



Impacts on Biodiversity by Sugarcane Production

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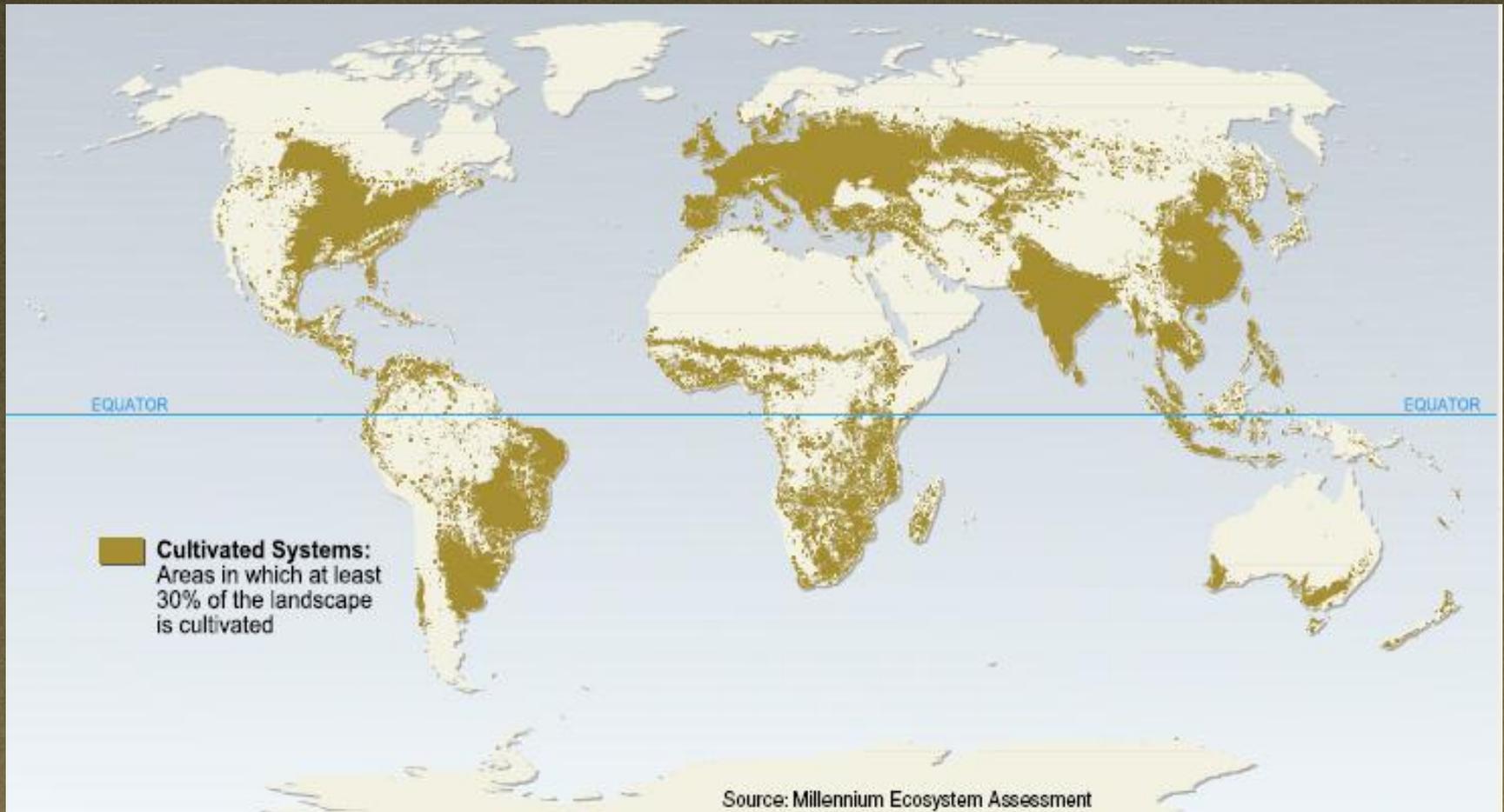
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17 March 2010

