




Visions for Climate Change Mitigation in Agriculture



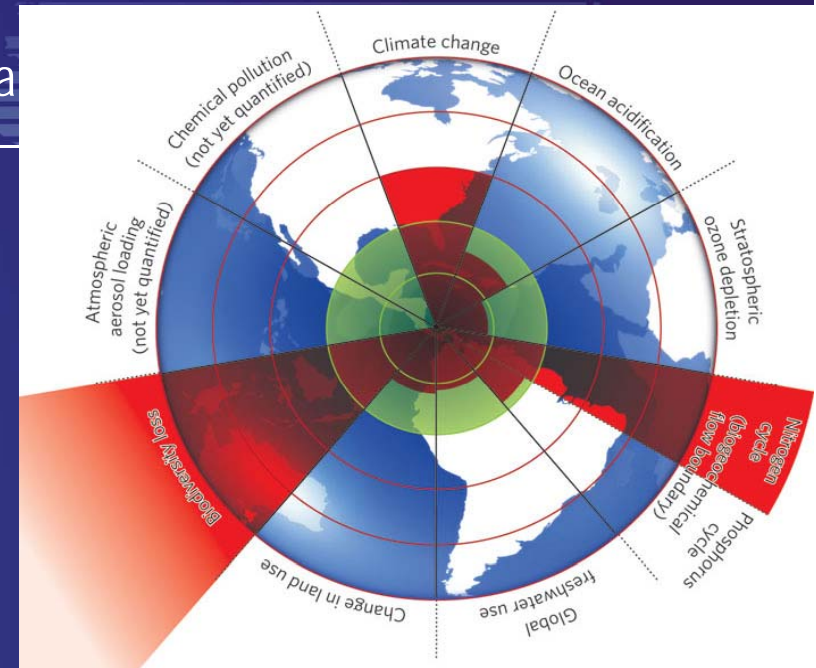
Conference on Carbon Credits for
Sustainable Land Use Systems
FiBL, Frick, 14 December 2011
Presented by: Ulrich HOFFMANN,
Senior Trade Policy Advisor
UNCTAD secretariat

UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

Points Worth being Born in Mind

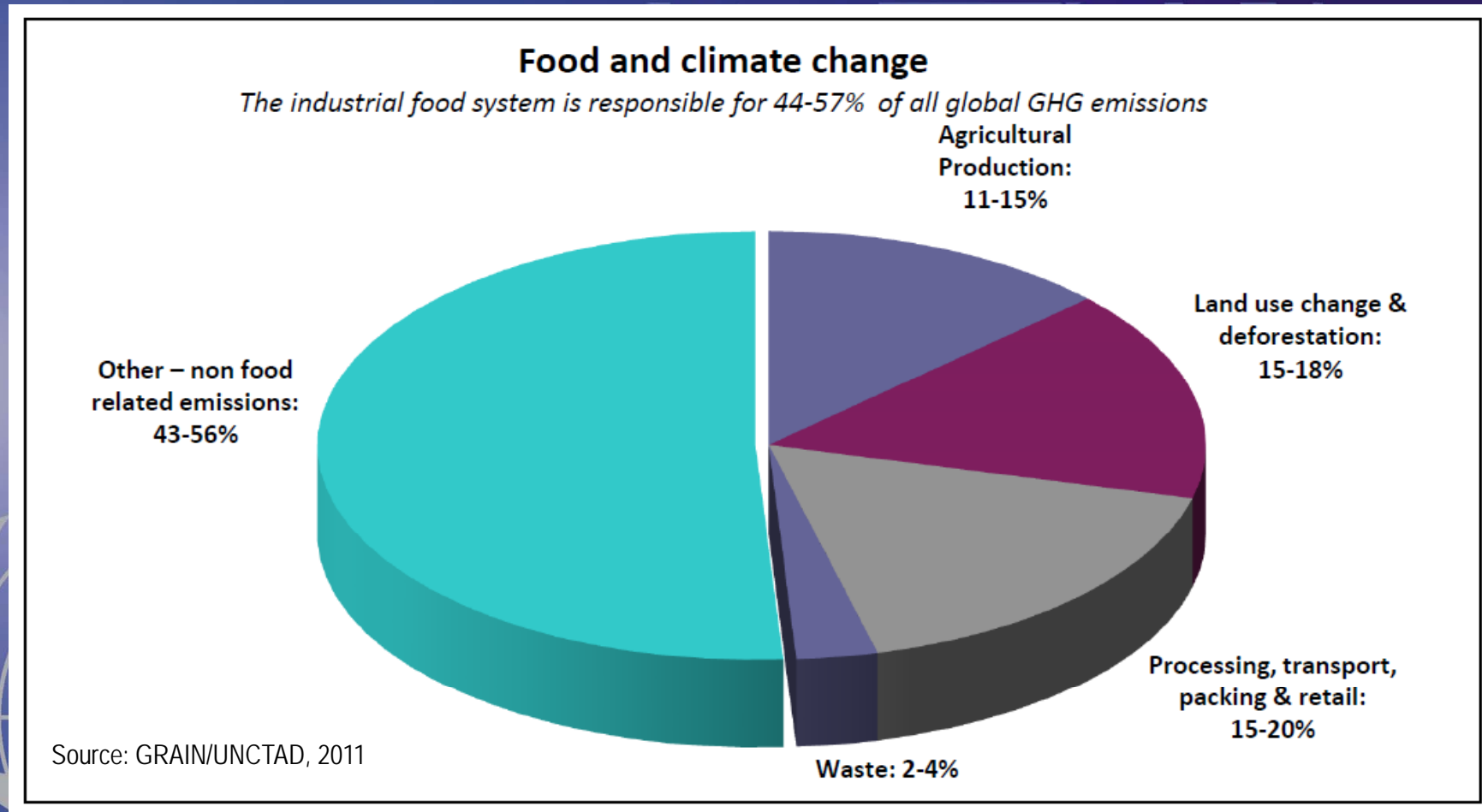
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- Two global environmental boundaries have already been surpassed – caused by conventional agriculture (the third boundary – climate change – is also very much agriculture-related).
- New dimension of resource-scarcity pressure:
 - (i) classical scarcities – fertile land, freshwater, energy, nitrogen, phosphorus;
 - (ii) new scarcities – new environmental limits that aggravate classical scarcities – climate change, ocean acidification, biodiversity loss; and
 - (iii) social issues that compound these scarcities – population & income growth in Africa, income growth in BRICs etc.
- How we define “efficiency, productivity and related technology” will determine the objectivity of our discourse on what we understand by “modern agriculture”. Paradoxically, we currently consider production methods as “modern” that are among the most pollutant, most resource-squandering, most energy-intensive and most dependent on subsidies”.



