

WORLD Resources Institute

THE NEW CLIMATE ECONOMY

The Global Commission on the Economy and Climate

BUILDING SUPPORT FOR INTERNATIONAL AGRICULTURAL PROGRAMS IN THE TIME OF CLIMATE CHANGE

Insights from the New Climate Economy Project Christopher Delgado, WRI and NCE December 10, 2014 Presentation at the Renewable Natural Resources Foundation Congress on Adapting Food Production to a Changing Climate

Photo credit: Cattle in Ethiopia, James Anderson, WRI

WHY SUPPORT INTERNATIONAL AGRICULTURE?

- Improve food security
- Reduce poverty
- Promote economic growth
- Facilitate structural transformation

WDR 2008 made the case about as well as possible...but also need to:

- Increase resilience of livelihoods
- Mitigate climate change

(is unfinished business....)





HYPOTHESES: INCREASED SUPPORT WILL REQUIRE EITHER

- Concern over a global food crisis manifested by spiking staple commodity prices
 OR
- Communicating pathways to address big issues of concern to Ministers of Finance through agriculture that do not have cheaper or faster alternatives

HISTORY: URGENCY AFTER 1974 CRISIS THEN COMPLACENCY AFTER SUCCESSFUL RESPONSE



Source: World Bank, World Development Report 2008

2008 FOOD PRICE CRISIS CONCENTRATED MINDS AGAIN ON INCREASING SUPPORT

- 2008: similarities but not as severe as 1974 but bad and unanticipated
 - Food, fuel and finance spiked in late 2007, early 2008
 - New spike in 2011
- International system, gov't, private sector responded
 - Share of ag loans in World Bank (for example) went from 7% avg in early 2000s to 12% 2010-2012 (closer to 30% in 1980)
 - More attention to transparency of food mkt (G20)
 - More direct foreign farm investments in LDCs
 - Yet most production response was in developed + BRICs



BUT THE WORLD HAS CHANGED SINCE 1974

- Sovereign debt = 40% of GDP of G7 in 1974, closer to 100% now
- Private led: ex: most of the 70% increase in WB project value 06/08 to 10/12 was from IFC, lending to PS in Lat. Am. and Asia
- Relative importance of ag to economic growth of developing countries is less:
 ex: ag = 10-20% of GDP in 2012 compared to about 25-30% in 1974 in middle and low income countries (World Bank)

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NOW GLOBAL FOOD SUPPLIES ARE BACK UP, PRICES ARE DOWN, AND MEMORIES SHORT

- FAO'S Grains and Oilseed Index down 12% in Nov. 2014 relative to year before
- Funding gains after crisis (like recent doubling of CGIAR) will likely decrease again
- And increase in focus on things increased global ag production has not solved: 800 million still chronically hungry, 42 million overweight children (2/3 in developing countries--IFPRI), etc.
- And now there is climate change and other worrisome results from non-sustainable agriculture....



LOOKING FORWARD, AGRICULTURE'S ROLE IN DEVELOPING WORLD IS DETERMINED BY

- Demand and supply opportunities and challenges, as before...
 BUTALSO:
- Demand and supply issues for competing users of natural resources: crops, forests, cities, etc.
- Land use is now a trade-off; no more "free" land and water...
- The "carbon budget" also entering...

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AGRICULTURAL LAND DEGRADATION: MORE AND MORE OF THE WORLD LOOKS LIKE THIS

- 25% of all ag land severely degraded
 - Another 8% moderately degraded
- Growing annually—how much?
- Cost in terms of reduced ag production of 3-7% and growing





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AGRICULTURAL RESILIENCE TO CLIMATE CHANGE IS THE GREAT UNDERFUNDED ISSUE

- Poor countries understand, but are upset when their ag seen as source of mitigation
 - Yet the poor in tropical countries have the most to lose from CC in terms of yield and income (IPCC AR5 WGII; Challinor et al. 2014)
 - African financing needs for adaptation estimated at \$35-50 Billion/yr (UNDP 2013),
 - Yet total adaptation financing in 2012 to Africa was \$1.6 Billion, and amount disbursed from the five main multilateral funds for adaptation less than \$53 Million/yr since 2000! (Shalatek et al. 2012)(courtesy of ODI for NCE, forthcoming)

