Climate Change Agriculture and Food Security Conference

Building Food Security in the Face of Climate Change

Held at the World Agroforestry Centre (ICRAF), Nairobi 4th May, 2010

Conference Documentation

Facilitation by: Jürgen Hagmann

Documentation by: Judith Odhiambo

Institute for People, Innovation & Change in Organizations

Table of Contents

1 Welcome Remarks and Keynote Presentations

The session was chaired by Dr. Stephen Hall, Director General of the World Fish Center. There were several presentations / keynote paper and some discussion.

1.1 Welcome Remark by Dennis Garrity, ICRAF

Director General, World Agroforestry Center

Thank you, Steve.

Good morning, and a warm welcome to you all to the Science Park of the World Agroforestry Centre, where we host over a dozen international organizations and programmes on our beautiful campus. And to Nairobi, a metropolis that is now regaining its good name as the green city in the sun. Those are inviting words for all who yearn for a better and more liveable world.]

I'd like to acknowledge the presence of Achim Steiner, Executive Director of UNEP, and co-founder of the Nairobi Forum on Science and Policy for Sustainable Agroecosystems. Achim, we are grateful for your passion in linking UNEPs global environmental leadership with the CGIAR, and the entire science community on climate change, as a sound basis for reaching and implementing a global agreement on tackling the enormous challenges that lay ahead.

And welcome also to Tik Leemans, Chair of the Earth Systems Science Partnership Scientific Committee; and

Thomas Rosswall, wonderful colleague and Chair of the Steering Committee of the CGIAR Climate Change Programme; its great to see you again Thomas, and

Carlos Sere, our good friend from ILRI just across town, who is today representing the Consortium Board of the CGIAR.

I also want to give a special thanks to Bruce Campbell and the CCAFS team for their efforts in organizing this event, and choosing this venue here in Nairobi. Bruce, we are honored to be the locus for this big event.

Today's event, in fact, reminds me of a bit of history – the history of collective action in research on climate change in the CGIAR. The first significant effort to bring together the entire expertise of the Centres on climate change research was the Intercentre Working Group on Climate Change, which was formed at the end of previous Millennium to bring together the key scientists across the 15 Centres to develop common platforms and collaborative action as a community of scientists.

I see a few of the members of that Group here with us today. You were the forerunners of a collective approach to climate change research across the system, and you deserve a sharp salute for your efforts.

Many others of you who here today were also gathered at the Centre back in May of 2003 to develop the 1st climate change challenge programme proposal. That was a heroic, but ill-fated effort. It just missed the cut by the Science Council, and it languished in the wilderness for several more years.

But the Inter-Centre Working Group on Climate Change continued to meet and work together during those years, until the political winds suddenly re-intensified, and there developed a massive new political interest in creating a CGIAR challenge programme on the topic.

That initial mad rush turned into a four-year ordeal that has finally resulted in the dawn of CCAFS.

The Inter-centre Working Group was disbanded in the rush to develop another Challenge Programme document on climate change. But I know that the scientists in the Working Group continued to interact and collaborate while the slow, grinding process of proposal writing and review ground on.

No one imagined that it would take so long. But it has finally reached fruition in the launch of the CCAFS Challenge Programme, and now in the advent of a Mega programme on climate change and agriculture.

As I reviewed the recent documentation for the Mega programme development, I noted that you boldly conceive these efforts to be a uniquely innovative and transformative research program that will be recognized as the foremost global source of relevant research results that lead to options and strategies for tackling food insecurity in the face of climate change.

That is a right and proper vision, and I know it can be done – if we put together the scientific clout and creativity in this room and it receives the support and nourishment that it needs.

In fact, as I look out and seeing this incredible gathering of brainpower and experience, I'm reminded of the words of John F Kennedy when he hosted a dinner for the high and mighty of the National Academy of Sciences one evening, and he said "This is probably the greatest concentration of brain power that has ever graced the White House, at least since Thomas Jefferson dined alone."

I guess that statement also reminds us that it is not only the collective genius, but also the genius of bold-thinking individuals that will change the world, and lead us to solutions to the terrible changes in our earth's climate system that lurk around the corner.

Terrible changes can come gradually or violently, and from many unforeseen sources. That realization came home to me last night in seeing a film about the super-volcano Anak Krakatoa, sleeping now in the Straits of Java.

Anak Krakatoa has had several horrific explosions in recorded history, most notably in 553 AD and 1883. Its next blow-up may come any time in the coming centuries, directly killing millions, and covering the entire globe in a thick cloud of ash that would persist for three years or so, decreasing global insulation enormously, reduce average global temperatures by 10 degrees C, and wipe out virtually all food production for years. Clearly, an explosion of Anak Krakatoa would make the inconvenience of the recent Icelandic volcanic events seem as nothing but a tiny blip on the screen.

We cannot prevent a Krakatoa, but we know that we can do a great deal to attenuate current greenhouse warming by attending to how we nurture the skin of planet Earth, or Gaia.

The way that we practice agriculture can help to repair and regreen the skin of Gaia.

We can forestall the destruction of our land and soils, and we can create an Evergreen Agriculture that integrates trees much more ubiquitously into agricultural systems. A recent study of global tree cover by the World Agro forestry Centre has found that about half of the

world's two billion hectares of agricultural land already has at least 10% tree cover. We also know that tree cover on farmlands is increasing steadily in many countries. And we know that this can be done, and is being done, in ways that enhance the lives and landscapes of billions of poorest rural and urban people.

This uniquely innovative and transformative research program ought to be the spearhead of those efforts. And I for one, have no doubt that, ultimately, it will.

Management:

ICRAF should be a key bidder on being the Lead Centre.

The governance and management system is based on lessons learned by the CGIAR in other initiatives involving multiple centres and partners.

A key lesson is that: "*a governance body that is composed of independent individuals with no institutional connection to consortium members ... appears to have more advantages and higher potential for effective and efficient performance. However, it should also take into account the need for support provided by a host institution as a legally constituted entity. Programmatic decisions should be left entirely to the steering committee."*

Thus, the proposal is to have an

- Independent Scientific Panel (ISP),
- An independent Program Secretariat and
- A Lead Centre.

The Secretariat will comprise a Program Leader supported by a Program Management Team and 4–6 staff. The Program Leader should report directly to the Consortium CEO. In addition to the Lead Centre, a number of Main Participating Centres will be recognized.

The ISP will give advice on priority setting and the strategic allocation of resources

As outlined in proposals, annual work plans and proposed budgets, to ensure the needed set of partners and Centres participate in MP7. The ISP will also play a role in assessing the quality of the research and management systems through an annual monitoring system. The Consortium will appoint the ISP. The ISP will interact regularly with the Lead Centre and the Secretariat.

