Agricultural Perspective on Migration

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AgMIP The Agricultural Model Intercomparison and Improvement Project

Migration of Agriculture as One Path to Sustainability
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Outline

- Introduction comments
- Agricultural complexities
- Disruptions that may result in migration
- Some key questions
- Examples
- Return to key questions

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Basic Premise

- Existing agricultural production systems are well established and adapted to climate, soil, markets, industry, technology, social, political, ecological conditions where they occur
- These systems, people, infrastructure, policy makers, environments are reasonably resilient to changes that occur; adjustments are continually being made to factors that can be controlled by different actors
- So, why worry about migration; who should worry?

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Agricultural Complexities

One can go to any region in the US and see similar characteristics of agriculture that have made US agriculture the envy of the world. So why worry?

Agricultural Complexities

- **Climate** is suitable to support production levels with use of appropriate technologies
- **Soils** are adequate, with appropriate management to alleviate limitations
- **Energy** is available and affordable
- **Supporting industries** provide needed inputs
- **Water** supply is available with reliable infrastructure
- **Impacts on the environment** are acceptable to society
- Agriculture provides **livelihoods** for many families
- Knowledgeable farmers who know climate, land, markets, technologies, and they **adapt** to changes

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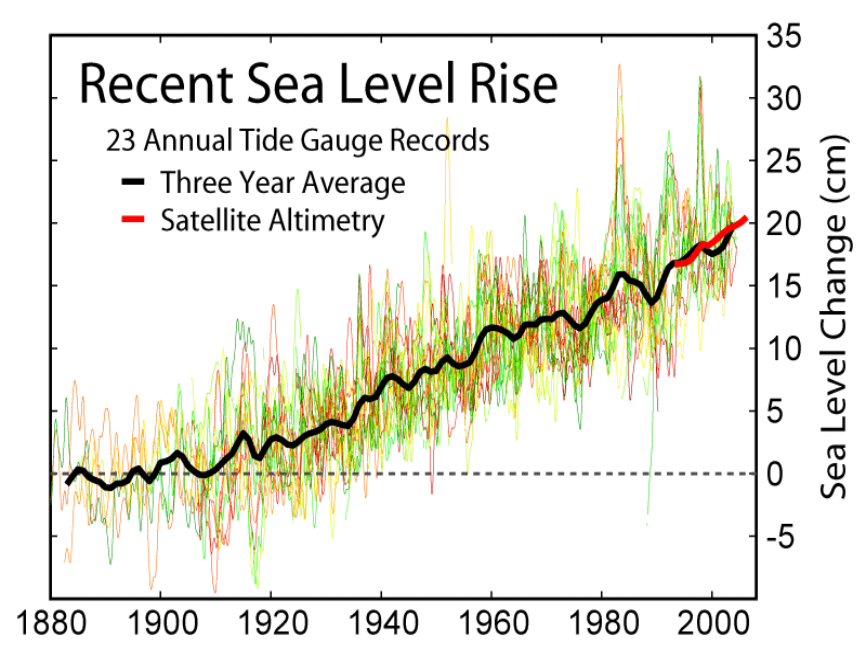
Disruptions May Lead to Agricultural Migration

- Climate change, sea level rise
- Soil degradation
- Changes in policies, regulations
- Increases in populations, changes in diet
- Changes in product prices, input costs (e.g., energy)
- Change in water supply, drought
- Conflicts



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Some Key Questions

- Is Agricultural migration a **reasonable strategic goal**? For whom?
- If so, what **information is needed** to evaluate options, taking into account all complexities?
- If not, what are the likely **outcomes of doing nothing**, and implications?
- What **pathways should be pursued** to achieve migration, and **by whom**?

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Examples

- McNider example, westward migration of agriculture
- Dairies migrating from southern to northern Florida
  - Planned migration, with financial support to dairies
  - Prompted by major pollution of Lake Okeechobee in S. Florida
  - Regulations passed to protect the lake, natural ecosystems
  - Key Point – policies were proactive, helping families keep their livelihoods

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Squeezed in S. Florida, dairy farms flourish here (in North Florida)

By GREG C. BRUNO

Sun Staff Writer

Published: Sunday, June 20, 2004 at 6:01 a.m.

WEST PALM BEACH - For decades, dairy and cattle farms dotted Lake Okeechobee's northern shores, a water-rich region long polluted by some of the most intensive agriculture in the state.

