

Agriculture at a Crossroads Implementing the IAASTD

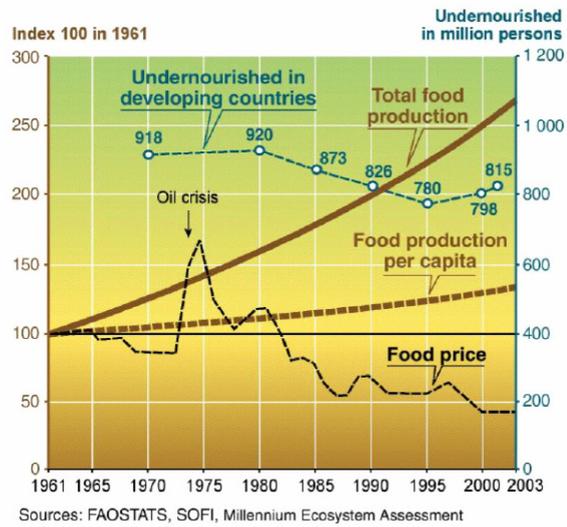
Bob Watson

Houses of Parliament

October 30, 2008

- **Drivers of the recent increase in food prices**
 - Increased demand from rapidly developing countries, e.g., China
 - Poor harvests due to variable weather - possibly related to human-induced climate change
 - Increased use of biofuels, especially maize in the US
 - High energy prices, hence fertilizer prices
 - Export bans from some large exporting countries
 - Speculation on the commodity markets

Key question is whether this is a blip or a harbinger

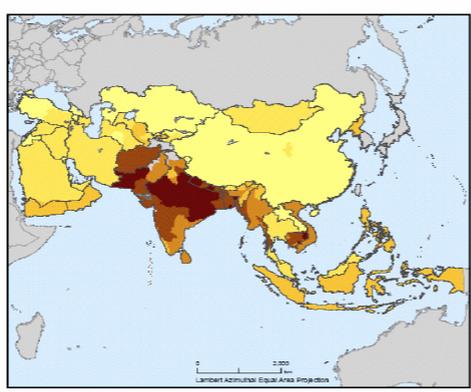
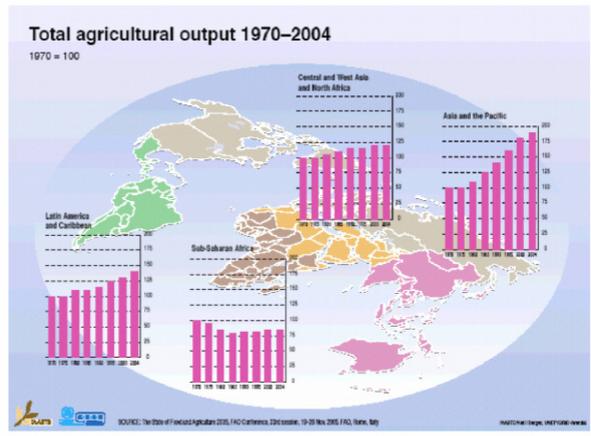


So What's the Problem ?

People have benefited unevenly from these yield increases across regions, in part because of different institutional and policy environments

This productivity increase has come at a cost: environmental sustainability – soils, water, biodiversity, climate change





Asia
By Subnational Administrative Level

Measures of Poverty
Child Malnutrition
Children are defined as underweight if their weight-for-age z-scores are more than two standard deviations (2 SD) below the median of the NCHES/CDC/WFSO International Reference Population.