The Secretariat will facilitate the implementation of MP7, in particular the coordination of activities across Centres and other partners, the preparation of proposals and work plans, the compilation of annual monitoring indicators and the production of synthesis products and reports. The Secretariat will have a very small staff complement, as the bulk of activities will be implemented through Centre staff (e.g. communications activities, database management, capacity building).

The Program Leader will be appointed by the Consortium Board and will be responsible for the day-to-day decisions of MP7; key decisions being made in consultation with the Program Management Team and with advice from the ISP and Lead Centre.

The Program Management Team will comprise 5–8 individuals, at least one of which is from the Lead Centre. These individuals will be drawn from the Theme Leaders and Regional Facilitators.

The Lead Centre will be the main contracting body for MP7 and will be represented on the ISP. It will review ISP and Secretariat decisions with respect to potential legal, financial or reputation risks that they may pose. However, programmatic interests do not fall under such legitimate institutional concerns.

Decisions about programs should be taken by the ISP alone, without the participation of the Lead Centre's representatives when an issue comes to a vote. This arrangement ensures independence of the ISP decision and shields the Lead Centre from real or perceived conflict of interest.

Depending on the strategic priorities, various Centres will be designated "Main Participating Centres". A number of the Main Participating Centres will have individual staff members who are on the Program Management Team.

Certain activities falling under MP7 will, for coherence on the ground, be managed by Centres managing activities that fall into other MPs.

1.2 Message from the Chair of the Consortium Board to the Climate Change Conference

Presented by Carlos Sere, ILRI Director General,

I would like to express my regrets for not being able to personally participate in this important meeting. I am very grateful to the Director General of ILRI, Carlos Sere, for accepting to represent the Consortium Board on this occasion.

As you may know, the CGIAR is placing a great deal of emphasis on understanding the links among climate change, agriculture and food security, as part of its reform process. The Consortium of the CGIAR Centres is now formally established, as part of the new, reformed CGIAR. The Board of the Consortium recognizes that greater coordination is needed for the Centres and their partners to

(i) Produce robust results and viable options for farmers to adapt to and mitigate climate change and

(ii) Increase awareness of the role of agriculture in addressing the climate crisis

The Consortium Board thus asked both the Chair and the Director of the Climate Change, Agriculture and Food Security Challenge Program to work with the Centres and their partners, including naturally the Earth System Science Partnership, to produce a collaborative proposal for an integrated research for development program (a mega-program in CGIAR jargon) on climate change and agriculture. Furthermore, the Consortium Board decided that this proposal should be 'fast-tracked' within the CGIAR System. This means that it is one of three priority areas where the Consortium Board and donors expect a convincing proposal for funding, for implementation to start in November 2010.

The Chair of the Consortium Board was very pleased that the leadership of the Challenge Program agreed to this integrated approach, which is very much in the spirit of the reform of the CGIAR system. He was also appreciative that they agreed to take on the responsibility to lead the development of the proposal for this mega-program.

Let me address some important questions which are very relevant to the reform process

WHY is it important to fast track a proposal on climate change and agriculture?

- This is a global and very urgent issue
    - Climate change promises serious negative impacts on agricultural systems in developing countries.
    - Climate change threatens agriculture, yet it also brings an opportunity – one that the world cannot afford to miss.
- The Consortium supports the role of research as a broker to bring about evidence based policies to both mitigate and adapt to climate change.

WHAT does the System expect from a mega-program on climate change and agriculture?

- A program that builds on ongoing research, of partners and Centres, and that adds value
- It will add value by being a coordinated research for development action to
    - diagnose and analyze the directions and potential impacts of climate change for agriculture and
    - to identify and develop adaptation and mitigation options for agricultural, food, livestock, fisheries and environmental systems

I believe that this consultation will be extremely important because by bringing together a large number of committed stakeholders will provide direct inputs to the development of the full proposal.

- The Climate Change and Agriculture Mega Program proposal will be submitted to the Consortium Board at their meeting in May 2010 for approval. Once approved, it will be forwarded to the CGIAR Fund Council for decision on funding. Implementation could start as early as November 2010.

I wish you success in your deliberation and will be paying great attention to its outcome.

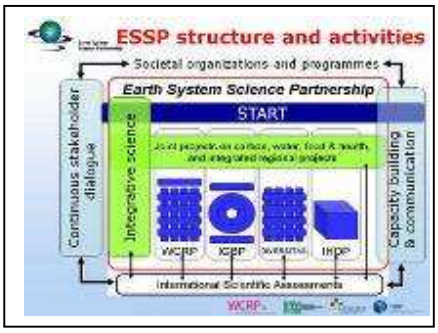
Carlos Pérez del Castillo

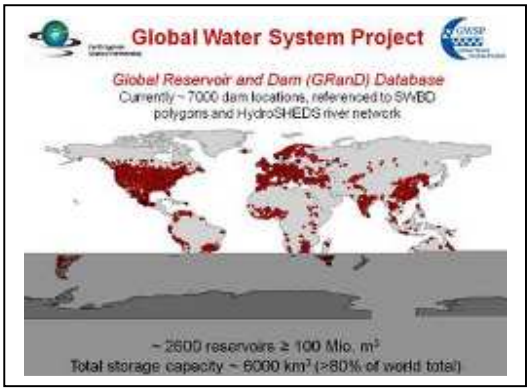
Chair of the Consortium Board of CGIAR Centers

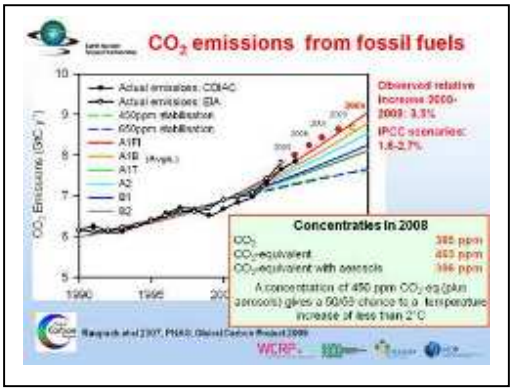
1.3The Earth System Science Partnership ESSP by Rik Leemans, ESSP Chair

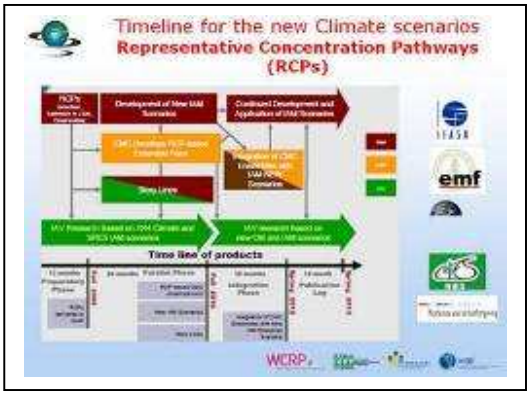
ESSP facilitates the study of the Earth's environment as an integrated system in order to understand how and why it is changing, and to explore the implications of these changes for global and regional sustainability.