Between the early 1970s and the mid-1980s, concentrations of farm-based nutrients entering the lake increased nearly three-fold, resulting in water quality declines and diminished freshwater habitats. A 30,000-ton blob of phosphorus-laden muck still sits at the bottom of the nation's second largest freshwater lake, continually polluting the entire Everglades ecosystem.

But after a state-sanctioned buyout plan in 1986, during which 32 of the region's 51 dairies took their cows and left the area, water quality in the region began to stabilize, environmental experts say.

Unfortunately for North Central Florida, the legacy those farmers left behind may now be influencing water quality in the greater Suwannee River region.

Other transformational events during the last 50 years

- Silent Spring
- Green Revolution
- Roundup Ready Soybean
- Drought in California?
- Others are anticipated

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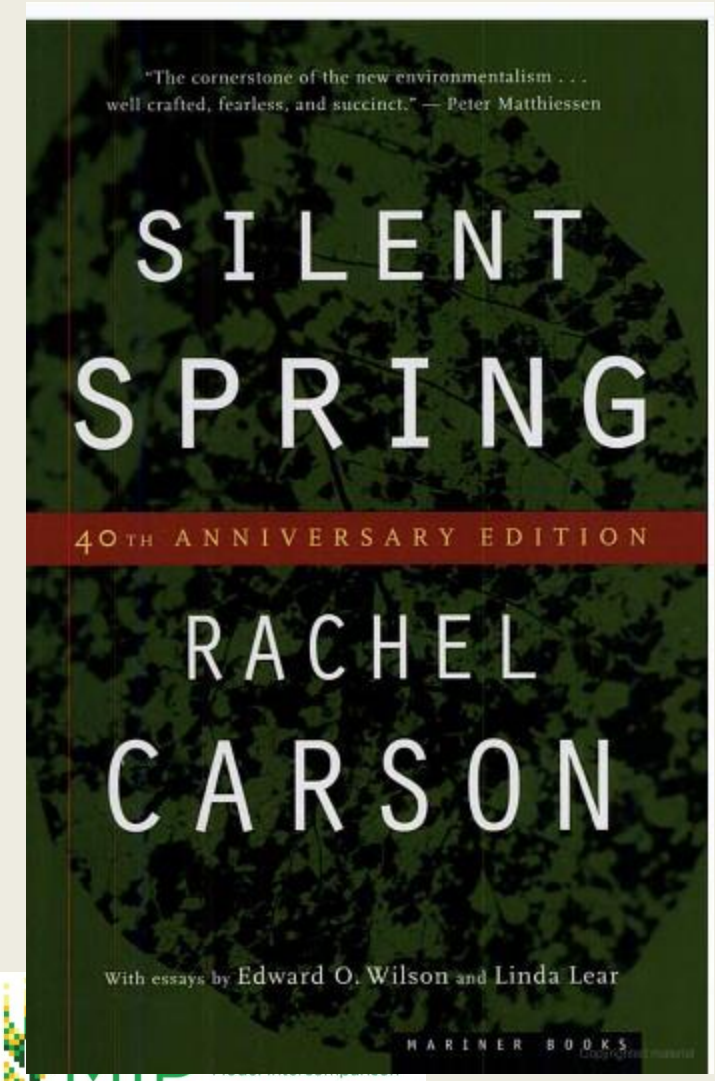
Silent Spring, Agriculture, and the Environment



1. A Fable for Tomorrow

THERE WAS ONCE a town in the heart of America where all life seemed to live in harmony with its surroundings. The town lay in the midst of a checkerboard of prosperous farms, with fields of grain and hillsides of orchards where, in spring, white clouds of bloom drifted above the green fields. In autumn, oak and maple and birch set up a blaze of color that flamed and flickered across a backdrop of pines. Then foxes barked in the hills and deer silently crossed the fields, half hidden in the mists of the fall mornings.

Along the roads, laurel, viburnum and alder, great ferns and wildflowers delighted the traveler's eye through much of the

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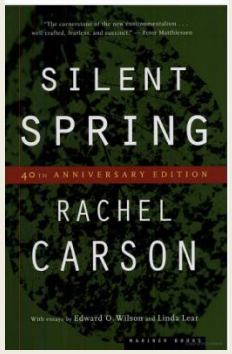

Silent Spring, Agriculture, and the Environment

- Interconnectedness of nature with everything else
- Motivation for book was death of birds due to DDT insecticide
- Carson was target of many in society
- But, her work led to changes in use of agricultural chemicals in order to reduce agrochemical impacts on ecosystems and human health

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Green Revolution

- Pre-1960s – 1970s
- Combined plant breeding with fertilizers and increased management intensity
- International agricultural research centers established

The Green Revolution started with high-yield wheat that resisted a variety of plant pests and diseases. Photo: Wikimedia Commons.

