Climate Change Mitigation: Ecological, small holder systems can be the solution

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www.agassessment.org
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International Assessment of Agricultural Knowledge, Science and Technology for Development

Overview

1. What is the problem with the present agriculture and food system?: Key findings of the IAASTD

2. Options for action

3. Conclusions

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How ecological, small holder systems (ecosystem and people-based system) are the solution Mitigation:

needs to be focused on industrial ag—which means focusing on x,y,z What is the reality of food production in the world today? Who produces most food and where is it eaten? IAASTD and why it needs to be brought to bear: what are the most relevant findings and why are they necessary to be understood in the world of climate negotiations?Right to Food and its implications with proposals for mkt-based approaches; Burden cannot be placed on small holder farmers"Climate smart" vs what is real tech transfer

The IAASTD Reports

(www.agassessment.org)

Multi-stakeholder: 400 authors, 52 countries

Multi-disciplinary

Multi-locational: Global / sub-Global Reports

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IAASTD Development and Sustainability Goals (MDG)

- Eradicating of Hunger and Poverty
- Improving Rural Livelihoods
- Improving Nutrition and Human Health
- Facilitating Environmentally, Socially, Equitable and Economically Sustainable Development

…the Challenges:

- Climate Change
- Population and Demand Growth
- Shrinking Natural Resources (land, water, energy)

….to which agriculture itself is contributing negatively

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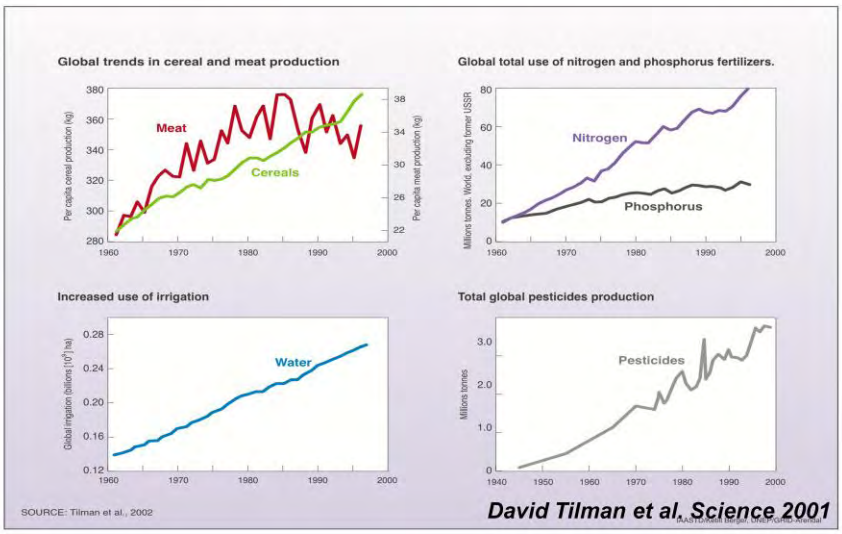
Realizing these goals requires acknowledging the multifunctionality of agriculture: the challenge is to simultaneously meet development and sustainability goals while increasing agricultural production

Background “Agriculture at a Crossroads”

IAASTD: The Reports: www.agassessment.org

Understanding the problem: the green revolution

Synthetic fertilizers, irrigation and pesticide use are UNSUSTAINABLE



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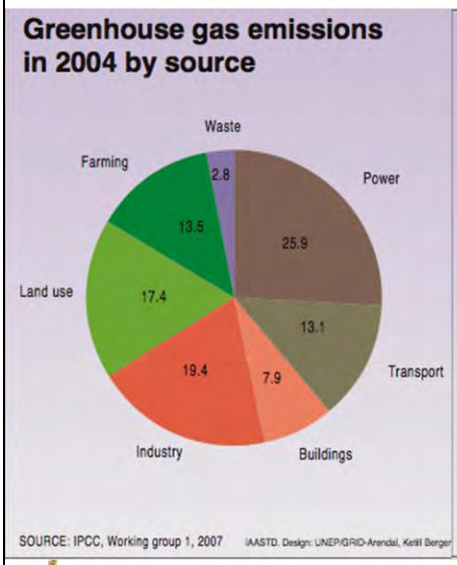
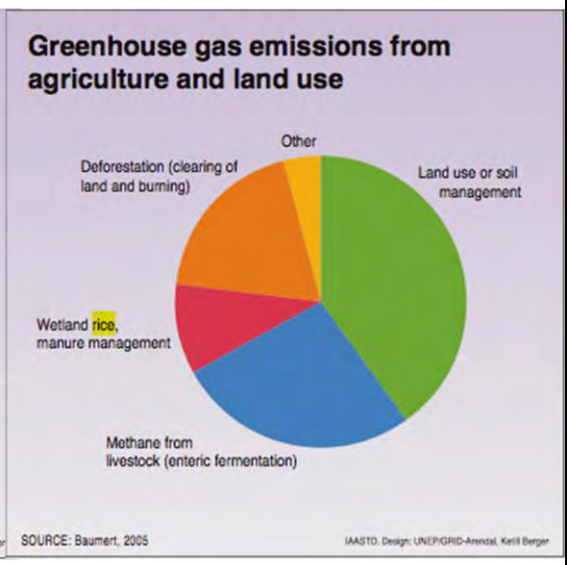
- The case for better seeds and agronomic practice…..quite clear conclusion!