ESSP and its international global change programmes develop basic and policy-relevant research agendas and convene researchers from universities and research institutes to address these agendas.









Now, it's more connected through the collaboration with CGIAR

Selected advantages and synergies:

- Link to national Climate Service organizations (WCRP)
- Immediate access to climate scenarios and their interpretations (e.g. extreme events)
- Link with water & land research
- Link with research on C, N and P cycles
- Link with human dimension research (e.g. governance & participatory approaches)
- Engage with other scientific communities

1.4 The Climate Change Challenge, by Thomas Rosswall, Chair CCAFS

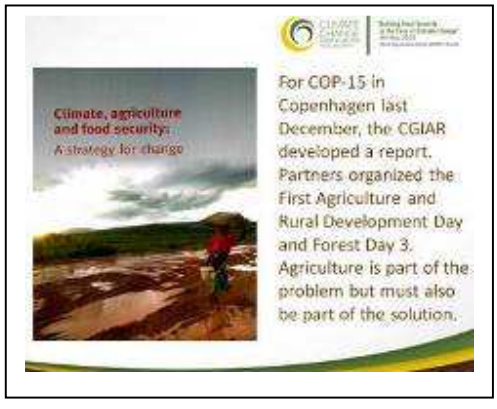
The Climate Change Challenge

- Climate change will worsen the living conditions of farmers, fishers and forest-dependent people who are already vulnerable and food insecure
- Rural communities face an immediate and ever-growing risk of increased crop failure, loss of livestock, and loss of fisheries.
- Hunger and malnutrition will increase

The Big Disconnect

Development and **global change** have been addressed, researched, and funded as **unrelated issues**

The Opportunity



Follow-up discussion in Montpellier,France in March on new CGIAR:

"There is a much greater need to focus research on poor farmers and vulnerable groups in the varied agricultural regions of the world," said Carlos Peréz del Castillo. "The role of partnerships will be huge in order to achieve impact on the ground in poverty reduction and environmental sustainability."

Climate Change MP

- Fast-track proposal developed building on CCAFS conceptual framework.
- Today to provide additional stakeholder perspectives
- Planning workshop will also "test" the framework by reference to the three CCAFS regions selected for initial focus: Indo-Gangetic Plains, West Africa and Eastern Africa.
- Discussion of impact pathways, key partnerships and research gaps, to inform implementation and garner feedback
- CCAFS will continue implementation of its plans in 2010 and may be folded into an approved MP in 2011

CCAFS Conference Programme 4 May:

- The policy context (Achim Steiner, David Radcliffe)
- The proposed agenda for research (Bruce Campbell)
- Adaptation and mitigation in an African context (Lindiwe Sibanda)
- Climate change downscaling (Sepo Hachigonta)
- Adaptation and Indian agriculture (Pramod Aggarwal)
- Decision support systems (Mark Stafford-Smith)
- Linking knowledge with action (Bill Clark)
- Planning Workshop CCAFS and MP on **5-7 May**

Reactions/Clarifications arising from the remarks

Question: *What is the underlying factor in making the world to corporate in a collective way and develop a collective responsibility to feed the world and take agricultural productivity as the main source holistically?*

Question: *what is the reaction of Agriculture to food price establishment 2 years ago building on the irrational price fluctuations taking place?*

Response: *What is we are going to do in the next few year? The responses have brought us where we are today. Balance sheet in modern agriculture is working towards its own demands. There is need to reduce soil fertility, degradation, reduce prices of fertilizers especially taking into account the demand of the small holder farmers. The future of agriculture is towards increased seeds, soil fertility and reduced prices of fertilizers.*

Food and Agriculture should be part of the solution as opposed to problems. We should not focus more on problem but forge ahead towards finding a lasting solution. There is also the need to change the lens through which we look at the problems in terms of research and work more towards the green revolution. The solutions Look at solutions to the challenges should help us increase food productivity. We cannot promote a system of production allowing the next generation to contribute twice as much in teams of cost

1.5 Climate Change, Environment Management and Agriculture, by Achim Steiner, UNEP

UN Under-Secretary General and UN Environment Programme (UNEP)

The presentation was made verbally. The following is an edited transcription based on recording of the presentation.

- The challenge of feeding another more than three billion people by 2050, in a way that does not compromise the natural and nature-based systems that underpins agriculture in the first place, is our collective challenge, one that takes on additional dimensions in a climate constrained world.
- I am sure everyone here today is fully conversant with the magnitude and the scale of the challenge the world faces. Simply expanding cropland by cutting down forests, draining the world's rivers and trying to implement a water-based, pesticide intensive and artificial fertilizer-based revolution in Africa would be a path that is unlikely to succeed. What is needed is a Green Revolution, but with a capital G.
- There are many innovative, creative and inspiring examples of how this can be achieved, many of which are informing the agricultural theme of UNEP's new Green Economy initiative. Indeed evidence is mounting from around the world that sustainable system for agricultural production present viable alternatives to existing, unsustainable farming practices.
- These new systems offer opportunities for competitive economic returns, the supply of essential and life-supporting ecosystem services, the creation of decent jobs and livelihoods, smaller ecological footprints, increased resilience to climate change, and enhanced food security. They have various names including organic, biodynamic and Fair-trade, : but they reflect the common goal of sustainability in the 21st century.
- This meeting is about how best to take pilots, ideas and currently marginal systems from the micro to the meta-level: how to catalyze and decisive and definitive response alongside the actions needed to turn these multiple challenges into opportunities including improved livelihoods.

The case for sustainable agriculture

- Purchasing patterns of Fair-trade products have remained strong despite the global economic downturn. In 2008, global sales of Fair-trade products exceeded US$3.5 billion.The major markets for organic food and beverages are expanding on average by 10 to 20 per cent per year and the global trade now stands at US$50 billion. Organic and biodynamic farming uses 20 to 56 per cent less energy per produced unit of crop dry matter. Results of the only available trial in developing countries suggest that the energy efficiency of organic farming is between 70 and 100 per cent. Shifting to organic farming can create between 10 and 30 per cent more employment opportunities, depending on farm size and crop.
- In 2007, Mexican farmers contributed to the creation of an additional 178,000 jobs by converting some agricultural production to organic. Creation of better and more

sustainable jobs in rural areas can discourage rural-urban migration and support community development, while increasing and sustaining food supplies to cities. Sustainable products command high price premiums, resulting in more income for farmers and others in the supply chain. For example, in Uganda farmers earn up to 180 per cent more for ginger that is produced organically, compared with conventionally produced ginger. An FAO study that analyzed 50 different cases, mostly from USA, reports that "The overwhelming majority of cases show that organic farms are more economically profitable.