Percent of Children Age 0-5 Underweight

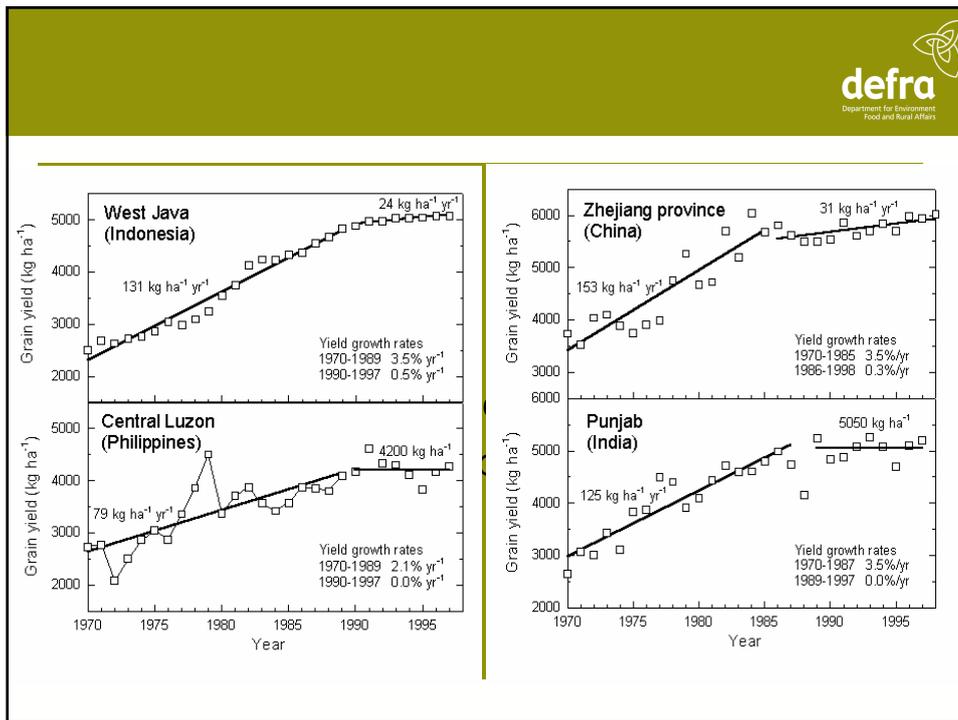
- less than 10%
- 10.1 - 20%
- 20.1 - 30%
- 30.1 - 40%
- 40.1 - 50%
- more than 50%

No Data

National boundaries

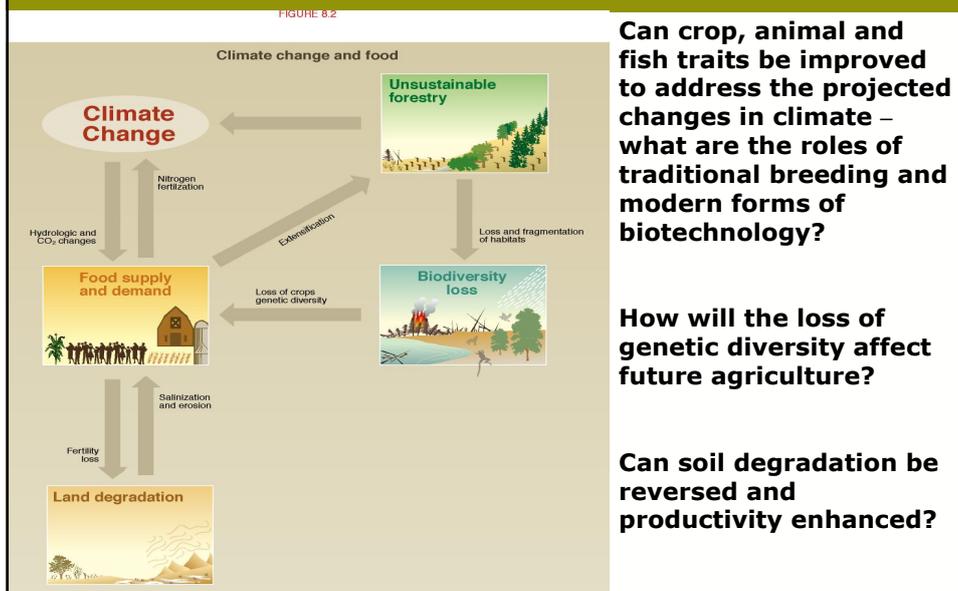
Subnational boundaries have been removed from countries for clarity.