Understanding the problem: GHG





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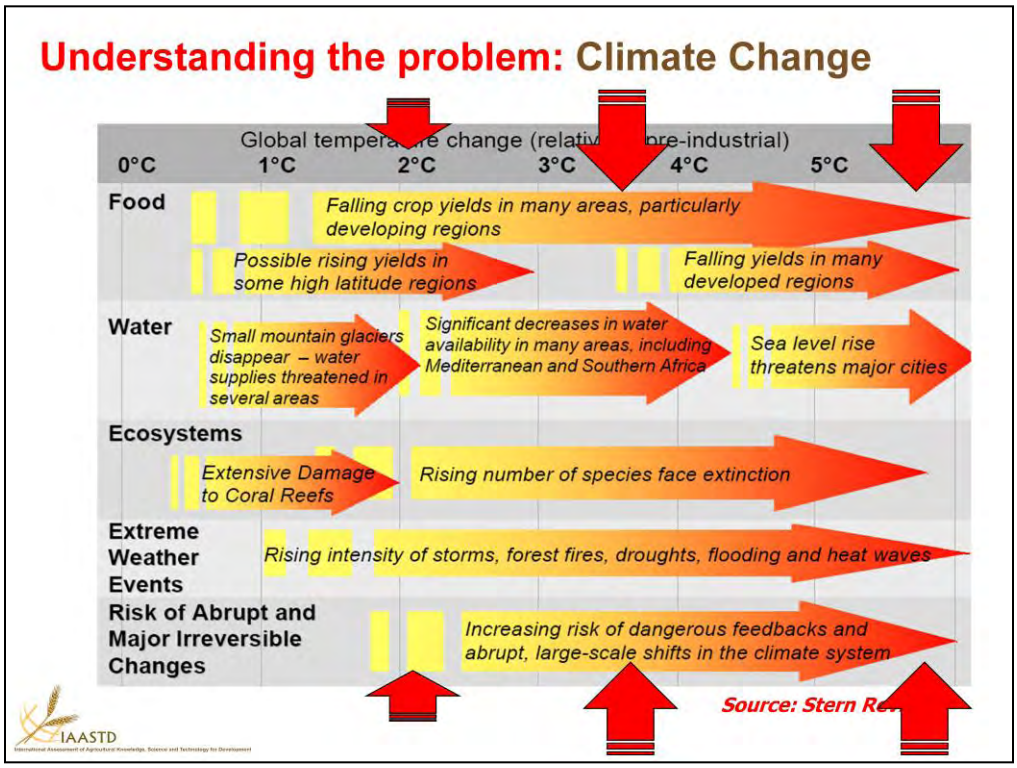
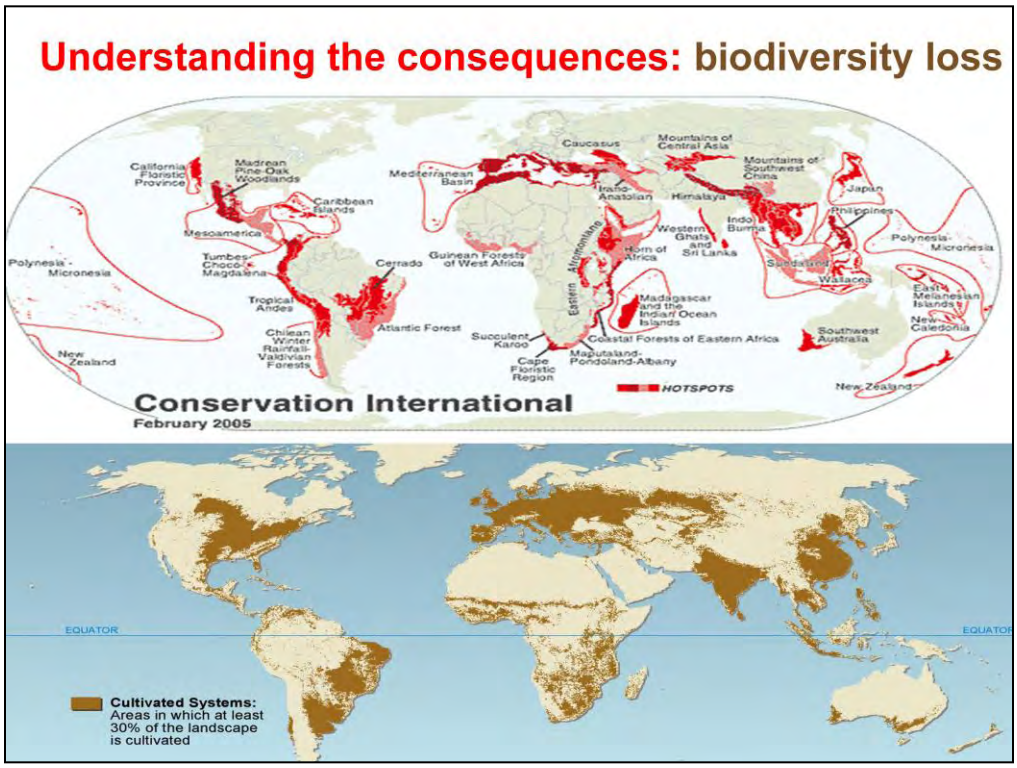