"The Green Revolution" @ countryside, Punjab, India

ALL SIZES

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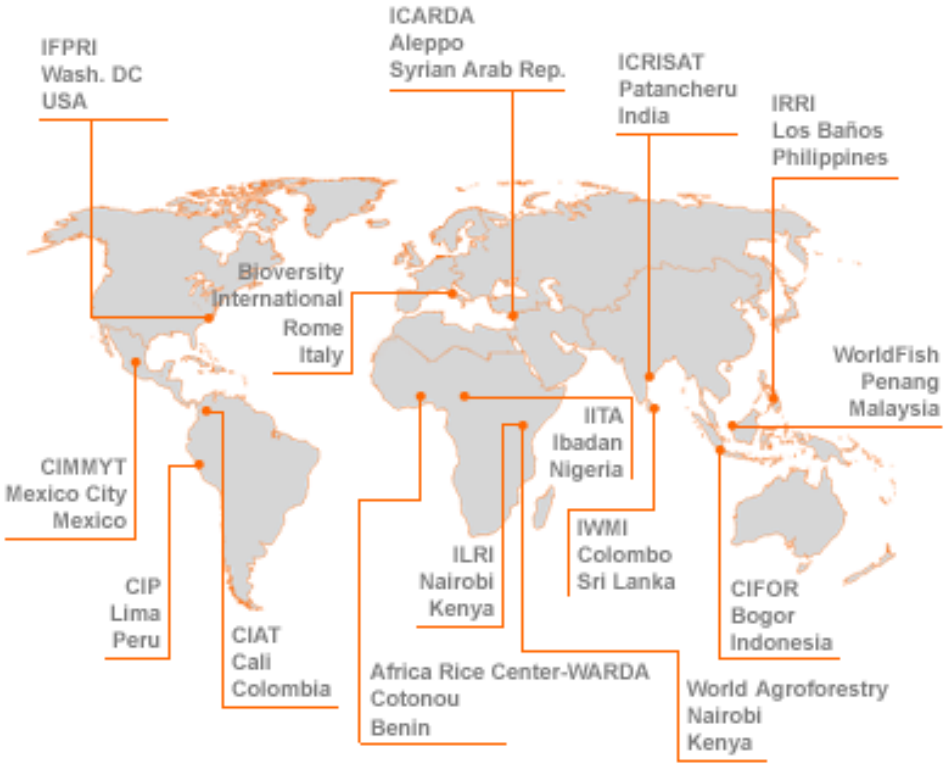

CGIAR Centers

ICRISAT – Hyderabad, India

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Roundup Ready Soybean & Biotechnology Innovations

- Genetic engineering of soybean: inserting a gene to make soybean resistant to glyphosate herbicide
- Widespread adoption in US

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Biotechnology

- Genome mapping of plants, animals, organisms
- Marker-assisted breeding
- Discovery of gene function
- Greater understanding of crop, animal performance across environments, management

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Addressing Agricultural Challenges: What Science is Needed?

- New technologies for sustainable intensification? What technologies & policies? What investments in research provide highest benefits to society?
- Need more engagement with policy makers and other stakeholders, & more public-private collaboration
- Agricultural models & systems approach are needed; traditional discipline-oriented research is inadequate
- However, if different models and/or different climate scenarios are used, we cannot compare results across studies and don't know reliability/uncertainty of results

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Goal: Significantly advance scientific capabilities for addressing complex Ag & food security issues, global and regional, in a changing climate