- Sustainable products offer poverty reduction and trade promotion opportunities. For example, while 80 per cent of organic producers (a significant proportion of them women) are in developing countries, about 97 per cent of sales revenue is generated in industrialized countries. This offers the possibility for small farmers to become part of the US$50 billion global organic food market. A joint UNEP-UNCTAD study analyzing 114 cases, showed that farmers in Kenya, Tanzania and Uganda have doubled their productivity – and ensured food security – by shifting their production to organic or near-organic methods. Data from the UN Food and Agriculture Organization suggest that in subsistence agricultural systems, conversion to organic farming can increase yields by up to 180 per cent.
- The carbon sequestration efficiency of organic systems in temperate climates is almost double that of conventional methods. Sustainably managed lands around the world maintain higher soil fertility than other systems.41 They also produce yields that, depending on a range of factors, can be equivalent to,42 or higher than, conventional farming systems. Higher levels of biodiversity have been recorded on sustainably managed farms around the world in terms of both terrestrial components and soil biodiversity, leading to improved long-term soil fertility and ecosystem efficiency.

Investing in agriculture for a Green Economy

- Evidence and analysis suggest that investments in greener and sustainable multifunctional agriculture offer high returns as well as multiple economic, social, and environmental benefits. Governments and businesses have a key role towards catalyzing the agricultural dimension of a Green Economy. Several investment opportunities exist, including in the following areas:
    - Storage and transport infrastructure, especially in developing countries, to reduce post-harvest losses;
    - Green industrialization for adding value through processing raw harvested produce
    - Infrastructure for production, marketing and trade in green inputs, such as organic fertilizers and biological and integrated pest control methods
    - Improving irrigation infrastructure and its efficiency, including at the farm level, to reduce water losses
    - Establishing Green Banks and/or micro-credit programmes for farmers and small- and medium-sized enterprises to offer small "green" loans to buy organic inputs or pay for organic certification, for example.

- Changes in perceptions are required to promote the shift to an ever green agriculture and these can be encouraged by new policies to move away from the "business as usual" approach that has dominated the agricultural sector for the past 40 years.
- Looking to the future, governments and stakeholders should focus their efforts in the following areas.
    - Re-directing agricultural subsidies towards supporting more sustainable agriculture including agroforestry and ICRAF's pioneering work with fertilizer trees;
    - Re-aligning trade regimes to support diversification of agricultural production and reduce poverty
    - Lobbying and advocacy efforts to encourage governments, the private sector, and consumers to reduce food waste, and procure and purchase sustainably produced agricultural products
    - Supporting and redirecting agricultural research, academic institutions and training of extension workers and farmers to make sustainable agriculture a model sector for a Green Economy
    - Building capacity to meet the requirements of major markets – especially related to health and environment – at all stages of supply chains, but particularly at the production level, resulting in the creation of a decent work environment and improved occupational health and safety;
    - Building institutions that can train policymakers and negotiators to promote a wider lens in terms of economic decision making which address issues and negotiations related to subsidies, fiscal and monetary instruments, and trade-distorting measures, among others, as they related to agriculture;
    - Creating and strengthening institutions and entrepreneurial skills that can ensure continuity and sustainability in agriculture's contribution to a Green Economy;
    - Building agriculture into the UN-brokered carbon market or funds_ the UNEP and Global Environment Facility-funded Carbon Benefits Project should soon have a standard that should enable such a move to happen

Notes and Background You May Wish to Draw Upon That Come from Your Last Davos Speech

- Support small-scale farmers in developing diversified and resilient eco-friendly intercropping systems, including perennials such as the Faidherbia albida - the tall, long-lived nitrogen fixating acacia tree, *Faidherbia albida* could limit the use of fertilizers; provide fodder for livestock (the tree goes green during the dry season), wood for construction and fuel wood, and medicine through its bark, as well as windbreaks and erosion control to farmers across sub-Saharan Africa. Faidherbia albida is a frequent component of farming systems of Senegal, Mali, Burkina Faso, Niger, Chad, Sudan, and Ethiopia, and in parts of northern Ghana, northern Nigeria, and northern Cameroon.
- A report from World Agroforestry Centre The tree is growing on over 4.8 million hectares of land in Niger. Half a million farmers in Malawi and in the southern highlands of Tanzania grow the tree on their maize fields. In Malawi, maize yields were increased up to 280 percent in the zone under the tree canopy compared with the zone outside the

tree canopy. In Zambia, recent unpublished observations showed that unfertilized maize yields in the vicinity of the *Faidherbia* trees averaged 4.1 tonnes per hectare, compared to 1.3 tonnes nearby but beyond the tree canopy. Yield increases have also been documented in unfertilized millets grown under the tree in West Africa, for sorghum in Ethiopia, other parts of Africa, and in India, in addition to groundnuts and cotton. Currently, the Departments of Agriculture in both Malawi and Zambia are seeking to double maize production with the use of the tree. They recommend that farmers establish 100 *Faidherbia* trees on each hectare of maize that is planted.

- Research is focusing on the concept of *sustainable intensificiation*, i.e. improved production from existing land areas by improving agronomic practices, improving crop-livestock integration to better use available energy and nutrients, improved use of water ('more crop per drop'). To this suite of methods we can add approaches like *conservation agriculture, micro-dosing of fertilizers, drip irrigation etc.,*
- Reduction of post-harvest loss (25%)
- Support market access, production and small-scale transport for farmers through micro-finance: The importance of this is often underestimated – agricultural expansion is driven also by low or unfair commodity prices. Adjusting trading regimes, providing adequate market infrastructure, improving regional trade (particularly in Africa), improving vertical integration of processing of agricultural commodities are all likely to deliver greater income to small farmers, thus giving them less incentive to expand and more capital to reinvest in farming.
- Finally, a concerted effort to feed the World is needed. But simply expanding cropland by cutting down forests, draining the Worlds rivers and trying to implement a water-based, pesticide intensive and artificial fertilizer-based revolution in Africa would be a catastrophe – and unlikely to succeed.
- Massive investments in agriculture are needed, especially for smallholders, in more organic intercropping systems, as well as in improving irrigation efficiencies.
- We also need investments in alternatives to agriculture. In many areas there are too many people who have to rely on ever more sub-divided parcels of land for a part of their subsistence. Reforming land tenure and providing alternative sources of income – on-farm and off-farm would reduce the pressure on the land and water, while improved agronomic technologies, a shift away from the heavy meat based diets of industrialized countries and 'smart' use of biotechnology should alleviate production constraints.
- Eco-agriculture: produce more with nature, not "counter nature". Ecosystems provide food and water to the world, especially to the poorest. Re: Ecosystem services as evidenced by the Millennium Ecosystem Assessment. 2010 the International Year of Biodiversity, is an opportunity for world Leaders to reaffirm their commitment to conserving the basis for life on earth. Biodiversity feeds people, produces livestock for animals, and provides meat from wild species and fish from the sea. Human kind can not only leave of raw cereals. Unsustainable agricultural practices will cause long term catastrophes. Unsustainable production is not a long term option.