Agriculture and Environmental Degradation

FIGURE 8.2

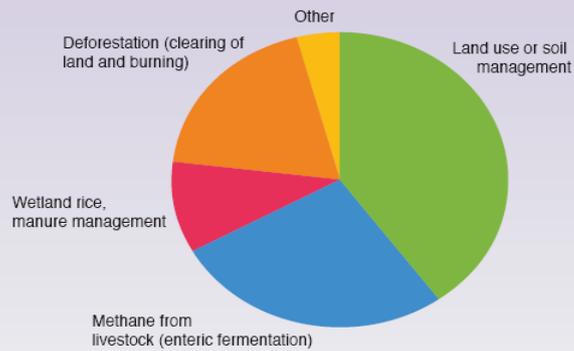


Can crop, animal and fish traits be improved to address the projected changes in climate – what are the roles of traditional breeding and modern forms of biotechnology?

How will the loss of genetic diversity affect future agriculture?

Can soil degradation be reversed and productivity enhanced?

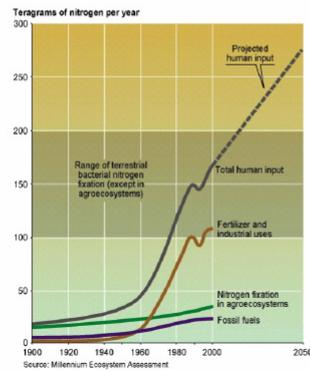
Greenhouse gas emissions from agriculture and land use

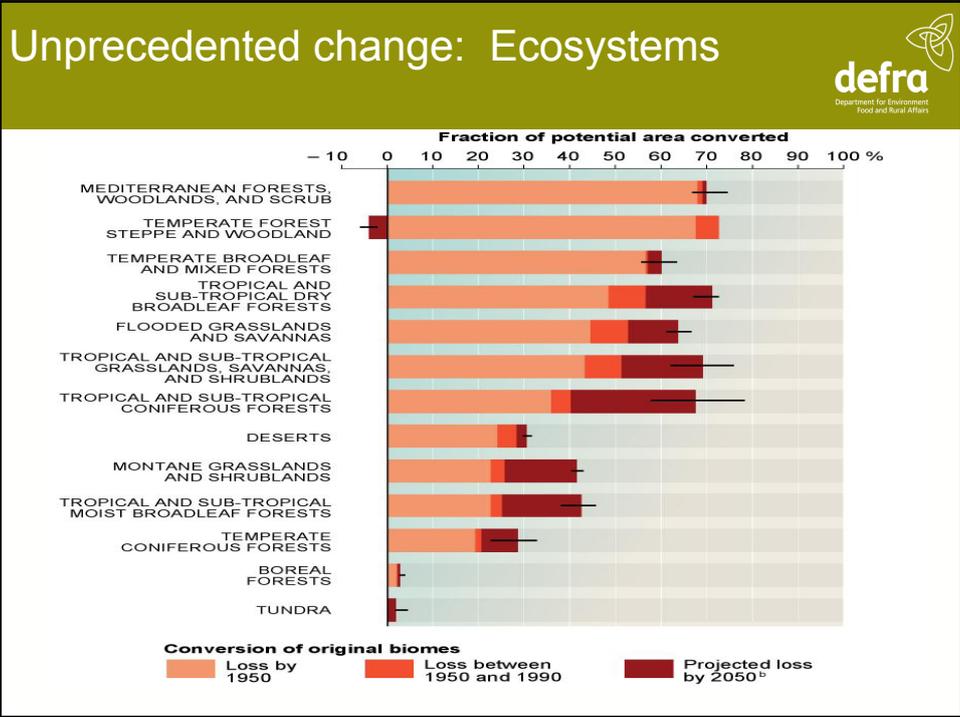
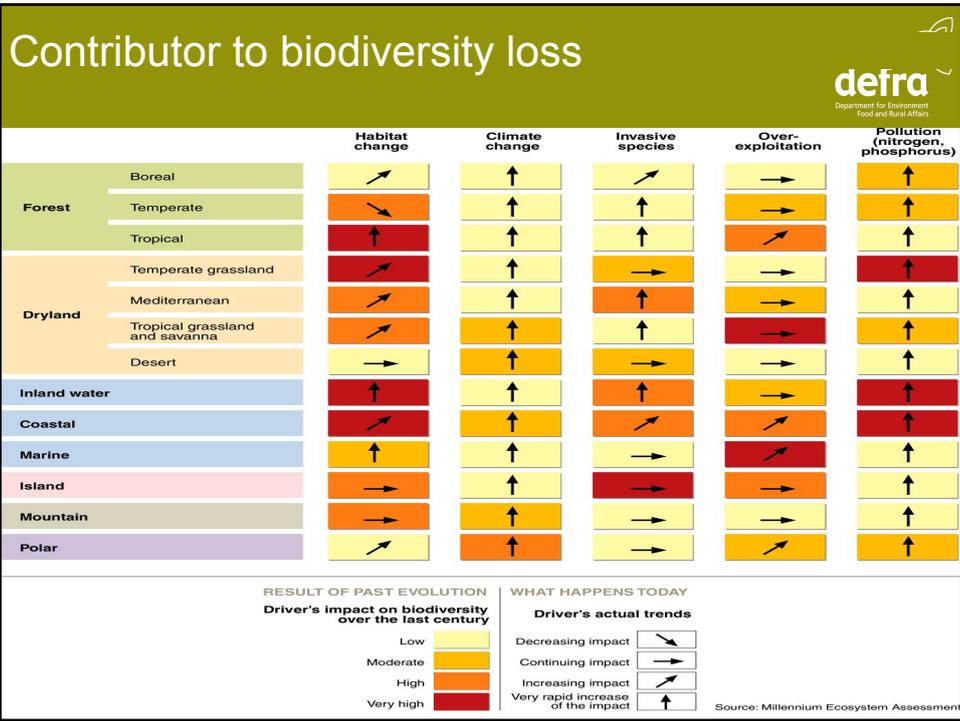


