

#### The Implications of Global Warming on Coffee Production

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#### **Overview**



- Is global warming fact or fiction?
- If it is occurring, what does it mean to coffee production?
- How will my business be impacted?

## Is global warming occurring?



#### • YES!

- Intergovernmental Panel on Climate Change (IPCC) 2007 report
- American Meteorological Society 2007 Statement on Climate Change
- Many other scientific bodies
- The debate is now about the causes (and the consequent policy choices)
- How can we be so sure?





#### Long term temperature change



Is Global Warming Occurring? Long-term temperature change and greenhouse gases



#### Antarctic Ice Core Data 1

Temperature Variation ——CO2 Concentration





The atmospheric concentration of  $CO_2$  and  $CH_4$  in 2005 exceeds by far the natural range of the last 650,000 years

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#### **Summary**

- Global Warming is occurring
  - 0.5°C in the past 50 years
  - 1.5°C 3.0°C by 2100
  - 0.2°C in the next decade
- The cause is at least in part anthropogenic (man-made)
- Changes in the next 10 years are likely to occur no matter what society does

#### **Global Warming Impacts**



- Geographic shifts of growing regions
- Increased variability and extremes
- Rise in sea level
- More big Hurricanes



#### **Geographic shifts**

- Imagine moving (or shifting) a growing area 500-1500 km north or south
  - Coffee-growing areas of Brazil shift to Argentina
  - US corn belt (lowa) shifts to Saskatchewan
  - Do the new areas have suitable soil and other factors necessary for the plant?
- Current growing areas will end up with the climate of areas at lower (warmer) latitudes
  - Iowa will end up with the climate of present day Tennessee
  - Brazil will become warmer (more tropical) and less suitable for coffee

**Geographic shifts** 

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## February 5, 2007 Reuters headline: *Brazil coffee at risk from global warming*

• "A 3-degree Celsius (5.4 Fahrenheit) rise in temperature would result in a 60 percent reduction in the Arabica coffee area in Brazil, the world's biggest producer of the beverage."



#### **Increased variability - temperature**

- Year to year variances are the norm
  - Extremes should be expected (prolonged cold/warm spells)





#### **Increased variability - precipitation**

- Droughts lasting many years or decades are quite common in the climatological record
- These are not evenly distributed geographically – there will be winners and losers
- Small changes in climate can make for big changes in growing conditions



#### **Drought is increasing most places**







#### **Ocean Impacts**

- Sea level rise
  - Ocean temperatures will rise as the earth warms
  - The expansion caused by the warming will lead to an increase in sea level
  - Melting of the Arctic and Antarctic ice sheets, and of the Greenland glacier, could potentially cause large rises
  - The current outlook is for an increase of 0.1m (4") to 0.9m (36") by 2100
  - Hurricanes
    - Warmer water will lead to more major hurricanes
    - Marginal basins (like the Atlantic) will become more active

#### The 10 year outlook for Coffee



- Temperatures will continue to rise
  - Globally 0.2°C, slight impact on coffee
  - Expect more extreme events in marginal growing areas
- Precipitation will slowly decrease in prime tropical/subtropical growing areas
  - Droughts may become more frequent
  - Marginal areas will see more impact
- Sea level will continue to rise slowly
  - Globally 0.05 m (2")



#### **Questions?**

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