Demand

- Agriculture World's largest industry employing 1 billion people. Need to feed another 3.2 billion in 40 years (2050). In Sub-Saharan Africa population will increase from current 1 billion to over 1.7 billion by 2050. 2/3 (6.4 billion) of World population will live in cities by 2050, up from current 3.3 billion – urban life lead to change in diets along with greater incomes. Need to feed more livestock as meat consumption increase from current 37.4 kg/person/year to 52 kg/person/year (by 2050)
- Currently >1/3 of all cereals go to feed livestock, projected to increase to 50% by 2050
- Food prices will become more volatile and higher as a result of environmental degradation, extreme weather, higher oil prices, more biofuels capturing croplands or the waste that could be used for animal feed, and speculation in food stocks

Challenges – The environmental food crises

- Agriculture consumes 70-90% of freshwater withdrawal. Unsustainable agriculture causes near half of the nutrient loadings in waste water, a primary cause of algae blooms and subsequent health risks, as well as pesticides, hormones and antibiotics. Over half of the worlds hospitals beds are filled with people suffering from water related diseases (WHO), some caused by run-off from unsustainable agriculture.
- Agriculture is a main driver of biodiversity loss, particularly of deforestation related to ranching and meat production. Agriculture responsible for an estimated 14% of greenhouse gas emissions, over 31% if deforestation is included.
- 5-25% of the projected increased food production to meet demand could be lost due to environmental degradation, rise in biofuel production, water scarcity, climate change, spread of diseases and pests, and land degradation, much due to unsustainable practices, plunging hundreds of millions into starvation
- Near 50% of all food produced is wasted, much in cities, but also other different post-harvest losses

Copying the past not a sustainable option

- Former Green Revolution in Asia mainly a result of increased use of water for irrigation and commercial artificial fertilizer and pesticides.
- Climate change makes rainfall unpredictable, particularly in Africa. African farmland is severely degraded and African farmers, on average, apply only 10 percent of soil nutrients used in the rest of the world
- Asia's Green revolution cannot be copied in Africa where lacking infrastructure results in up to 7 fold higher fertilizer prices and no water for irrigation

After Dr. Steiners inspiring speech, there was a break.

1.6Session 2: Enhancing Food Security in the Face of Climate Change, by David Radcliffe, EU

Senior Policy Officer, Agricultural Research for Development, DG Development and Relations with ACP States

The challenge

1. Eradicate extreme poverty and hunger

- Food security and malnutrition have increased in the world Hunger affecting human development, social and political stability, and progress towards MDGs
    - Number of food insecure in 2009: **1.02 billion**
    - **MDG1** seriously off-track

How does Climate Change affect Food Security?

- Impacts on availability and access
- Adaptation:
    - Coping with current variability
    - Approaching the thresholds
- Mitigation: Opportunities as well as threats

Some consequences of climate change impacting on agriculture

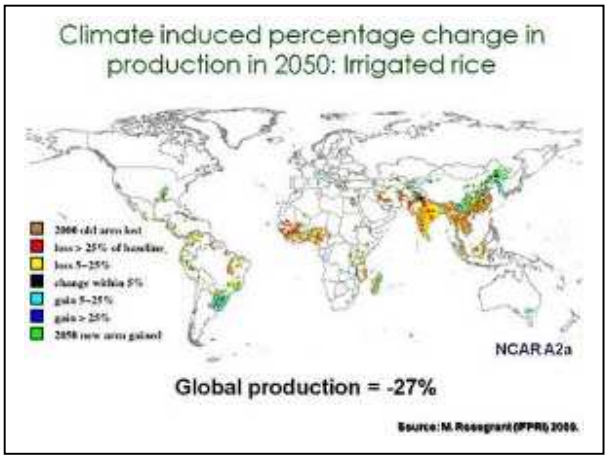
- Heat stress on crops and animals (and humans) leading to lower productivity or death
- Less predictable monsoons and weather patterns
- Increasing water deficit –worsening in longer term – note glacial melt and competition for water resources
- Greater incidence of severe floods and drought
- Sea level rise and salinisation from tidal surges.
- Changing eco-zones for crops, forests, livestock, marine resources
- Changing conditions for pests and disease.
- More frequent, less predictable famines/ food shortages?

Impacts are not equal

- The impacts will be more strongly felt in developing countries at low latitudes
- Agriculture and natural resource management are sensitive to Climate Change and natural disasters
- The poor will be most vulnerable:
  - More rural and dependent on agriculture
  - More likely to reside in disaster prone areas
  - Fewer assets and poorer access to services
  - Have less capacity to respond
  - Women farmers, socially excluded groups, landless face particular problems

Some Analytical difficulties

- What parameters are changing?
- When, where and by how much.
- Who is most affected?
- Probabilities – not certainties
- Non-linear changes
- Many different scenarios
- Attribution to climate change?
- Interaction between medium term weather cycles and longer term Climate Change

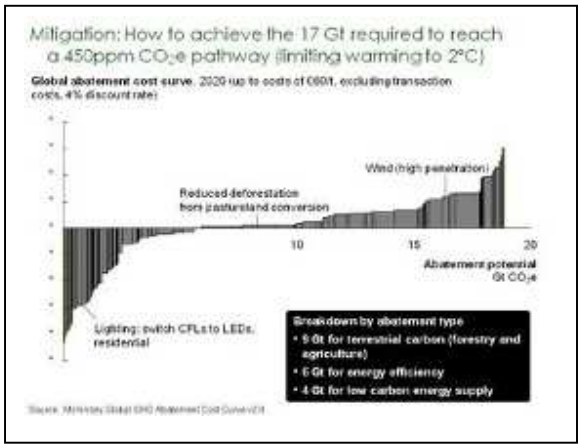


Some approaches to Adaptation

- Maximise understanding of possible impacts in time and space
- Build on what farmers are doing already (responses to current variability)
- Strengthen disaster risk reduction / management
- Create incentives and regulation to promote innovation
- Conduct action research and link to scaling up
- Create financial instruments to manage risks
- Strengthen safety nets for most vulnerable
- Increase access to international funding for adaptation

Mitigation must be development led

- Agriculture significant emitter of GHGs
- C sequestration potential in soils
- Largest potential in developing countries
- The poor farmer has an extremely low carbon footprint
- Poorest as custodians of public goods – soils and forests
- Mitigation as a co-benefit of development (incentivise carbon friendly practices)
- Market-based incentives should be accessible to, and not disadvantage, smallholder farmers
- Synergies exist between mitigation, adaptation and development – but trade-offs may need to be made



How do we respond?

How Is international community reacting?

- Global initiatives on food security – L'Aquila Commitments $20 billion over 3 years
- Global initiatives on climate change – Fast start financing $30 billion over 3 years ($10 billion from EU)
- How do we ensure synergies to minimise impacts and build on opportunities?
- There is much to do. Development and climate based policies and financing not always well integrated

How is EU contributing?

