sequestration on U.S. agricultural lands?

Soil scientists estimate that an additional 20% of U.S. annual carbon emissions can be sequestered back into agricultural soils.

C-Sequestration: Policy Options



C-Sequestration: Policy Options

What are some of the issues associated with soil carbon sequestration policies?

- measurement, monitoring, verification
- permanence
- additionality (baselines)
- impact on other ghg (nitrous oxide, methane)
- social/cultural issues of sector
- economics

C-Sequestration: Policy Options

Measurement, monitoring, verification

We CAN measure, monitor, and verify soil carbon. We've done it for years.

ISSUE: scale – national, regional, state, farm, field

ISSUE: models, databases, remote sensing, direct sampling

ISSUE: costs vs. accuracy (discount rates, acceptable error)

C-Sequestration: Policy Options

Permanence

Soil carbon is not permanent.

ISSUE: practices, weather, unanticipated circumstances can lead to C release

ISSUE: contracts, liability, frequency of verification

C-Sequestration: Policy Options

Additionality

ISSUE: establish a baseline

ISSUE: show “additional environmental benefit”

C-Sequestration: Policy Options

Total GHG accounting

ISSUE: with agriculture, in particular, nitrous oxide and methane are also important

ISSUE: unanticipated consequences

C-Sequestration: Policy Options

Social/cultural issues of the agricultural sector

ISSUE: adoption of new practices

ISSUE: support structure necessary

C-Sequestration: Policy Options

Economics

ISSUE: new equipment

ISSUE: 3-5 year risk period

ISSUE: carbon markets

C-Sequestration: Policy Options

Soil Carbon Sequestration:

WIN-WIN-WIN

Agriculture

Society

Environment