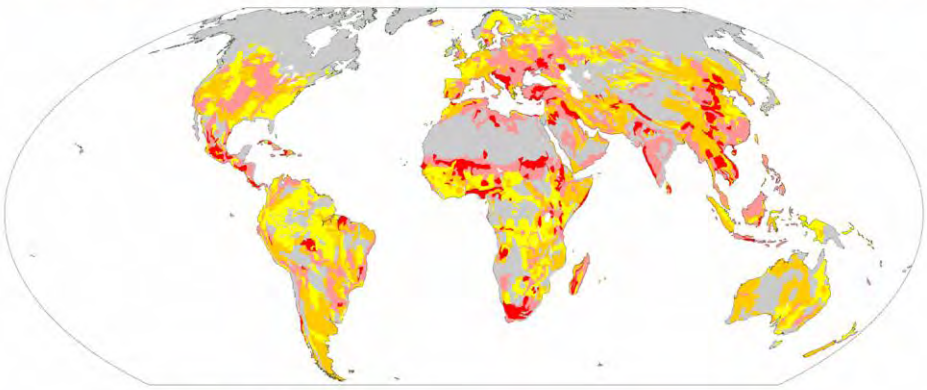
Relation between temperature and impacts: The risks intensify as temperature rises. A BAU scenario implies a rise of 4-5 degrees-equivalent to the change in average temperatures from the last ice age to today.



mark with circles that appear on a click the different biodiversity hotspots I guess they would show up in the most intensively cultivated areas…so making the point that farmers can be the best stewards of biodiveristy in these areas…

Understanding the consequences: Soil degradation

All agricultural soils show signs of degradation



Land degradation :

light | medium | high | very high

FAO -GIS, March 2000

World map of severity of land degradation – GLASOD (FAO 2000)

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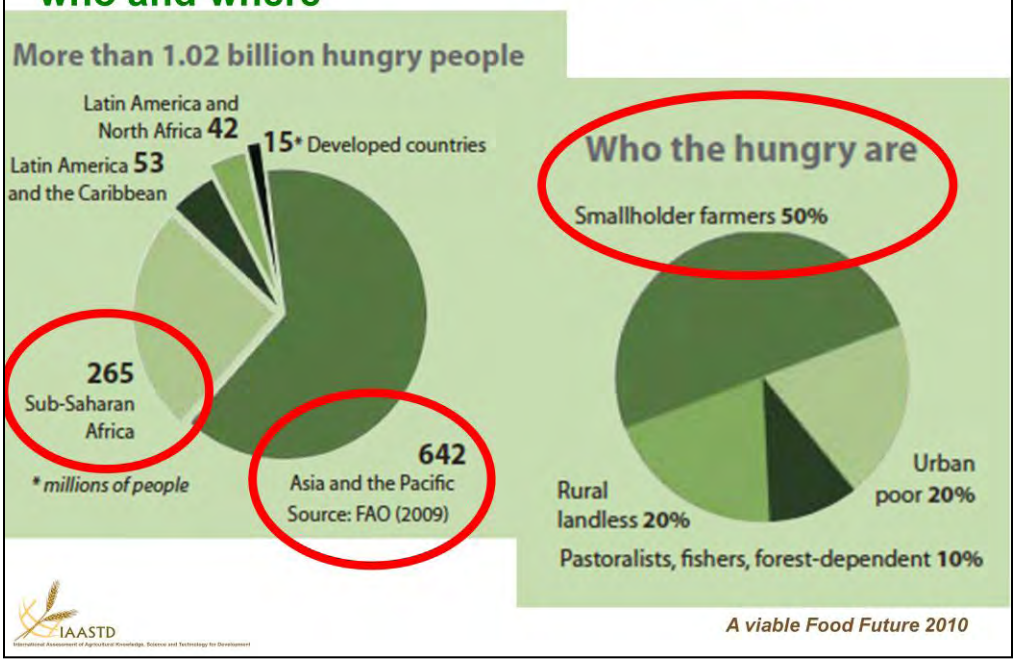
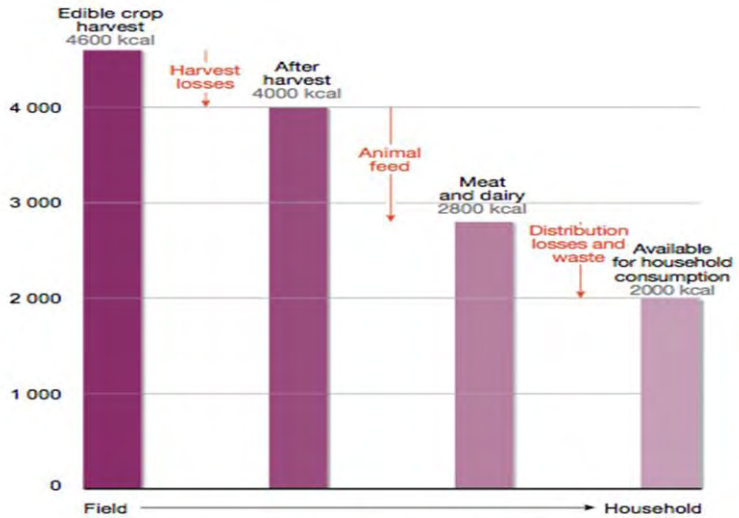
Understanding the consequences: Hungry: who and where