New policy to promote a more comprehensive approach towards addressing food security challenges in developing countries

- In rural and urban areas
- Across all 4 pillars:
    1) Increasing **availability** of food
    2) Improving **access** to food
    3) Improving **nutritional adequacy** of food intake
    4) Enhancing **crisis** prevention and management

- Recognising that strategies need to be country-owned and country-specific

Increasing Availability of Food

- Improve **smallholder resilience** and rural livelihoods
    - A focus on support for **ecologically efficient agricultural intensification for smallholder farmers**, and in particular women
    - A substantial increase in support to demand-led **agricultural research for development**, extension and innovation, aiming to reach a **50%** increase by 2015
    - Actively support greater participation of **civil society** and **farmer organisations** in decision-making
    - Improve the regulatory and institutional conditions for **responsible private investments** in all stages of the agricultural value chain and stimulate public-private investments

Relevant European Commission Initiatives

- Food facility
- Food Security Thematic Programme
    - Includes €130m for CGIAR (2007-10) - €5 million for CCAFS
- Global Climate Change Alliance
- European Development Fund
- Framework Programme 7
- Joint Programming Initiative on Climate Change, Agriculture and Food Security

European perspectives on Agricultural Research for Development (ARD)

- Principles
    - Generator of public goods – knowledge, technology, capacity
    - Part of Innovation system – inputs, extension, markets
    - Demand driven, with stakeholder participation
    - Balances traditional knowledge and new technologies
- Recognises GFAR as apex institution and CGIAR as main public sector supplier of international ARD public goods
- Main regional supporter of CGIAR – 40% budget in 2008
- Fully committed to CGIAR reform process

Where does CCAFS fit and what should it do?

- Build understanding of problems
- Provide evidence for policies
- Pilot adaptation and development-led mitigation
- Focus on key climate ‘hotspots’ and the poor and vulnerable
- Yield results and have a clear vision of how these relate to impacts – on poverty, food security and environmental sustainability

- Spearhead CGIAR Reform – the First Mega-Programme
    - Progressive expansion, building on success
    - Innovative partnerships to deliver results and impacts
    - Integration of climate across other CGIAR MPs
- ***Current Donors: EC, Canada, Denmark, World Bank***

2 CCAFSAgenda: Climate change, Agriculture and food security: A proposed New Agenda for Research and development, by Bruce Campbell

Presented by Bruce Campbell, Director CCAFS

Proposed CGIAR Mega Program on Climate Change, Agriculture and Food Security

Outline

- Some history
- Why work on Climate Change, Agriculture and Food Security?
- Proposed R for D program

1. Some history

- 2002-2003 – Inter-centre working group on climate change → Nairobi meeting; Challenge Program proposal
- 2006-2007 – ESSP-CGIAR prepared new proposal →Stakeholder meetings, regional input →Bali COP announced
- 2009
    - Funds: EU, CIDA, WB, Danida
    - Hired staff
    - Planning/implementation

The New CGIAR

- Major reforms
- All work to be conducted in “Mega Programs” (MPs)
- Climate Change MP proposed (“MP7”)
- CCAFS asked to lead development
- CP likely to be rolled into MP

Our strategy

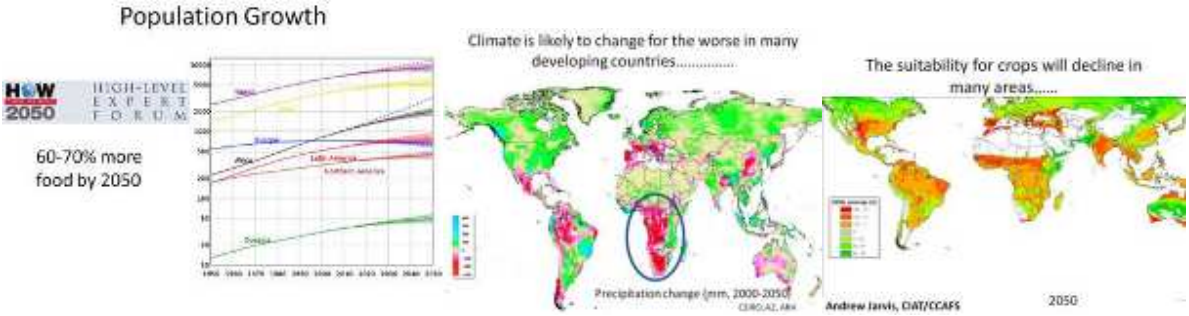
- Make everything we do relevant to the new realities in the CGIAR

  - E.g. High-level meeting with private sector (don't even mention CP – focus on climate change and food security)
- Use on-going implementation to "test" the proposals in the MP concept

MP proposal development process

- CCAFS Management Team meet (March)
- GCARD – MP presented to diverse stakeholders (April)
- CGIAR Contact Point Meeting (April)
- Nairobi meeting (May)
  - What are the priorities?
  - Inputs into the implementation in the target regions

Why a program on Climate Change, Agriculture and Food Security

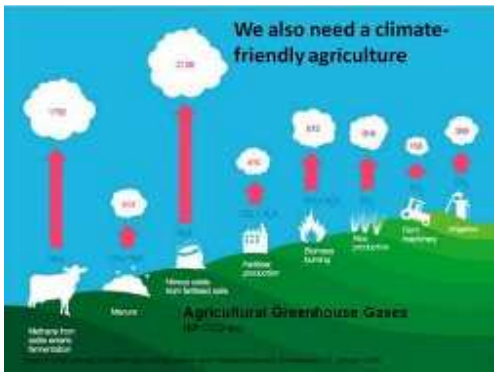


"Unchecked climate change will result in a 20 percent increase in malnourished children by 2050"

We need

- Agriculture and food systems that are climate-resilient
- Enhanced adaptive capacity

At the level of households, at the level of landscapes, national levels, regional systems in terms of Policies, technologies, practices, capacity development



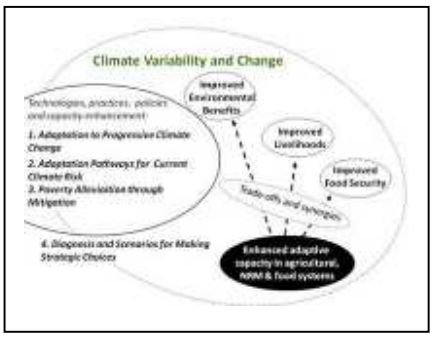
We don't only need a climate-resilient agriculture; we also need a climate-friendly agriculture

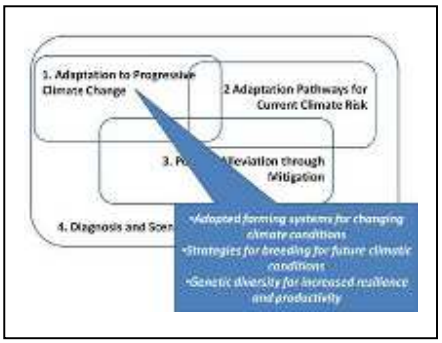
Agriculture is a major source of GHGs – some 14% of the world's emissions