UKaid from the Department for International Development

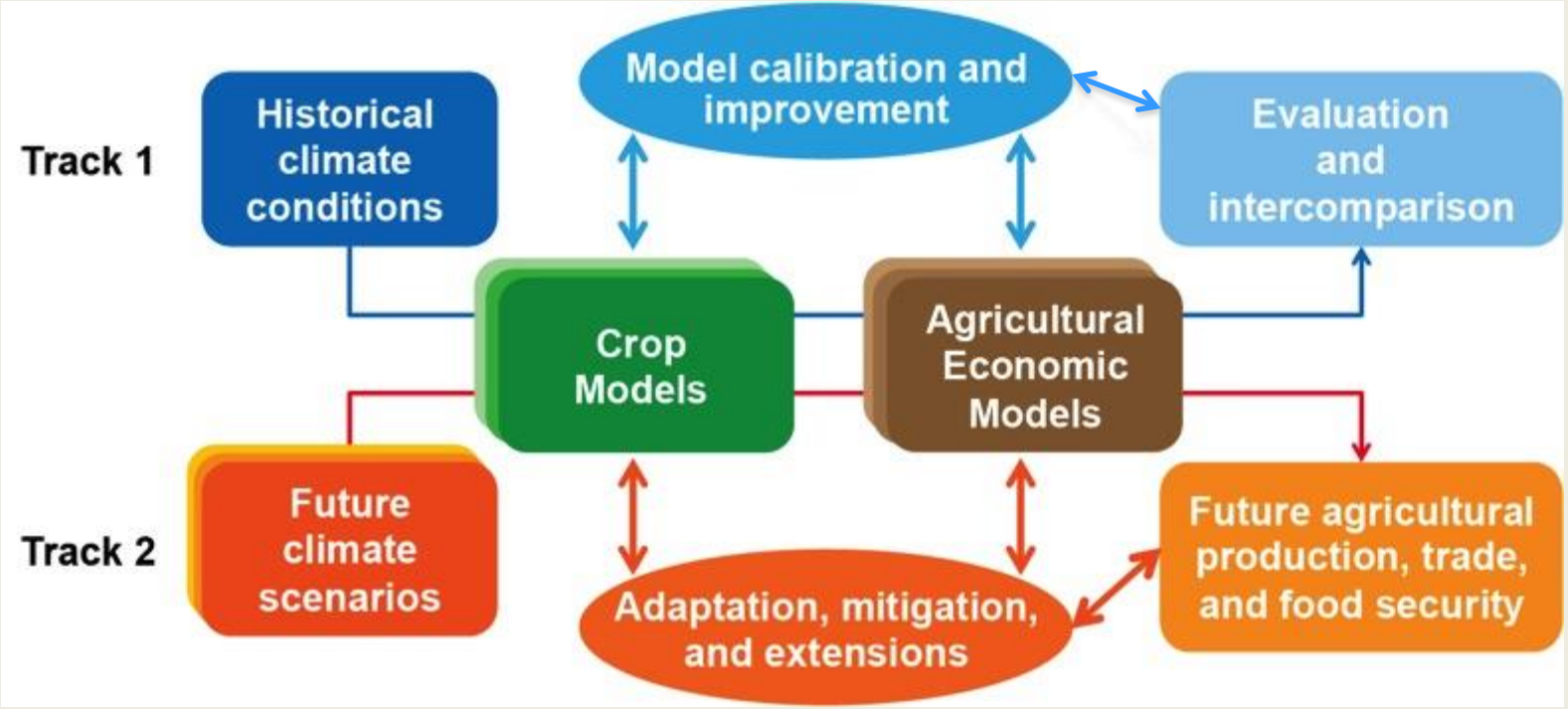
USDA

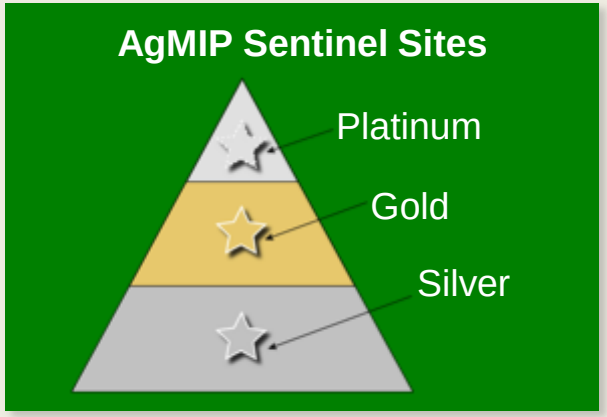
USAID United States Agency International Development

CGIAR RESEARCH PROGRAM ON Climate Change, Agriculture and Food Security CCAFS

NASA

Two-Track Science Approach





Track 1: Model Improvement and Intercomparison

Track 2: Climate Change Multi-Model Assessment

Regional and Global Scales

AgMIP Sentinel Data Sites

Rosenzweig et al., 2013 AgForMet

Returning to Key Questions

- Policies should include strategies for agricultural migration
- Understanding of agricultural systems coupled with human and ecological interactions is needed
- Systems approach using models and data is essential to evaluate alternative pathways for migration, including outcomes with no policy actions (e.g., what are collective responses of all actors)
- Opportunity to re-engineer agricultural systems to achieve productivity, sustainability, other societal goals.

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