SOURCE: Baumert, 2005

IAASTD/Ketilil Berger, UNEP/GRID-Arendal

Perturbation of the Nitrogen Cycle





Future Challenges

- Demand for food will double within the next 25-50 years, primarily in developing countries
- We need sustained growth in the agricultural sector to feed the world to enhance rural livelihoods to stimulate economic growth
- Meet food safety standards
- In an environmentally and socially sustainable manner

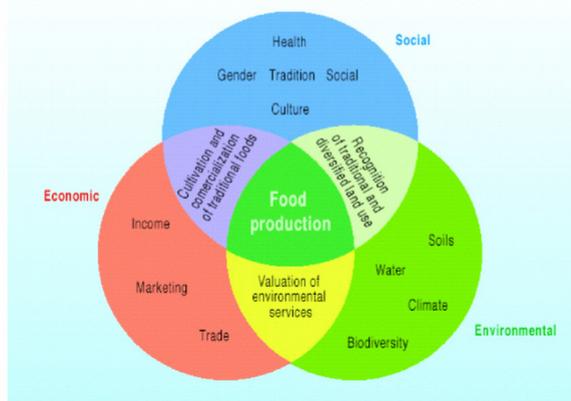


With Continuing Limitations

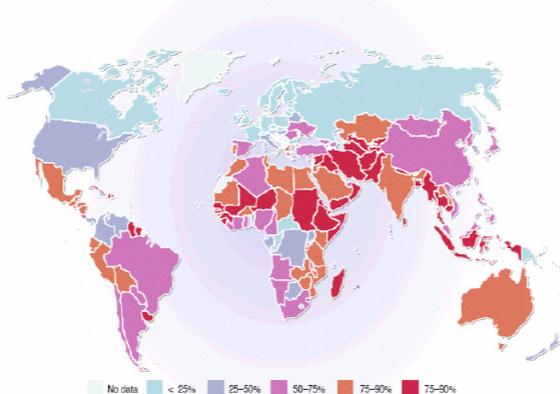
- Less labor
- Less water
- Less arable land
- Increasing land policy conflicts
- Loss of biodiversity: genetic, species and ecosystem
- Increasing levels of pollution
- Changing climate



The inescapable interconnectedness of agriculture's different roles and functions