Source: Nature, September 2009

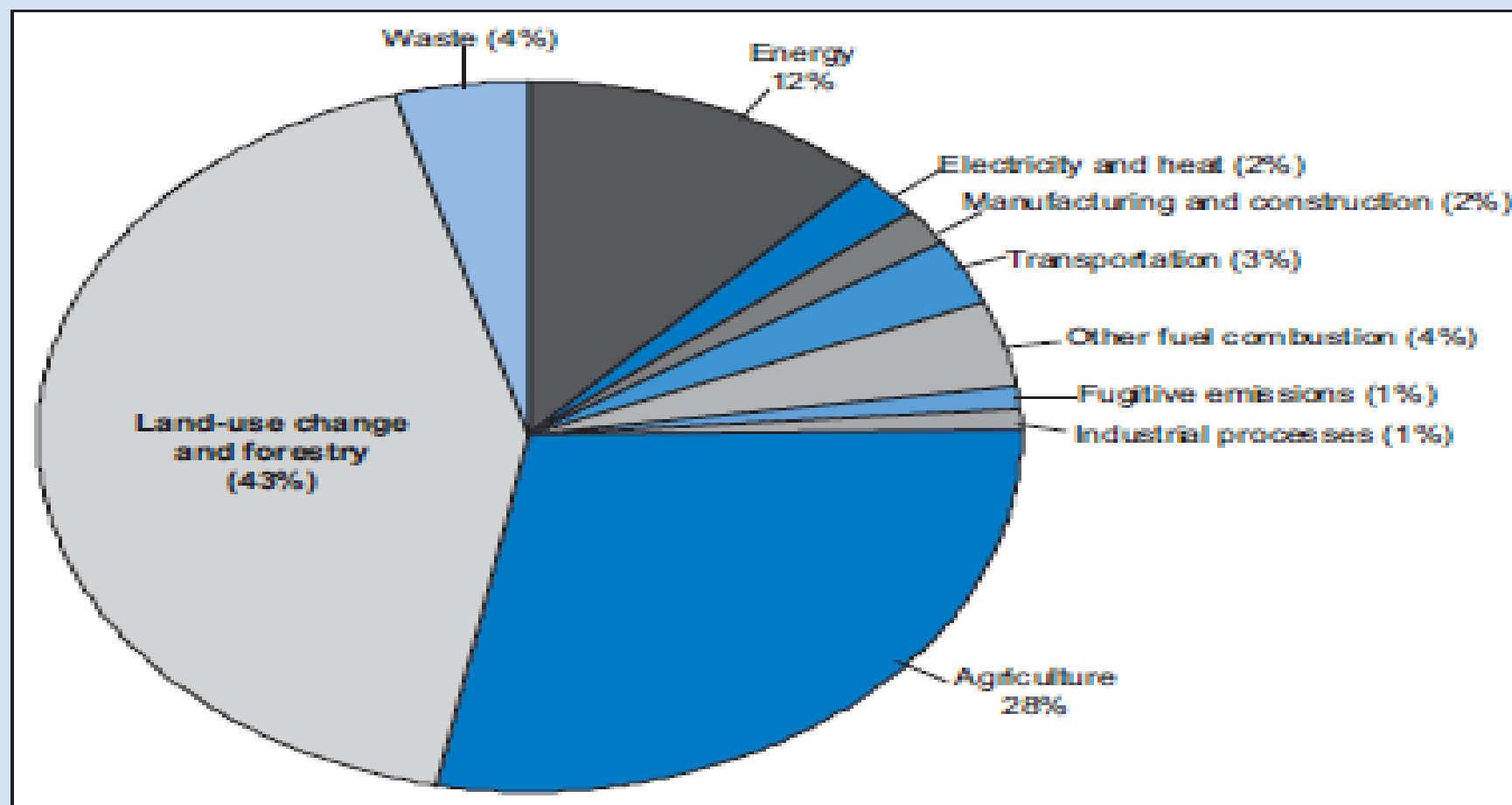
Direct and Indirect Emissions from Agriculture



Importance of Agricultural GHG Emissions in LDCs

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LDC GHG emissions by sector, 2005
(Per cent of total emissions)