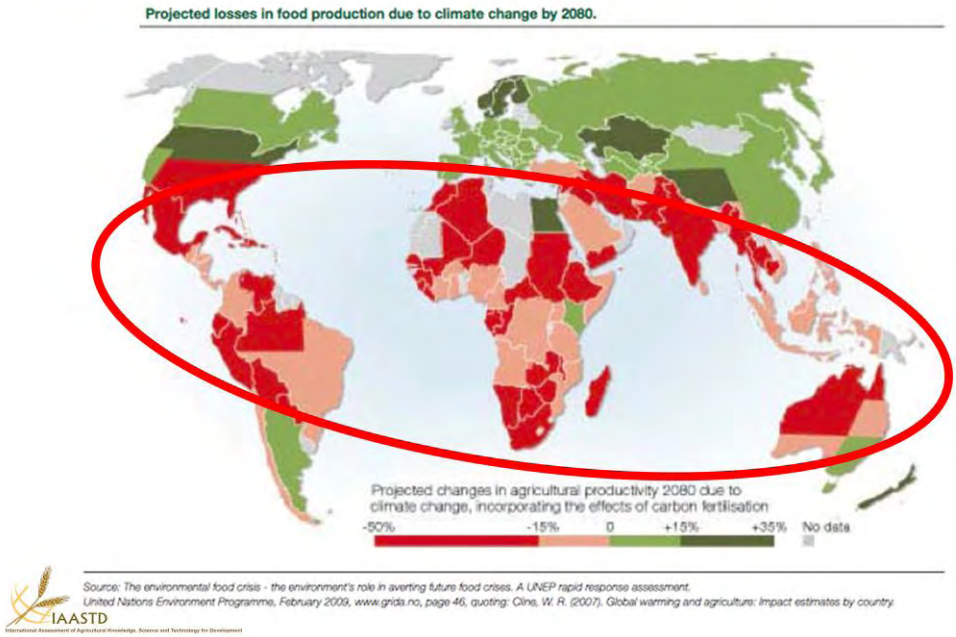
Understanding the consequences: overproduction, conversion and wastage



A gross estimate of the global picture of losses, conversion and wastage at different stages of the food supply chain. (Source: Lundqvist *et al.*, 2008).

The transfer of externalities to the general society (at large and the future generations) has lead to cheap food and so wastage

Understanding the consequences: CC and water / temperature stresses



Relation between temperature and impacts: The risks intensify as temperature rises. A BAU scenario implies a rise of 4-5 degrees-equivalent to the change in average temperatures from the last ice age to today.

A scenario with 3.6 degrees is very likely and the consequences are dramatic for agriculture

IAASTD….the bottom line
……..Business as usual is NOT an option

"a fundamental shift in AKST and the linked agri-food system policies, institutions, capacity development and investments"

Paradigm change: Transition to sustainable / organic / agro-ecological / resilient agriculture

i.e., addresses multifunctionality:

- needs of the small-scale and family farms (social & economics);
- systemic and holistic approach;
- is part of the solution to hunger, poverty, health;
- is part of the solution to CC