Photo credit: CIFOR, Flickr, https://www.flickr.com/photos

FORESTS ARE BEING CUT DOWN (13 Mha+/Yr) AND LAND CONVERTED TO AG. (5 Mha+/Yr)

- By 2050, wood removals projected to triple
- Pulp demand going down in U.S. and Europe

- But pulp & timber demand soaring in developing countries
- Demand for new ag land inevitable
- Global net deforestation 2000 to 2009 at 5.2 M ha/yr (FAO)

YET AGRCILTURE TYPICALLY BLAMED: DRIVERS OF DEFORESTATION



Source: G. Kissinger et al, Drivers of Deforestation and Forest Degradation: Synthesis Report for Policymakers, 7 Sept. 2012

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AG AS PERPETRATOR: HIGH GLOBAL AGRICULTURE & LAND USE GHG EMISSIONS 2010



Note: Figures may not equal 100% due to rounding.

* LULUCF = Land Use, Land Use Change, and Forestry.

** Includes emissions from on-farm energy consumption as well as from manufacturing of farm tractors, irrigation pumps, other machinery, and key inputs such as fertilizer. It excludes emissions from the transport of food.

*** Excludes emissions from agricultural energy sources described above.

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Source: WRI analysis based on UNEP 2012, FAO 2012, EIA 2012, IEA 2012, and Houghton 2008 with adjustments.



SUPPORT FOR INT'L AGRICULTURE IN THE ABSENCE OF FOOD PRICE CRISES REQUIRES

- Food productivity research focused on traits to raise crop, animal, and forest productivity sustainably in specific locations dealing with specific resource issues
- Invest in efficiency of ruminant livestock necessary for climate mitigation as well as productivity growth
- Stop deforestation through enforcement of land use laws made possible by monitoring technology
- Restore agricultural and forest landscapes for resilience and mitigation (or we will all "have a problem, Houston...")

Photo credit: World Resources Institute, Flickr

PUBLIC INVESTMENTS IN AG R&D IN THE 21ST CENTURY DIFF. THAN 20 YRS AGO

- Productivity: need more for less resources; era of "free" additional resources is over
 - Traits are name of game now in intensification
 - Genetics; use biotech tools such as MAS w/ conventional breeding
 - Practices: AWD for rice, for example
- Ruminant and related emissions are 6% of global GHGs all sectors: cut by ½ profitably
 - Pasture improvement, esp Lat.Am.
 - Grazing management
 - But protect nearby forest

INSIGHTS FROM HIGH REGIONAL VARIATION IN Kg CO_2e / Kg BEEF PRODUCTION

	N. Amer	W. Euro	E. Euro	SS Africa	LAC	S. Asia	E. & SE. Asia
kgCO ₂ e	29	18	14	60	72 (77	47
% from Enteric CH4	38%	33%	36%	68%	33%	65%	60%

Note: Other sources include manure, feed production related, land use change, energy, and post-farm. Major differences come from differences in production systems, feed quality, herd management, and manure management.

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Source: FAO (Gerber et al. 2013)
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NOTE THAT AGRICULTURE IS NOT DRIVING THE <u>REMOVAL OF TREES</u> (DEGRADATION)

Issue is where trees are cut, and what happens to land after trees cut; these are both mainly a matter of governance



Source: G. Kissinger et al, *Drivers of Deforestation and Forest Degradation: Synthesis Report for Policymakers*, 7 Sept. 2012

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STOPPING DEFORESTATION REQUIRES GOOD GOVERNANCE OF ALL LAND

- Globally still on order of 5.2 M ha/yr, est at 4-5 Gt GHGs emissions (IPCC)
- Ag intensification requires adjacent forest protection
- Starting 2004: Brazil enforces ban on illegal logging in the Amazon using remote sensing
- Brazilian Amazon deforestation down ³/₄ + now
- 2014: Global Forest Watch enables near real time monitoring
- Private sector responding in their supply chains (e.g. Cons. Goods Forum, etc)

STOPPING DEFORESTATION: BRAZIL SINCE 2004 IN THE AMAZON, USING REMOTE SENSING



source: J. Assuncao and T. Heller (2014)