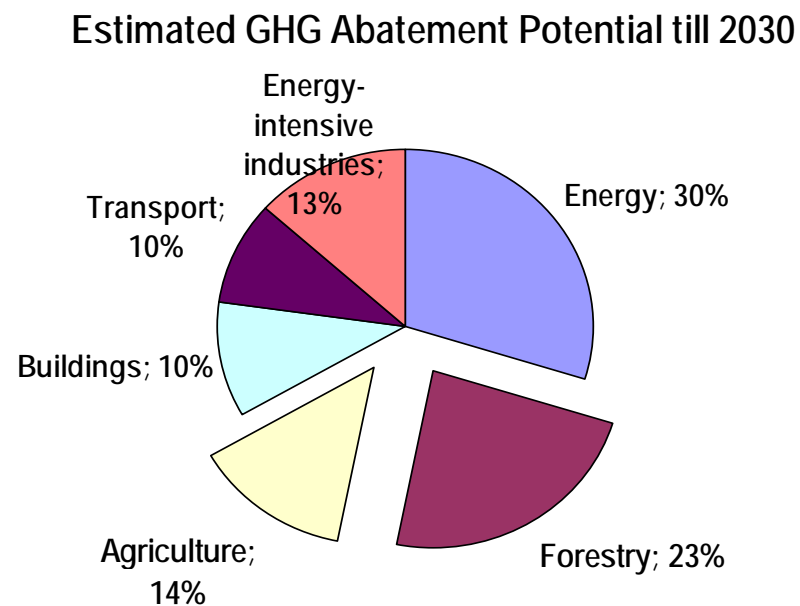


Source: World Resources Institute and UNCTAD, LDC Report 2010

Colossal Magnitude of CC Challenges for Agriculture ⁵

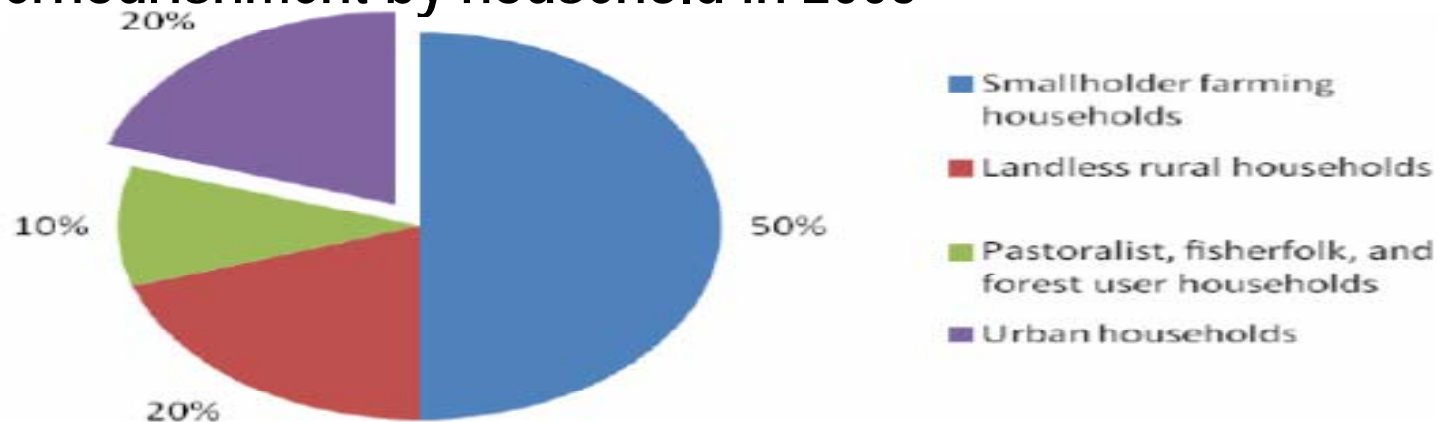
- Agriculture is very GHG-intensive: it accounts for about 13-15% of global GHG emissions, but only for about 4% of global GDP.
- Under a BaU-scenario, agricultural GHG emissions are likely to grow by 40-60% till 2030, when a decline of at least 30-40% is required.
- Agricultural productivity could decline by up to 50% in some regions till 2080.
- Agriculture has a very significant mitigation potential; and that at relatively low costs and with many economic and social co-benefits.