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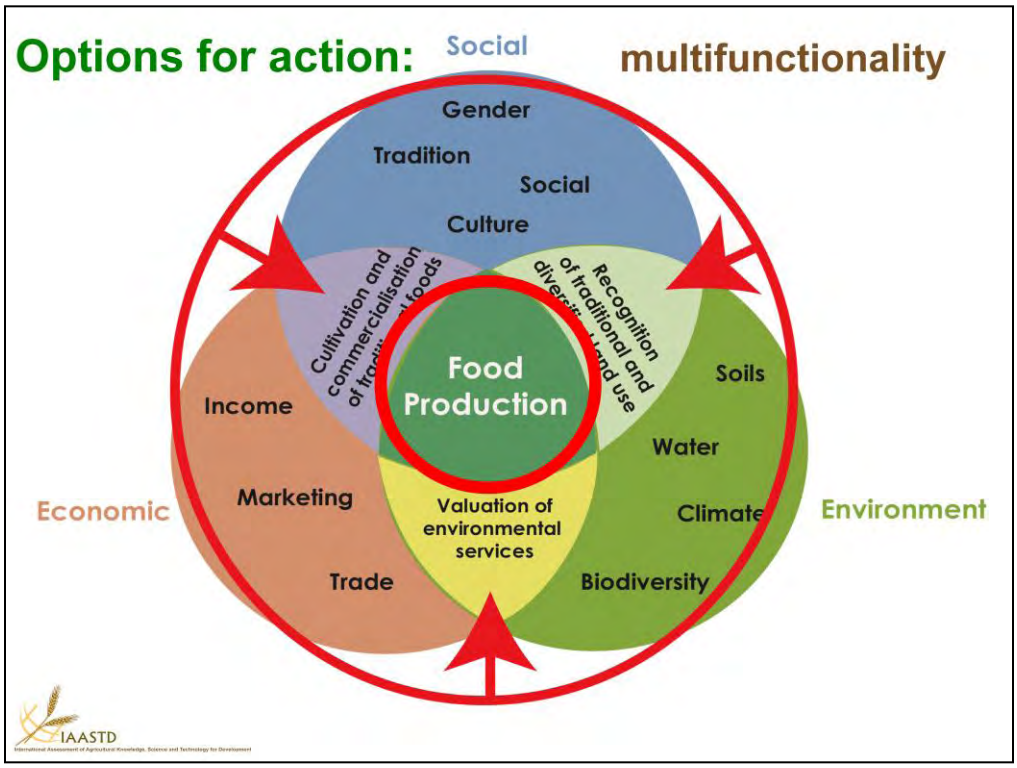
Options for action:
Social
multifunctionality
Gender
Tradition
Social
Culture
Cultivation and commercialisation
Recognition of traditional and
Food Production
Income
Soils
Water
Economic
Marketing
Valuation of environmental services
Climate
Environment
Trade
Biodiversity
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The small scale farmers, fisher-folks and pastoralists: doing the numbers

Why empower, involve and support small scale/family farmers (women)?

1.5 billion peasants on 380 million farms
800 million people growing urban gardens
410 million gathering the hidden harvest of forests and savannas
190 million pastoralists
100 million peasant fishers

In addition 370 million of these are also indigenous people

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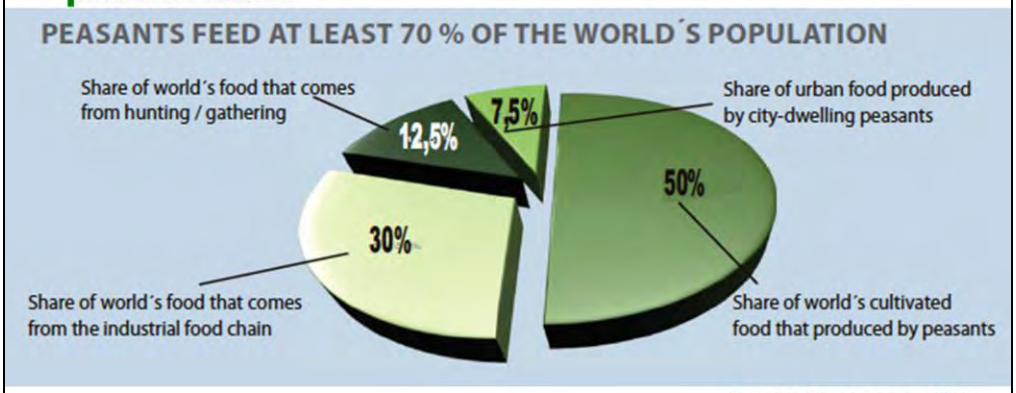
Challenges over the next 50 years need targeted application of existing AKST; institutional reform and approaches for modern and traditional agricultural and natural resource management and breakthroughs in science and technology, i.e.,

- advance approaches to value, internalize and/or pay for agroecolgical services.
- **improved soil and water management (increase retention and decrease erosion);**
- **increased water productivity and value per unit used;**
- **deployment of soil conservation measures;**
- **use of microbiological techniques to suppress diseases in soils;**
- **use of phosphorus-solubilizing bacteria;**
- **integrated pest management (IPM)(participatory), molecular techniques; and modeling; build systems resilience for CC pest threats;**
- **intensified integrated crop, tree, livestock and fish systems managed as multifunctional agricultural systems**