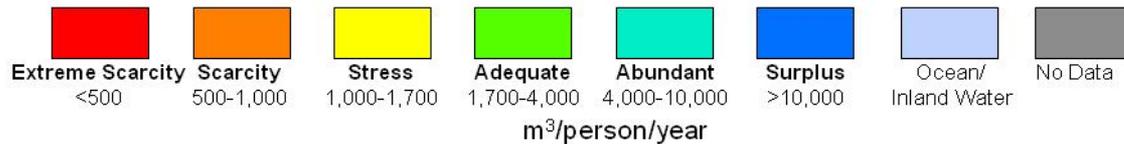
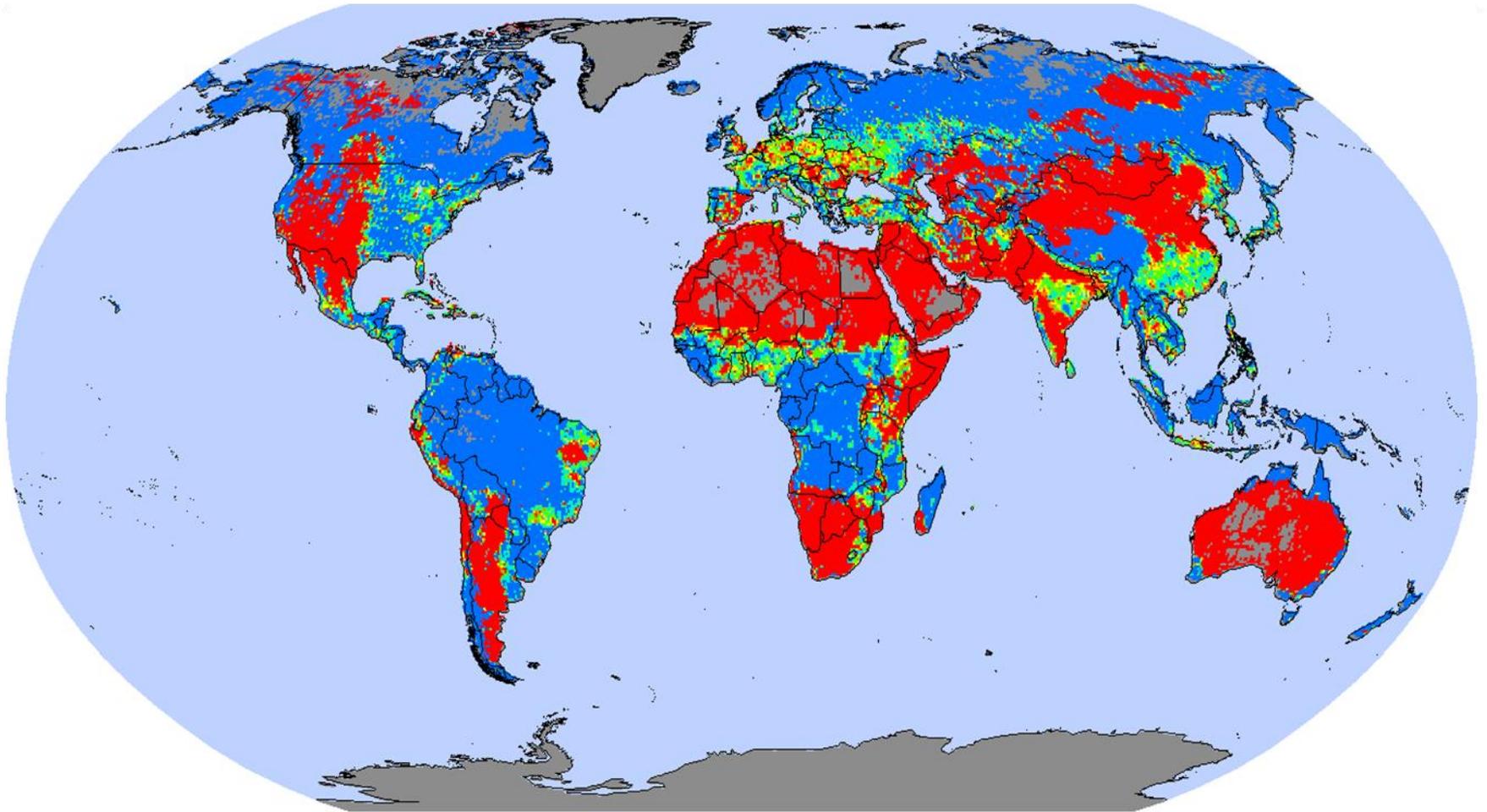