Source: McKinsey Global Institute, 2010

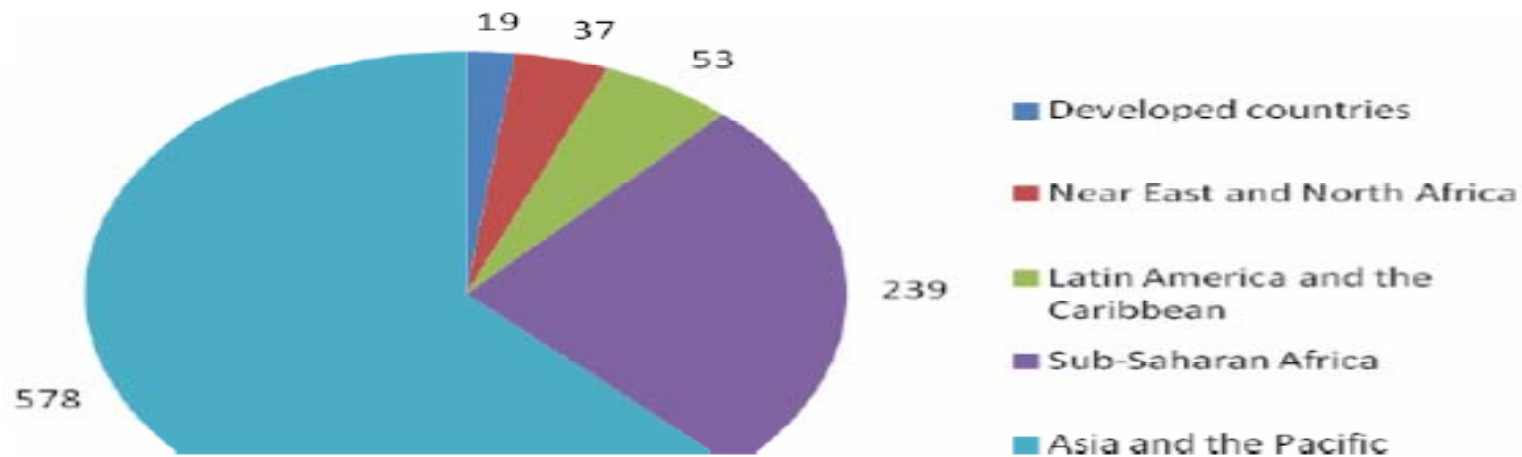


Where are the World's Undernourished?

Undernourishment by household in 2005



Undernourishment by region (2010, millions)



Source: Oxfam, Growing a better future, London, 2011

The Productivity Conundrum

- The perception that there is a supply side productivity problem is questionable. Hunger and malnutrition are mainly related to lack of purchasing power and/or inability of rural poor to be self-sufficient.
- What is needed is the intelligent use of nature, local knowledge and minimal external input use.
- Conventional agriculture increasingly encounters resource scarcities, lower productivity growth despite high external input use and serious contamination problems (nitrogen contamination, but one salient issue).
- Multifunctionality of Agriculture: (farmer is not only producers of agr products, but manager of an agro-ecological system):

- Food
- Soils & Landscape
- Education
- Water
- Biodiversity
- Energy
- Recreation

Reproductive Ecological Capacity is of key importance

New Vision

- Food systems are at risk from gradual degradation of their own eco-system integrity & services. **REQUIRED:** Re-establishing systemic efficiency requirements and a stronger integration of patterns and socio-economic drivers of utilization of land, water, nutrients & hydrocarbon resources, based on better ecological knowledge (strengthening/re-creating regenerative capacity of agricultural systems: closed loops/little external input dependence, includes sufficient availability/generation of compost/green fertilizers).
- Need food systems that deliver a range of economic, environmental & social goals, while being resilient to risks and disruptions. Three major challenges:
 - Sustainable production challenge (9 bn people)
 - Equity challenge related to poverty eradication (multiplier effect of agriculture)
 - Resilience challenge (reduced vulnerability to climate change impact)
- Biodiverse, eco-functional and locally focused farming is resource efficient and conducive to localized control of production system – promotes revitalization of local food economy and strengthens food sovereignty.

New Vision (cont'd)

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- Skewed power relations, market dominance, cost/price distortions, and unequal consumption patterns are the key problems – required fundamental changes are easier at times of revolutionary, rather than evolutionary changes (Fukushima disaster, inundations in Pakistan and Thailand)
- Livestock production is key climate hotspot in agriculture (in Germany, 70% of GHG emissions and 61% of all cultivated land destined for animal protein production, plus the equivalent of the surface of Belgium for imported soy-bean feed).
- Overall strategy:
 - Making low-input systems more productive and efficient (high output)
 - Making high input systems less harmful and problematic
- Greenwashing (continuing with modified business as usual):
 - Climate-smart agriculture / doing more with less
 - Superficial change: techno innovation, green inputs, institutional change

Potential of OA to Reduce GHG Emissions

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Tabelle 10.2: Theoretisch mögliche Treibhausgas-Reduktionspotenziale bezogen auf die landwirtschaftliche Gesamtproduktion in Deutschland: Jeweils „klimaschutzoptimales“ Verfahren im Vergleich zur durchschnittlichen gegenwärtigen Praxis