The small scale farmers, fisher-folks and pastoralist



A viable Food Future 2010

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Options for action

Empower, involve and support small scale/family farmers (women) with

- sustainable agricultural practices (S&T information, knowledge sharing, participatory research, incl breeding)
- restoration and management of ecosystem services
- crop/animal and labor productivity increases, appropriate mechanization
- promote diversity of crops, animals and systems
- safety nets (insurances, etc)

Business as usual is not an option

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Options for action: the system's approach

Using natural systems to regulate pest outbreaks

(example of push-pull greater farm productivity vs higher yields 2 to 10X)

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The push-pull method is an integrated production system, in which a crop combination deals with a number of issues at once:

1.Insect pest: the stem borer in the corn filed are repelled by the cover crop Desmodium, and attracted by the Napier grass, a trap crop planted around the field.

2.Desmodium is also attractive to the natural enemies of the stem borer, so the few that enter the field are readily parasitized.

3.The parasitic weed Striga weed is controlled by Desmodium, which stops its growth through exudates from the roots

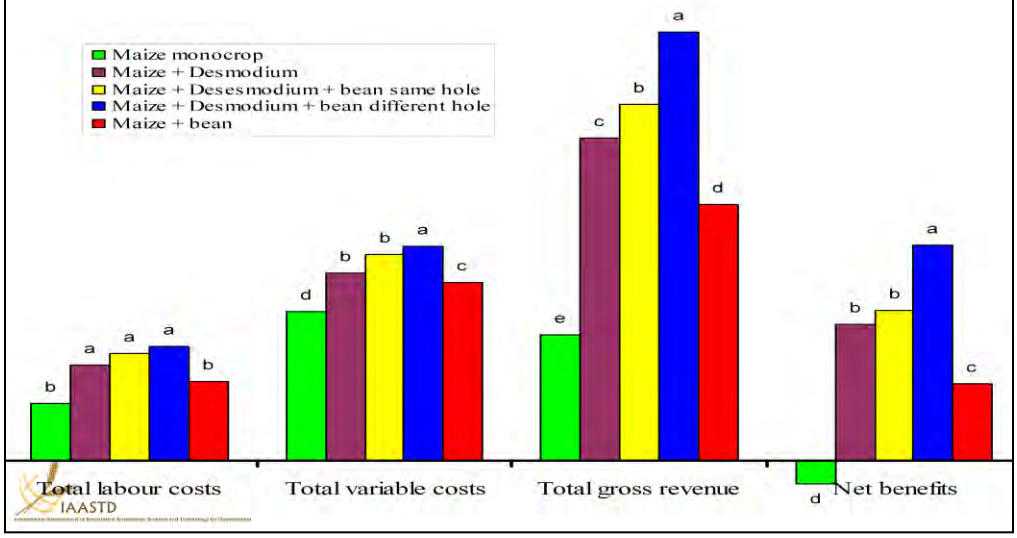
4.Erosion is stopped, the ground being covered in permanence.

5.In addition to high corn yields, the system also produces fodder for livestock

6.In this "conservation" agriculture system, the soil fertility is enhanced at each cropping cycle, Desmodium being a legume, fixing nitrogen, manure form the livestock brings back N and other important nutrients.

7.The push-pull system, developed at the ICIPE in Nairobi, has been featured in Wired Magazine last November on the future of food

ECONOMICS OF INTEGRATING EDIBLE BEANS IN THE 'PUSH-PULL' SYSTEM *(source Z Khan et al)*



Options for action: animals on farm

Managing natural resources to benefit people

It is **imperative** to put the animals back on farm: sanitation, health, carbon cycle, sustainability

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We could also add …and other critical ecosystem services (pest management, pollination, water, air etc….maybe not yet…

Options for action: Valuing ecosystem services

K,S&T for sustainable agriculture: Use what works…..Biological control
Saved cassava, the staple of 200 million people and 20 million lives

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Options for action

- **Improve markets (fair), infrastructure, and institutions** (reverse rural-urban flow; more and green jobs)
- **Expand R&D and disseminate results:**
  - **ecosystem sustainability oriented research** (ecological revolution for a climate smart agriculture)
  - **develop new knowledge and technology with stakeholder participation for the transition to sustainable food production** (animals on farm, animal, plant and system diversity, biological control &IPM, PES) (more R&D jobs)

Business as usual is not an option

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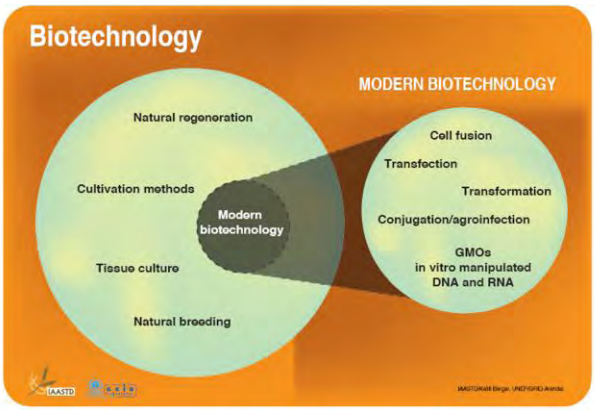
Options for action