Agriculture's Global Footprint



33% of Earth's surface in crops or grazing but 55% of habitable area

Global Water Scarcity



Sugar is the 7th largest source of human calories (80% is from cane)

2nd largest source of ethanol, globally

Grown in over 100 countries

SUGARCANE

PRIMARY IMPACTS ON BIODIVERSITY

- Land use
 - Currently occupies 24,375,413 hectares, globally, and expanding
- Greenhouse gas emissions
 - Multiple emission sources
 - Sequestration and avoided emissions as well
- Water consumption
 - High use of irrigation in some water stressed production regions
- Freshwater and marine habitat impacts
 - Agrochemical impacts on freshwater quality for drinking
 - Agrochemical impacts on coral reef and marine species health

CRITICAL FRONTIERS OF CANE EXPANSION

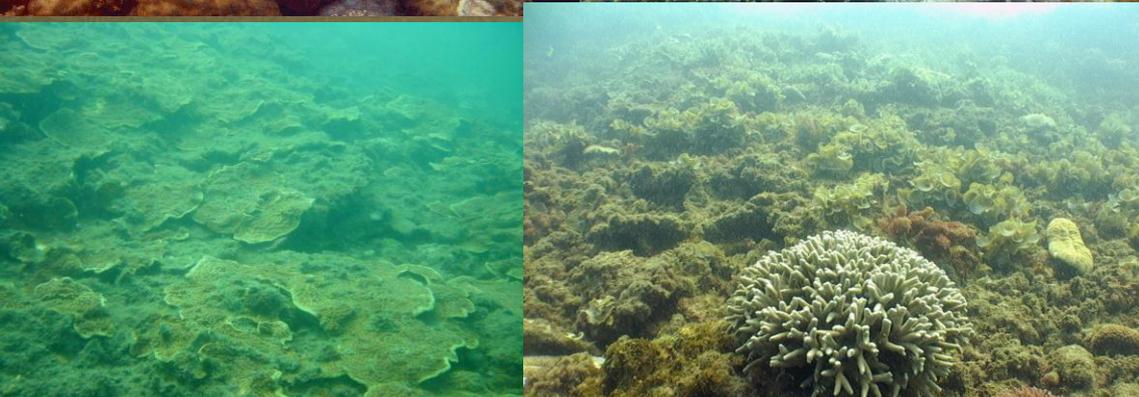
- Coastal East Africa
 - Biofuel and sugar production in Mozambique, Tanzania, Zambia
 - Species impacted: elephants, cheetah, leopard, bovids, birds
- Southeast Asia
 - Predominantly for sugar production in Laos and Cambodia
 - Species impacted: elephants, primates, birds
- New Guinea
 - For sugar production to be consumed in Indonesia
 - Species impacted: birds, amphibians, tree kangaroo

FRESHWATER AND MARINE HABITAT

- Depletion of freshwater resources
 - Excessive and inefficient irrigation
 - In-field burning
- Agrochemical run-off
 - Harming freshwater and marine biodiversity



Healthy Coral



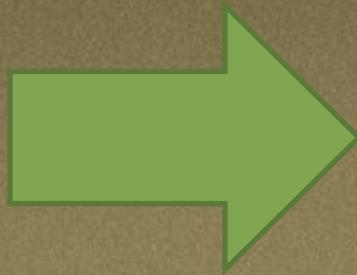
Run-off
Damaged Coral

CLIMATE CHANGE IMPACTS

- Sources of emissions:
 - Habitat conversion
 - Pre and post harvest burning
 - Production and application of agrochemicals
 - In-field
- Sources of sequestration and reduced emissions
 - Soil carbon sequestration
 - Mill co-generation
 - Ethanol replacing fossil-based fuels

SOLUTION SUITES

- Good governance
- Adoption of metric based standards
- Improved performance through adoption of BMPs
- Innovation
- Use of degraded lands



METRIC BASED STANDARDS

- Bonsucro: Better Sugar Cane Initiative
- 5 Core Principles
- Addresses habitat conversion, greenhouse gas emissions, and freshwater impacts
- Metric based standard that allows producers to meet the outcomes through their chosen methods
- Membership includes all parts of the sugarcane value chain with producers from around the world as well as ethanol, molasses, and sugar end users.