Produkt bzw. Verfahren*	Gesamtproduktionsmenge in Deutschland 2006 in Tonnen	THG-Emissionen 2006 in t CO ₂ -Äquivalente	Reduktionspotenzial in Prozent der produktbezogenen Emissionen	Reduktionspotenzial in t CO ₂ -Äquivalente	Reduktionspotenzial in Prozent der Gesamtemissionen der deutschen Landwirtschaft
Getreide ohne Futtergetreide	23.380.000	9.200.000	-65%	-5.800.000	-4,4%
Kartoffeln	11.624.000	700.000	-9%	-100.000	< -0,1%
Zuckerrüben	25.285.000	1.100.000	-47%	-500.000	-0,4%
Raps	5.052.000	4.100.000	-56%	-2.200.000	-1,6%
Schweinefleisch	4.213.000	13.000.000	-43%	-5.800.000	-4,3%
Milch	27.995.000	23.800.000	-25%	-6.000.000	-4,5%
Rindfleisch	1.284.000	9.600.000	-13%	-1.300.000	-1,0%
Humusaufbau auf Ackerland			-500 kg/ha/Jahr	-5.400.000	-4,1%
Biogasanlagen			-10% der THG Tierproduktion	-4.600.000	-3,5%
Wiedervernässung von Moorflächen		36.900.000	-100%	-36.900.000	-27,7%
Gesamtpotenzial zur Reduktion von Treibhausgasen				-68.600.000	- 51,6 %

*Bis auf das Verfahren „Bullen-/Ochsenmast aus Milchviehkälbern“ sind die Reduktionspotenziale definiert als Umstellung von durchschnittlicher konventioneller [konv] auf ökologische ‚best-practice‘-Wirtschaftsweise [öko_plus-Verfahren]. Im Fall des Verfahrens „Bullen-/Ochsenmast aus Milchviehkälbern“ besteht das THG-Reduktionspotenzial in der Umstellung ökologischer Ochsenmast aus Milchviehkälbern auf konventionelle Bullenmast, da dieses das klimafreundlichere Verfahren ist. Die Wiedervernässung landwirtschaftlich genutzter Moorflächen bezieht sich auf alle dort durchgeführten Bewirtschaftungsformen.

Quelle: IÖW, eigene Berechnungen auf Grundlage der Klimabilanzierung, sowie Daten der FAL (2000) für Kartoffeln, Zuckerrüben und Raps, des FiBL (2007) zum Humusaufbau, sowie Angaben aus dem Nationalen Inventarbericht (UMWELTBUNDESAMT 2005) zu dem Treibhausgasemissionen aus der Moornutzung. Zahlen der Spalten 2 und 4 gerundet auf 100.000.

Summing Up

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- The world needs a paradigm shift in agricultural development: From a “Green Revolution” to an “Eco-intensification” approach.
- Meeting the food security challenges is primarily about empowerment of the poor and their food sovereignty.
- Sustainable agricultural practices meet the five-fold challenge of food security, promoting equitable economic and social development, overcoming resource constraints and preserving biodiversity.
- Governments need to remove a spate of direct and indirect disincentives to sustainable agriculture (will free resources).
- Public investment needs to be considerably strengthened in R&D and in extension to shift from input intensive to knowledge intensive agriculture.

Summing Up

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- Recommendation of EC Standing Committee on Ag Research
3rd SCAR Foresight Exercise: "Approaches that promise building blocks towards low-input high output systems, integrate historical knowledge and agro-ecology principles that use nature's capacity, should receive the highest priority for funding."
(February 2011)



THANK YOU

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UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

TRADE AND ENVIRONMENT REVIEW

2009/2010

Promoting poles of clean growth to foster the transition to a more sustainable economy

UNCTAD
UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT

N° 18, December 2010

UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT
UNITED NATIONS ENVIRONMENT PROGRAMME
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UNEP-UNCTAD Capacity Building Task Force on Trade, Environment and Development (CBTF)

Best Practices for Organic Policy
What Developing Country Governments Can Do to Promote the Organic Agriculture Sector

UNCTAD POLICY BRIEFS

Agriculture at the Crossroads: Guaranteeing Food Security in a Changing Global Climate

For a large number of developing countries, agriculture remains the single most important sector. Climate change has the potential to damage irreversibly the natural resource base on which agriculture depends, with grave consequences for food security in developing countries. However, agriculture is the sector that has the potential to transcend from being a problem to becoming an essential part of the solution to climate change provided there is a more holistic vision of food security, climate-change adaptation and mitigation as well as agriculture's pro-poor development contribution. What is required is a rapid and significant shift from conventional, industrial, monoculture-based and high-external-input dependent production towards mosaics of sustainable production systems that also considerably improve the productivity of small-scale farmers. The required transformation is however more fundamental than simply tweaking the existing industrial agricultural systems.