Biotechnology and genetic engineering

- Issues of definition, cost:benefit, suitability, alternatives and safety



Business as usual is not an option

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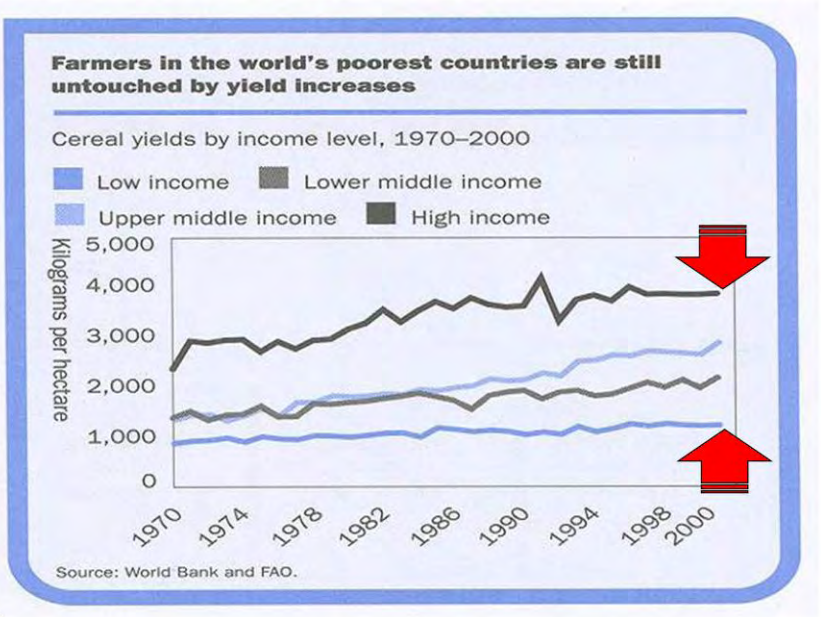
Options for action: closing the yield gap



Options for action: more crop and animal diversity

Managing crops and animals to benefit people and biodiversity

Encouraging a wider genetic base in agriculture…trees, fruits, grains, vegetables, lost crops, animals

for nutrition, cultural diversity, incomes, pest control, resilience to climate change

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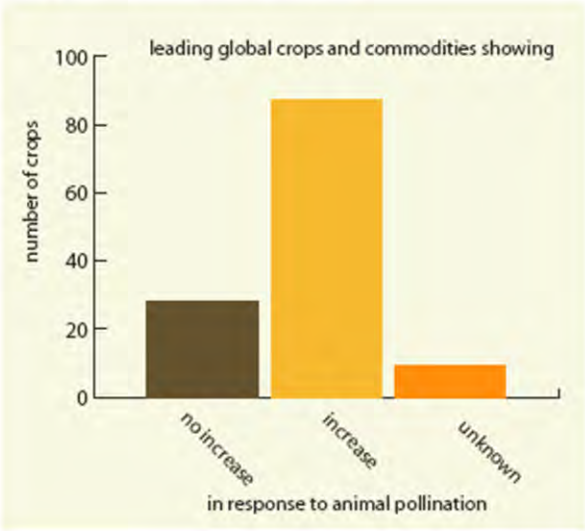
Options for action: more ecosystem services

Managing insects to benefit people and biodiversity

Using natural systems to increase productivity and quality through wild pollination services:

In agro-ecosystems, pollinators are essential for orchard,



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mention coffee…in Brazil! And the benefits of shading and increased pollination on yield and ?quality (actually some example for quality improvement following better pollination would be good

horticultural and forage production, as well as the production of seed for many root and fibre crops. Wild pollination services are promoted when agricultural landscapes are diverse, patches of natural habitat remain, and the use agrochemicals is minimized.

Options for action

- Bring all sectors responsible for sustainable development into a comprehensive systemic analysis, to recognize that policy decisions in one sector (i.e., transportation) strongly affect other sectors (input & market access)
- Promote responsible governance and behavior at global, regional and local levels
- Invest in long term gains versus short term quick fixes (i.e., deal with the cause not the symptoms by understanding the system)