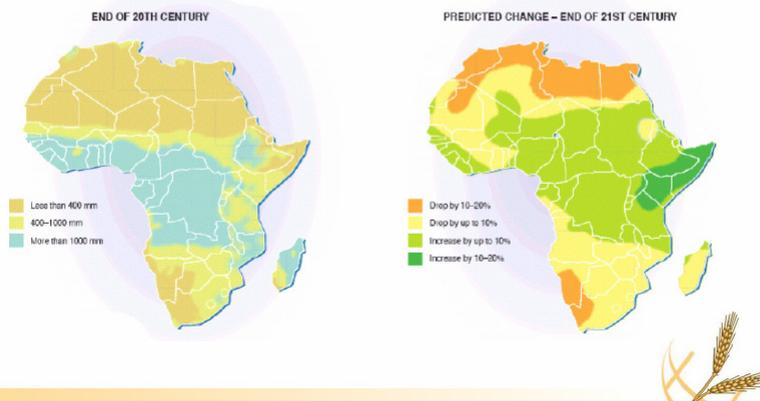


A critical challenge - Water
Proportion of water withdrawal for agriculture 2001

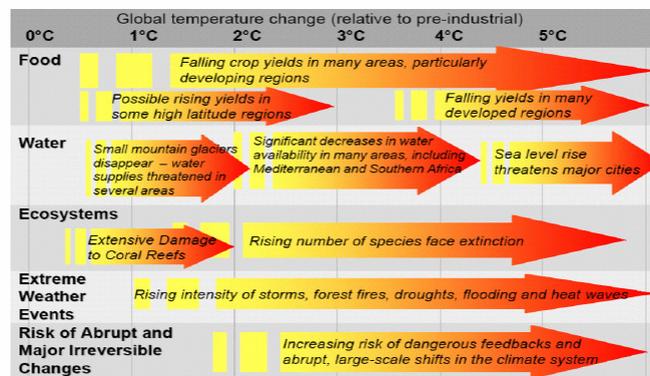


Projected change in available water

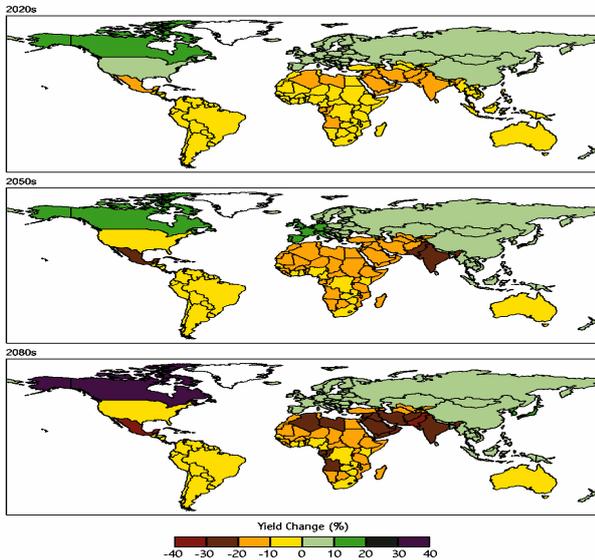
Changes in available water



Projected impacts of climate change



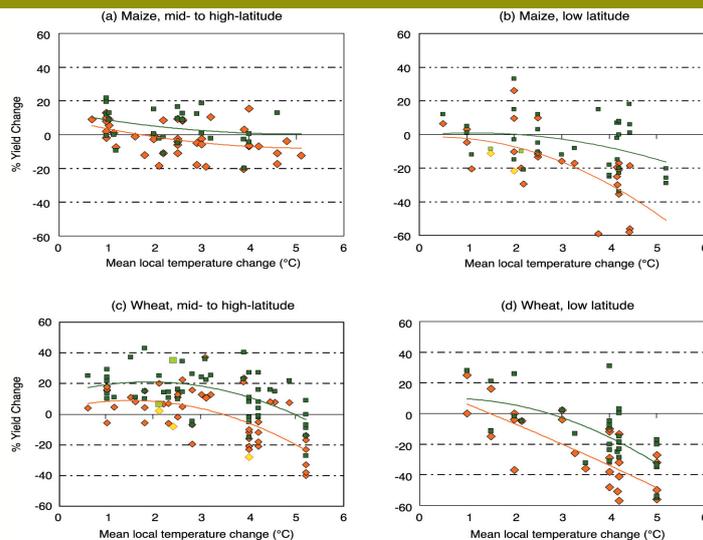
To what degree will crop yields decrease in the tropics and sub-tropics, but increase at high latitudes?