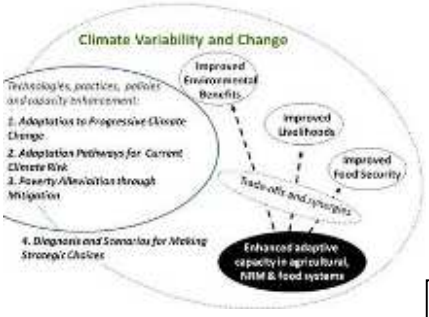
This brings some threats to developing country agriculture as developed countries turn to products with lower carbon foot-prints; as conversion to agriculture from forest lands is halted, or attempted to be halted

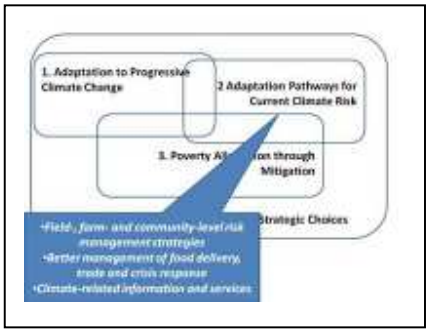
Proposed R4D program

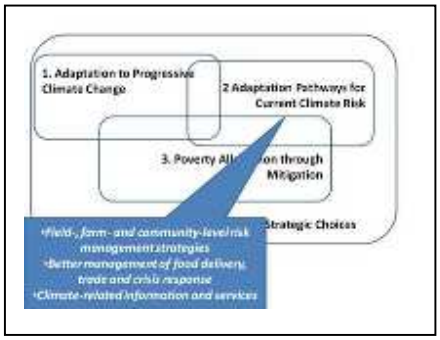
- Objectives
- Beneficiaries
- Thematic focus
- Regional implementation
- Partnerships
- Capacity development

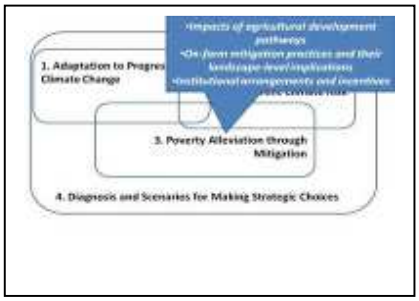


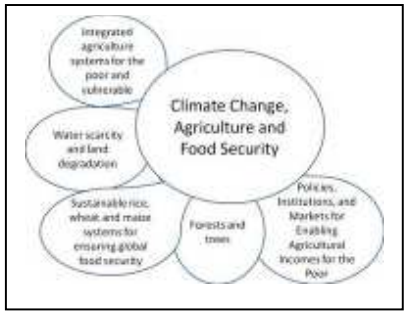












3 Key Aspects around the new Agenda

3.1Articulating Africa-Wide Policy Issues for Adaptation and Mitigation, by L. Sibanda, FANRPAN

By Lindiwe Sibanda, FANRPAN

Outline

Saving the Planet or a Win - Win Treaty?

- Global Climate Change Scenario
- Clash of the Titans

Climate Change and Africa

- Status of Smallholder Farmers
- Climate Change Impacts

What is Africa Doing?

- CAADP
- The African Climate Position - Road to Copenhagen
- Priorities for Africa - Adaptation and Mitigation
- Model for Engagement

Growing Challenges

- 1.7 billion more people to feed
- Ratio of arable land to population declining by 40-55%
- Growing water scarcity
- Climate change

Climate Change and Sustainable Development in Africa

Africa contributes only about 3.8% of total GHGs

Yet African countries are among the most vulnerable to climate change, because of the following factors:

- High poverty levels
- Heavy reliance on climate-sensitive sectors (e.g. rain-fed agriculture, mining, oil & gas, fisheries, forests, tourism, etc.)
- Poor economic and social infrastructure
- Existing stresses on health and well being (e.g., HIV/AIDS, Malaria, illiteracy)
- Conflicts
- Low adaptive capacity (limited human, institutional, technological and financial capacities)

Climate Change in Africa

- Africa x 0.5C warmer now than 100 years ago
- Temperatures have risen much higher , parts of Kenya have become 3.5℃ hotter in the past 20 years (Oxfam, the New Economics Foundation and the Working Group on Climate Change and Development)
- Agriculture contributes over 20% GDP
- Climate change negative impact on agriculture **- up to 2% by 2010**

Why Africa's Climate Change Burden is Greater

- 300 million people – 35% of Africans live in extreme poverty
- 250 million people – 30% directly affected by desertification and drought
- Africa is the least polluter - (3.8**%)** of the GHG concentrations in the atmosphere

COMESA: 2003 Crop Yields(MT/ha) COMESA vs. Global

Crop	COMESA	Global
Maize	1.39	4.47
Rice	1.12	3.84
Wheat	1.38	2.66
Sorghum	0.67	1.30
Cassava	8.18	10.76
Beans	0.60	0.70
Bananas	4.69	15.25

What is Africa Doing?

- AFRICAN UNION-CAADP
- Africa Bio-Carbon Initiative
- FARMING FIRST

The Comprehensive Africa Agriculture Development Programme (CAADP)

- **Endorsed by the AU Assembly – July 2003**
- **Goal**

"*To help African countries reach a higher path of economic growth through agriculture-led development, which eliminates hunger, reduces poverty & food insecurity & enables expansion of exports."*

What is Africa Doing?

Comprehensive Africa Agriculture Development Plan

CAADP Areas of Intervention	
Pillar 1	Extending the area under sustainable land management and reliable water control systems
Pillar 2	Improvement of rural infrastructure and enhanced market access
Pillar 3	Increased food availability and nutrition
Pillar 4	Improving agricultural research and technology dissemination and adoption

His Excellency Ngwazi Dr. Bingu wa Mutharika quoted

MALAWI SHALL NEVER GO BEGGING FOR FOOD AGAIN"

2004

"IN 5 YEARS NO AFRICAN CHILD SHOULD DIE OF HUNGER AND MALNUTRITION"

Bringing Perspectives Together

CAADP addresses the climate challenge by:

- enhancing biodiversity through sustainable agriculture and agroforestry
- safeguarding the productivity of farms through SLWM

But, recognizing climate change, both local and global, as a threat to these objectives, by

- Using these same approaches as adaptation strategies to climate change.

And, recognizing the role that carbon plays in land use, as well as in the global climate regime, by

- Linking mitigation strategies, especially carbon sequestration, to these goals.