In most developing countries, agriculture accounts for between 20-60% of GDP and employs up to 65% of the labor force, providing a livelihood for approximately 2.6 billion people globally. Despite increased world food production in the last few decades, the areas that remain in food or malnutrition danger by half by 2015 now appear beyond reach. In fact, the number of people suffering from chronic hunger has increased from under 800 million in 1996 to over one billion recently.

Global warming poses significant threats to agricultural production and trade, and consequently increases the risks of malnutrition and climate change. Preliminary estimates for the period up to 2050 suggest a decline of some 10-30% of agricultural productivity in the most climate change-exposed developing country regions: Sub-Saharan Africa and South Asia. For some countries in these regions, total agricultural production could decline by up to 50%.

GHG emissions in agriculture
Agriculture accounts for about 10-20% of global GHG emissions, the former being confined to direct, the latter including indirect agricultural GHG emissions from agricultural inputs, equipment, food processing, transport, and land-use changes. As agriculture's share in global GDP is just about 4%, this suggests that agriculture is a very GHG-emission-intensive. Agricultural emissions of methane and nitrous oxide (collectively accounting for over 90% of agricultural GHG) grew by 17% in the period 1990-2005, about three times up to as productivity increased in global cereal production, for instance. These GHG emissions are predicted to rise by further 20-60% by 2020 in response to population growth and changing diets in developing countries, in particular towards the greater consumption of ruminant meats and dairy products, as well as the further spread of industrial farming.

Composition of GHG emissions in agriculture
The composition of GHG emissions in agriculture is very different from that of other industries. Carbon emissions account for only about 2% of emissions, almost 90% of which mostly from fertilizer use, and methane (CH₄) emissions (related to fermentation

digestion by ruminant livestock, residue/straw management and rice cultivation in flooded conditions) represent 46 and 45%, respectively. In many developing countries, agriculture accounts for the majority or a major share of national GHG emissions.

Key driving forces of GHG emissions in agriculture
Land-use changes, primarily deforestation, mono-crop-based industrial agricultural practices, and industrial livestock production that rely on significant external inputs are the major driving forces of agricultural GHG emissions.

Deforestation has been largely driven by intensified cattle, animal feed, vegetable oil or palm, and large-scale bio-fuel production, mostly in natural or increased exports. Deforestation for fuel wood and subsistence agriculture by rural poor and landless has also played a role.

Today's advanced food production systems have become heavily dependent on the continuous investment in and use of energy-intensive machinery and fossil-fuel-based agricultural inputs. At present, industrial agriculture uses 2-3 times more fertilizer and 1.5 times more pesticides for the production of 1kg of food than it did 40 years ago. Industrial agriculture uses ten times more energy than eco-agriculture, consuming on average 10 energy calories for every food calorie produced. This imbalance is only possible with cheap energy-intensive inputs like distorted prices.

Promising mitigation and adaptation strategies
Agriculture is a sector that has the potential to move from being part of the problem to becoming an essential part of the solution to climate change. It is however clear that a much more fundamental transformation is required to meet the challenge of the rising industrial-agricultural systems. In essence, the key task is to transition the system, from high-external-input-dependent model of input-intensive agriculture to a regenerative agricultural system. Such a system (consisting of a mosaic of sustainable production methods) continuously recycles the resources it uses and achieves higher productivity and profitability of the

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DISCUSSION PAPERS

ASSURING FOOD SECURITY IN DEVELOPING COUNTRIES UNDER THE CHALLENGES OF CLIMATE CHANGE: KEY TRADE AND DEVELOPMENT ISSUES OF A FUNDAMENTAL TRANSFORMATION OF AGRICULTURE

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LEAST DEVELOPED COUNTRIES SERIES

N° 20 C, May 2011

UNCTAD POLICY BRIEFS

Sustainable agriculture and food security in LDCs

The most critical issues facing LDCs today are poverty and hunger. These issues related to each other and to environmental degradation. LDCs are primarily agricultural economies with nearly 70% of the population engaged in agriculture. The vast majority of the poor and food insecure are in rural areas. Therefore poverty alleviation and food security must start in these areas.