BONSUCROTM

BETTER SUGAR CANE INITIATIVE

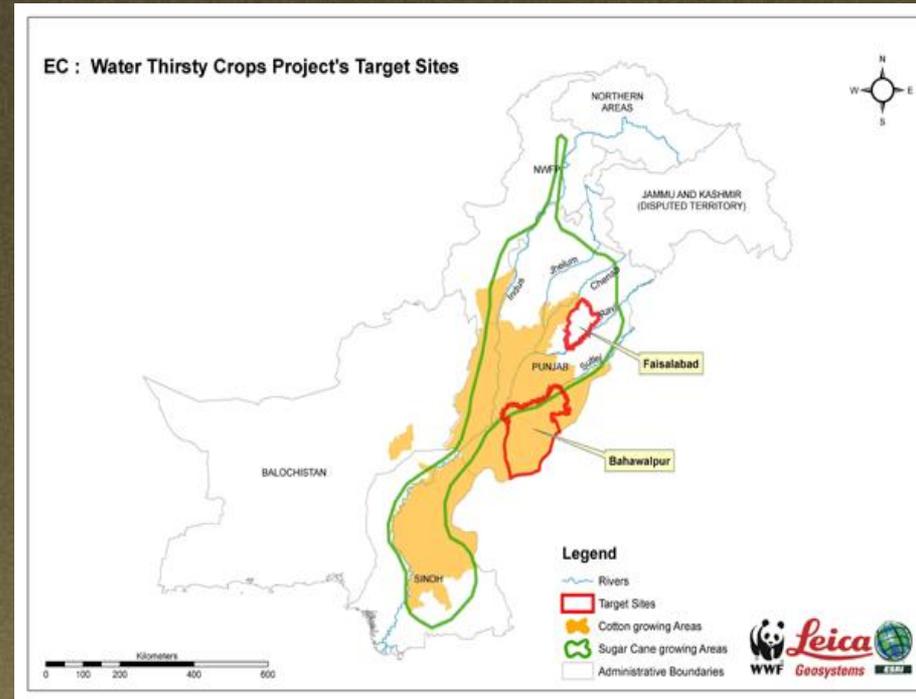
ADOPTION OF BETTER MANAGEMENT PRACTICES

- Issues in India:
 - Water table depleting year after year (1500-3000 litres/1 kg of cane)
 - Improper cultivation practices
 - Imbalanced nutrient management and other practices like mono cropping often result in low productivity
 - Unpredictable climatic aberrations
- WWF-India Thirsty Crops work
 - 21 BMPs
 - Implemented by farmer groups
 - Results include improved input use (water and agrochemicals) increased POL and sucrose recovery
- WWF-International and ICRISAT partnership
 - SSI may save between 40 - 80% of water
 - Potentially extend crushing period



ADOPTION OF BETTER MANAGEMENT PRACTICES

- Work in Pakistan
- Focus is on creating water use efficiency and improving water quality in Pakistan
- Agriculture uses 90-95% of all water in Pakistan
- Results thus far in controlled plots:
 - 25% reduction in N
 - 100% reduction in pesticides
 - 20% reduction in water use