Percentage change in average crop yields for a mid-range climate change scenario

Even as soon as 2020 crop yields in SSA and parts of Asia are projected to decrease by up to 20%

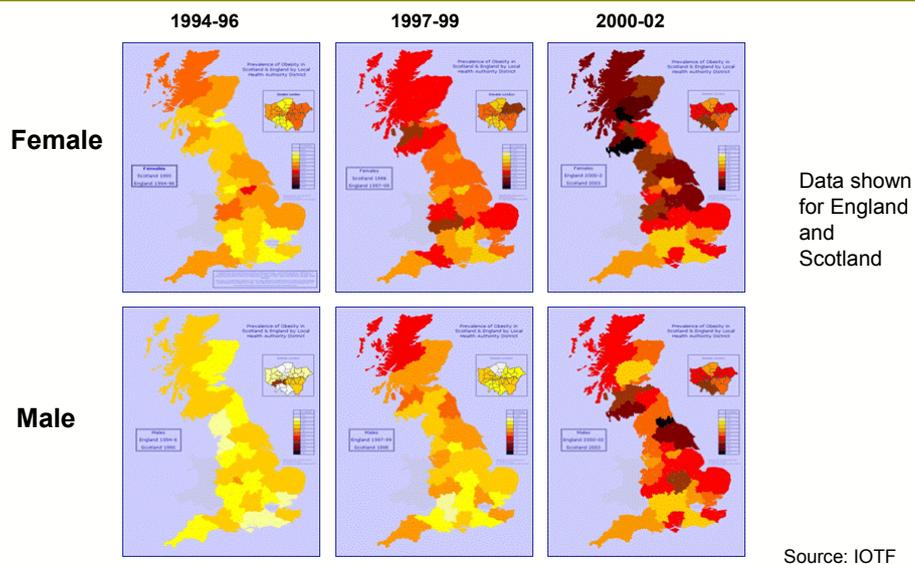
Climate change impacts on maize and wheat yields



The climate in the UK is expected to be much wetter in the winter and drier in the summer

- Potentially increased but more variable crop yields for modest increases in temperature – decreases for increases in temperature above 2-3°C
- Longer thermal growing season
- Changes to geographic ranges of crops
- Increased heat stress in livestock
- Increased pests and pathogens
- Increased storm damage to crops
- Highly variable precipitation – too much – too little

Obesity – a major issue within the UK and globally



Agricultural S&T Challenges



- to produce, by region, the diversified array of crops, livestock, fish, forests, biomass (for energy) and commodities needed over the next 50 years in an environmentally and socially sustainable manner
 - to address water deficit problems, e.g., through improved drought tolerant crops, irrigation technologies, etc
 - to address soil fertility and salinization of soils
 - to improve the nutritional quality of food
 - to improve the temperature tolerance of crops
 - to combat new or emerging agricultural pests or diseases
 - to reduce external and energy-intensive inputs
 - to reduce post harvest losses
 - to improve nutrient cycling
 - to improve food safety



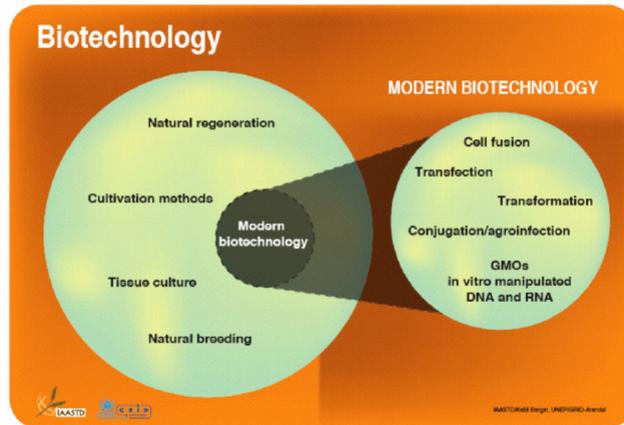
Knowledge, Science and Technology

- Many technologies already exist
- Need for appropriate and complementary integration of local and traditional knowledge with formal AKST

However some challenges will primarily depend on development of new and emerging AKST – e.g. Biotechnology