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THE KEY : RESTORING 150 M HA OF DEGRADED AGRIC. LANDSCAPES BY 2030 FOR RESILIENCE

- Basically Two Approaches:
 Capital & skill intensive development projects
 - e.g. China's Loess plateau watershed rehab projects
 - Maybe 1 M ha/year in new projects
 - Labor intensive farmer-managed rehab

 e.g. Niger natural regeneration
 9 M ha a year in new area quite feasible

PROJECTS: RESTORING PRODUCTIVE AGRICULTURAL LANDSCAPES: EXAMPLE FROM CHINA'S LOESS PLATEAU

1990 Free ranging of goats on steep slopes was big part of the problem; not much other livestock due to absence of feed

Terracing; planting forage, fruit trees and shrubs; confinement of goats; cashmere and dairy introduced with cut & carry, huge success

2012

Source: World Bank project completion evaluations of the Loess Plateau Watershed Habilitation Projects I and II, 1999 and 2005.

ERR = 20% OVERALL, BUT LIVESTOCK 27%!

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SILVO-PASTORAL SYSTEMS IN CENTRAL AMERICA

– Internalizing the value of ecosystem interactions amongst trees, shrubs, livestock and crops to farmer incomes through livestock Improving the sustainability of natural resources – Reducing GHGs

Photo: Enrique Murgueitio[,] Zoraida Calle, Carlos Hernando Molina, Julián Chará, Fernando Uribe CIPAV - Centro para la Investigación en Sistemas Sostenibles de Producción Agropecuaria. Cali, Colombia.

5 MIL HA in NIGER SHOWS WAY FOR SACLING TO 300 M HA IN AFRICA EVEN OUTSIDE PROJECTS

1980s



2013



Maradi and Zinder Provinces

- 1970's/1980's zone of increasing marginalization, declining crop yields, decreasing viability of livestock keeping
- Now 5 million ha of fields restored
- Implementation: NGO, then "know how" spread by farmers, rural code reformed 1993 for rights to trees; \$20/ha/year max non-farmer funding over 30 years
- Impact: Million rural households; additional 500 000 t of cereals per year feeding 2.5 m people and extra US\$250 million in income

Source: WRI analysis using the following datasets: Protected areas: IUCN and UNEP. 2013. The World Database on Protected Areas (WDPA). Cambridge, UK: UNEP-WCMC. Croplands: Fritz, S. and L. See. 2013. Global Hybrid Cropland. Laxenburg, Austria: IIASA and IFPRI. Precipitation isohyets: FAO/UNEP Desertification and Mapping Project. 1986. Africa Mean Annual Rainfall. Geneva, Switzerland: UNEP/GRID.

Impact for Niger Zinder case from worldagroforestry.org

SOLUTION: RESTORING 350 M HA OF FOREST LANDSCAPE BY 2030

 Now enshrined in "New York Declaration" of Sept. 23, 2014

Opportunity cost of land an issue

- Most benefits are ecosystem services outside markets
- Mix of full forest, mosaic forest, and agroforestry needed
- Forest restoration in tandem with ag restoration
 new era of land use planning

How it is done:

- Countries pledge
- Policies facilitate
- Projects, Farmers, PS, and Gov'ts do



LAND USE IN THE CONTEXT OF OVERALL NEW CLIMATE ECONOMY GHG ABATEMENT POTENTIAL PER YEAR BY 2030



Source: Emissions estimates: IPCC AR5; New Climate Economy analysis based on expert input and multiple data sources

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ECONOMIC LAND USE CAN PROVIDE BY 2030 30% OF MITIGATION NEEDED FOR 2° C PATH

1. Zero deforesting natural forests by 2030 (3 Gt CO_2e mean expectation within a range) 2. Restore 150 M ha ag land by 2030 (1.1 Gt) 3. Restore 350 M ha forest (full, mosaic, agroforestry) (3 Gt) 4. Reduce food waste (0.3 Gt) 5. Go from \$78 bil +/yr of ag input subsidies to funding Climate Smart Ag triple wins (incl. 0.9 Gt mitigation)

MORE DETAILS AT

http://newclimateeconomy.report/land-use/

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