The outcome of the World Food Summit states that, "food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life." It requires that food is available locally and that people have the means to acquire it, either by growing it or purchasing it, throughout the entire year.

Productivity of LDC agriculture is relatively low. Land degradation is a major problem, due to increasing population pressure, erosion, water scarcity and the breakdown of traditional systems for soil fertility. Farmers have little support from their Governments, with African countries spending only 0% of their budget on agriculture, disproportionate to the size of the sector in terms of employment and economic activity. Twenty years ago most LDCs chartered marketing boards, extension services and credit support and opened up agricultural markets to subsidized exports from developed countries. This decimated agricultural sectors and most turned from net food exporters to net food importers within a decade. The LDC food import bill rose from \$9 billion in 2002 to \$24 billion in 2008.

International finance organizations and bilateral donors advised several LDCs to set up production and export capacity for cash crops. While some countries, such as Tanzania, have been successful in this regard, this focus often detracted political attention and crowded out investment from staple food production and its supportive infrastructure and institutions.

In addition, post harvest losses in LDCs are large, with at least one third of food produced being lost before reaching consumers due to spoilage, poor storage and transport facilities. On-site processing of agricultural products is limited by energy poverty; 82% of rural households in sub-Saharan Africa have no electricity.

Environmental degradation contributes to food insecurity. Natural ecosystems provide most of the world's poor with food, fuel, medicine, building materials and cultural identity. These systems are being systematically degraded and destroyed, and their regenerative and strategic productive capacity jeopardized. Unsustainable land management practices lead to scarcity of water for both drinking and agriculture.

The changing climate increases extreme weather events in LDCs (extreme temperature, floods and drought) and unpredictable changes in weather patterns that affect agriculture. Extreme weather events

in LDCs increased fivefold from the period 1970-79 to 2000-10, resulting in over USD 14 billion losses. Land use changes, forestry and agriculture account for over 70% of LDC greenhouse gas emissions.

Environmental degradation, low agricultural productivity, high post harvest losses, limited connections to markets, energy poverty, limited education and non-agricultural opportunities, hunger and three lead millions of desperate people to leave rural areas each year for the cities, only to find that life is often no better.

To check this vicious circle, rural areas in LDCs must be revitalized, transforming them into vibrant places with a clear perspective for families and young people. For this we need a fundamental transformation, even a revolution, in agriculture.

This revolution should not be based on expensive imported external inputs. Governments spend large amounts of their foreign currency received on agrochemicals (synthetic fertilizers, pesticides, herbicides, fungicides). LDCs import over 90% of the agrochemicals used in agriculture. Many of these chemicals are dangerous, with pesticides being a top cause of occupational mortality and morbidity, and they are difficult to provide to rural farmers at the right time. It is problematic that the global seed, agrochemical and biotechnology market is dominated by few companies, with the four biggest controlling 60% of global agro-chemical, a third of seed and almost 40% of biotechnology supply.

The prices of oil and agrochemicals are increasing, due to the increasing price of fossil fuels, used in agrochemicals, and mineral phosphorous, used in synthetic fertilizer. The agricultural input index skyrocketed just before the first food price crisis of 2008. As can be seen in Figure 1, the ratio of food prices to input prices fell steadily over the 2004-2008 period. Farmers were not profiting from higher food prices because their input prices were increasing much faster.

In the light of the above, going down the high-external-input-dependent, industrial agriculture route places LDCs in a situation of extreme vulnerability.

Figure 1 - Development of the output to input price ratio: food versus inputs

Source: FAO, The State of Agricultural Commodity Markets 2009: High Food Prices and the Food Crisis - Experience and Lessons Learned, Rome, 2009, p. 90.