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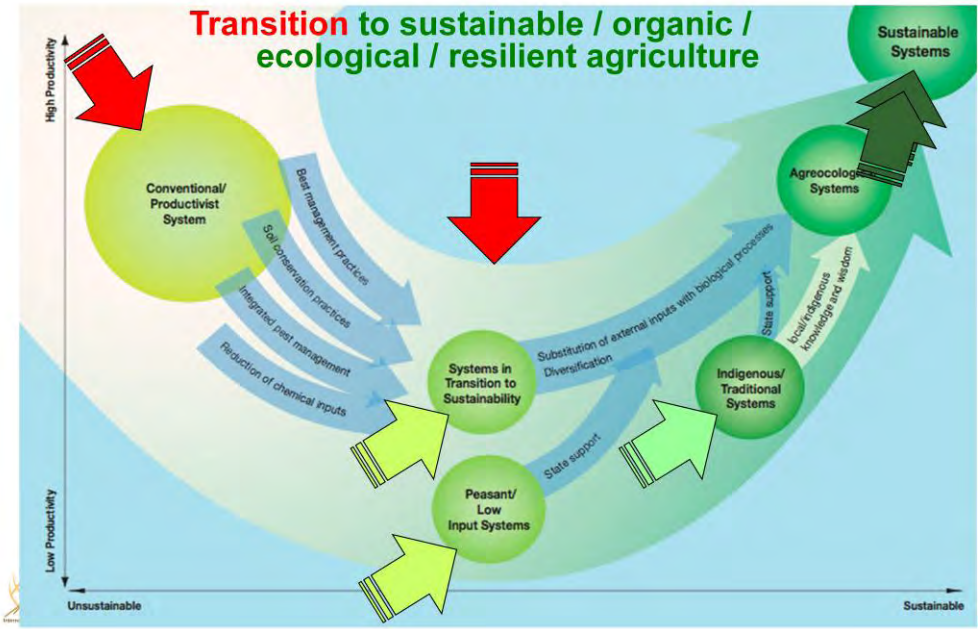
In conclusion: : the challenge



Conventional system:

Best ngnt practices

Soil conservation practices

IPM

Reduction of chemical inputs

System in Transition to sustainability: substitution of external inputs with biological processes

Peasant low input: state support to reach “substitutions etc…

Indigenous traditional systems: state support to reach the substitutions….

Big numbers

Investing between 0.1% and 0.16% of total GDP ($83-$141 Billion) / year 2011-2050

Year		2011	2030					2050				
Scenario	Unit	BAU	[a] B2	[a] B1	BAU	G1	G2	B2	B1	BAU	G1	G2
Agricultural sector variables												
Crop production	Bn $/Yr	449	519	506	478	512	531	570	538	500	550	593
Livestock production	Bn $/Yr	313	407	407	406	407	408	498	499	499	502	506
Employment	M people	1087	1415	1376	1338	1404	1446	1689	1610	1533	1653	1732
[b] Soil quality	Dmnl	0.92	0.80	0.82	0.86	0.94	0.97	0.73	0.75	0.81	0.98	1.03
[c] Agriculture water use	KM3/Yr	3423	4488	4418	4317	3551	3543	5365	5209	4929	3220	3221
Harvested land	Bn Ha	1.20	1.28	1.27	1.26	1.24	1.24	1.33	1.32	1.30	1.25	1.25
Deforestation	M Ha/Yr	15	22	19	15	7	7	25	21	15	7	7
Calories per capita per day (available for supply)	Kcal/P/D	2787	2973	3050	2840	3001	3093	3178	3273	2981	3238	3382
Calories per capita per day (available for household consumption)	Kcal/P/D	2081	2315	2256	2120	2237	2305	2476	2406	2227	2414	2524

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To contrast business as usual and explore possible avenues to green agriculture to 2050, two green scenarios (G1 and G2) of investments were developed to incorporate the global investments that would be needed. Respectively, these are 1% and 2% of total GDP, assume investments for agriculture equal to 10% and 8% of the total green investment (on average $83 billion per year in G1 and $141 billion in G2) between 2010 and 2050

In conclusion: Message to COP16

1. Today's main agricultural system and practices are not solving the major problems of food security and food sovereignty. Hunger, poverty and inequity nexus with widespread under and malnutrition persist at a global level (social and economic)
2. These systems and practices are the source of huge externalities that are burdening agriculture itself, such as the contributions to Climate Change. They have destroyed much of the agrobiodiversity and the soils (environment)

Therefore: Need to implement without further delays the comprehensive options for action developed by the IAASTD

1. ….this will deal with the above issues from a causal angle
2. ….place the emphasis on the small scale and family farmer, research, education and development for organic and agroecological practices, trade policies that support and favor small scale agriculture (ecosocial intensification)
3. …..this will spurn investments across the board in agriculture and the necessary enabling conditions

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- **Soil** (fertility, erosion control, …)
- **water** (distribution, ….)
- **Pest** (prevention through soil, plant, animal and environmental health, interventions via environmental management, breeding, and biocontrol methods)
- **Agricultural system** (resilience to CC, diversified food demands,…)
- **Improved labor productivity(** with efficient use of farm mechanization and skill development and education that create quality/dignified jobs with gender equity)

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You cannot solve the problem with the same kind of thinking that created the problem. ***Albert Einstein***

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