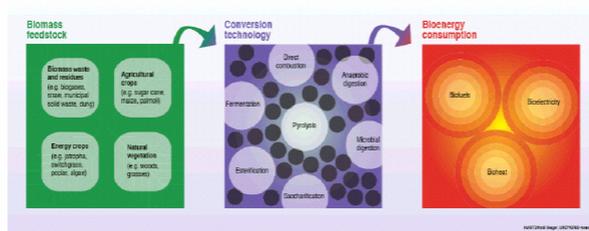


Biotechnology



Bioenergy

From biomass to energy consumption



Environmental, social and economic sustainability are key challenges



Biofuels

- Two major sources of biofuels
 - Bioethanol from sugar and maize
 - Biodiesel from palm oil, soy and rapeseed
- Rarely economic - normally heavily subsidized
- Serious questions regarding environmental sustainability
 - Greenhouse gas emissions - direct and indirect emissions
 - Loss of biodiversity, soil and water degradation
- Serious Questions regarding social sustainability
 - Competition for land - food price increases
 - Involuntary displacement of small-scale farmers by large-scale plantations

A major challenge: The small scale farmer

Pro-poor progress requires:

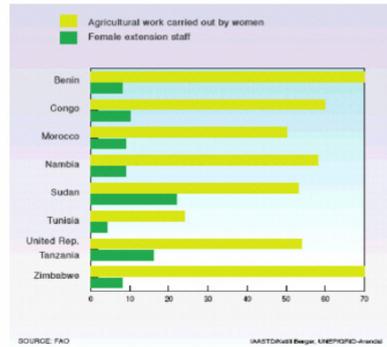
- creating opportunities for innovation and entrepreneurship which targets this group
- Increased public research and extension investment

Small scale farm sustainability – poses difficult policy choices

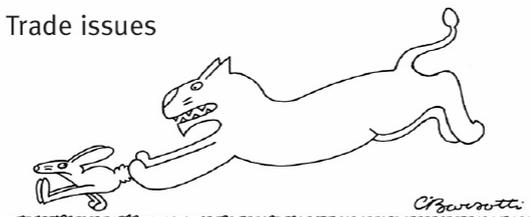
- Payment for ecological services



The percentage of agricultural work carried out by women compared with the percentage of female extension staff in selected African countries



Trade issues



"What are you complaining about? It's a level playing field."

Opening national agricultural markets to international competition can offer economic benefits, but can lead to long term negative effects on poverty alleviation, food security and the environment without basic national institutions and infrastructure being in place



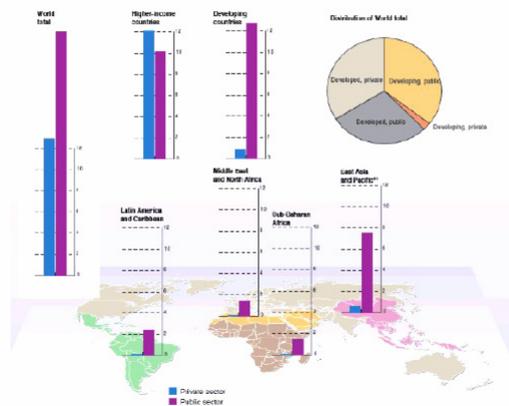
AKST Investments

Shifts in funding levels and sources for agriculture

- Public sector research funding, especially that relevant to developing countries has been irregular and has not increased with time
- Private sector funding growing, but the focus is primarily on OECD markets
- Targeted investments in S&T can yield enormous benefits –but are the current public and private sector research activities adequate and effective?



Public and private agricultural R&D spending by region - 2000



Suggestions for decision-makers

- Improve public-private-CSO involvement in AKST with accountability for social and environmental outcomes
- Develop macro-level policy changes to enable AKST linkages with development goals
- Shift focus from production technologies to understanding and enhancing the production and adapting to environmental climate change impacts
- Build and reform AKST skill base (basic sciences, social, political and legal knowledge) and innovation capacities of rural communities and consumers

Conclusions

- Climate change poses both opportunities and challenges to the agricultural sector
- Agriculture is not simply production – agriculture must be viewed as multifunctional – it must be environmentally and socially sustainable – it must be placed in an ecosystem approach – agro-ecological approaches are key to success
- Innovation involving all relevant stakeholders is critical
- The farmer must be in the middle – especially the small-scale farmer – participatory processes are critical
- Science and technology is critical – the risks and benefits of all technologies must be evaluated