INDUSTRY INNOVATION

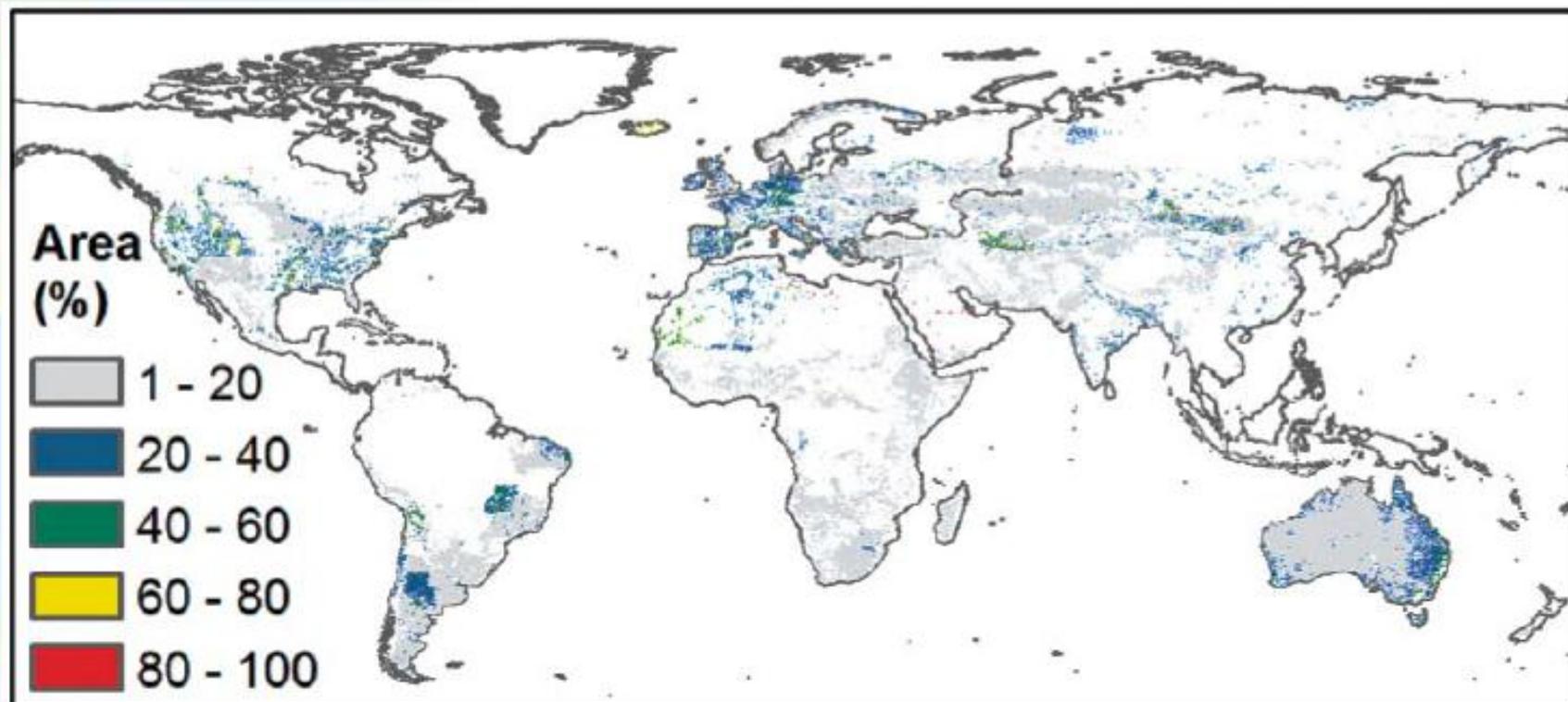
- Project Catalyst Goal: Foster innovation by farmers through multi-stakeholder collaboration to improve freshwater quality delivered to the Great Barrier Reef ecosystem.
- Results to date:
 - Creation of multi-scale water quality monitoring system
 - Precision agriculture plans for 4,800 hectares on 19 farms
 - Improved water quality for 24,000 ML
 - Implementation of easy-to-use tractor data recording system called AgDat that is linked to the mill.
 - Piloting of new farm management techniques to solve environmental and agronomic challenges.
 - Now expanding to 50 farms and over 10,000 hectares





Bringing >1 Billion Acres Of Abandoned Agricultural Land Back Into Production?

Pacific Ethanol, Inc.



Campbell et al., *Env. Sci. Technol.* (2008) **ASAP Article**, 10.1021/es800052w



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