The Africa Bio-Carbon Initiative

- An initiative of COMESA, EAC and SADC – NOW AFRICAWIDE
- Launched in Poznan in December 2008
- Endorsed African Heads of States- Libya 2009
    - *Nobel Laureate Wangari Maathai*
    - *Honourable Rejoice Mabudafhasi, Deputy Minister of Environmental Affairs, South Africa,*
    - *Mr Agus Purnomo from Indonesia's National Council on Climate Change*
    - *Honourable Ligia de Doens, Minister of Environment for Panama*
    - *Honourable Ambassador Blake of Antigua and Barbuda*
    - *Brent Swallow from the World Agroforestry Centre (ICRAF)*
    - *Alexander Mueller from the Food and Agriculture Organisation (FAO)*

The Africa Bio-Carbon Initiative

Vision

- To reduce climate change impacts and enhance community resilience
- Enhance access to rural energy and empower rural populations,
- Increased agricultural productivity and improved food security

PURPOSE

A post-2012 climate change framework that:

- Acknowledges Africa's food security efforts
- Rewards i climate change mitigation in agriculture, forestry and other land-uses
- Promotes adaptation

CALL

- To call for release of funding for research and the development activities to enhance learning and ensure that sustainable agriculture/forestry/land use activities are rewarded and eligible for funding in the international post-2012 framework.

The Africa Climate Change

Focus

- Integration – Climate Change considerations must be integrated into policies, sectoral planning and implementation at local, national and regional levels
- Disaster reduction and risk management – better diagnosis of vulnerabilities and strengthen local leadership and response
- Building economic and social resilience
- Reflects African realities and priorities - poverty reduction and community benefits
- Reduced emissions for deforestation and forest degradation (REDD)
- Agriculture, Forest and Other Land Use (AFOLU)
- Land Use, Land Use Change and Forestry (LULUCF)

The Africa Bio-Carbon Initiative

Principles

- Africa reaffirms its commitment to climate change mitigation and adaptation
- Initiative advanced and driven by African leadership
- Reflects African realities and priorities - poverty reduction and community benefits
- Builds on existing African institutions and frameworks (e.g. NEPAD, CAADP,)
- Seeks to Establish stronger linkages between food security, climate change and global environmental conventions
- Avoids duplication and leverages on global partnerships for evidence to support policy processes

Addressing Climate Change – To Do

- **ADAPTATION** is happening today!
- NAPAS- African countries actively preparing these and need support
- **MITIGATION** –focus on opportunities!
  - Recognize that total CO2 emissions are low, but per capita emissions are high if land-use changes are taken into account. Focus on mitigation options which reduce land degradation and vulnerabilities
  - 13 African countries have prepared NAMAs

NAPAS-Country X

- Sensitization of population on effective water use
- Distilling existing water dams and construction of new ones
- Expansion of food subsidies in rural areas
- Conservation and protection of the country's water towers
- Encourage water harvesting in urban and rural areas
- Enhanced food relief supply to the vulnerable
- Increased use of insecticide treated materials
- Distilling existing water dams and construction of new ones
- Expansion of food subsidies in rural areas
- Conservation and protection of the country's water towers
- Encourage water harvesting in urban and rural areas
- Enhanced food relief supply to the vulnerable
- Increased use of insecticide treated materials

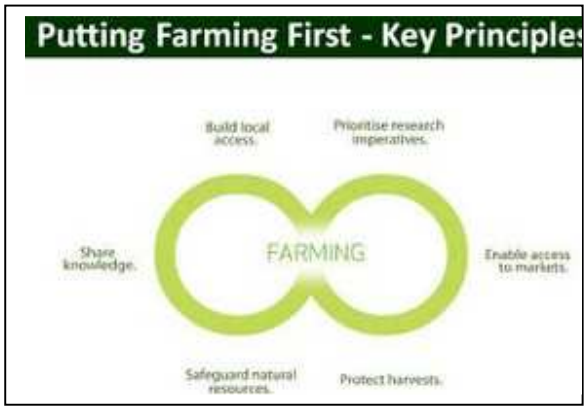
Africa's Strategy – "REDD – AFOLU Coalition"

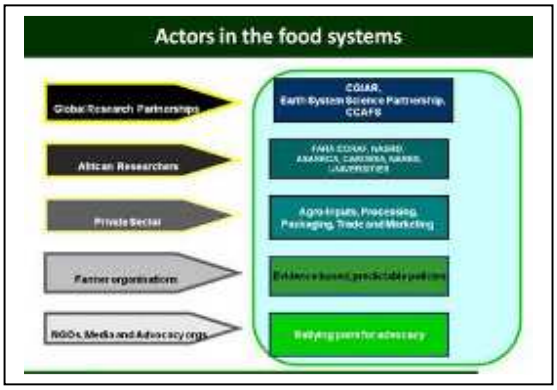
- Africa promotes REDD +- the reduction of greenhouse gas emissions by forest sources
  - *REDD provides a unique opportunity for forest nations to be rewarded for forest protection and stewardship*
  - *REDD++ is a welcome opportunity*
- Africa promotes AFOLU - carbon sequester. through agriculture, forestry and land use

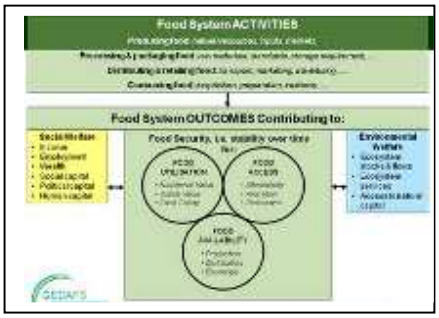
Climate Change in Africa

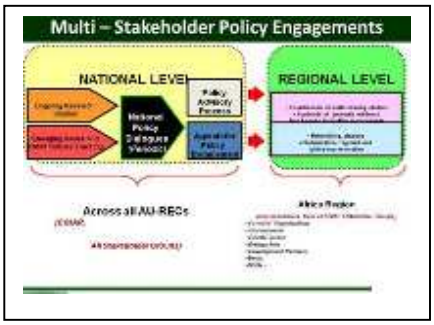
Status of African Farmers

- Land owned – maximum 2 acres
- Main Crops – Staples (Corn)
- Livestock-multiple use low returns
- Yield Maize 100kg/ha
- Fertilizer used: 0.2 of recommended/desired levels
- Use of recycled seeds
- Agricultural implements owned - hand hoe
- Policy engagements Nil









Facing up to the Climate Change Challenge- Partnerships

- Identify and develop regional and country programmes capacity to generate and administer an adequate base of knowledge base to address climate change challenge for sustainable development
- Focus on climate-related activities:
  - Policy research and analysis: control of activities responsible for emissions, participatory adaptation cost assessment
  - Consensus building at community and national level: alternative grassroots climate change adaptation strategies
  - Holding local corporations to account (responsibility &liability)
  - Capacity strengthening, technical advice and assistance
  - Communication and outreach and movement building

- Knowledge management and peer learning
- Linking agriculture and climate scientists

The New Economy- Bio-Carbon Initiative

Model for Distributing New Money

- Scale up of community managed environment programmes, e.g. CAMPFIRE – communal areas management program for indigenous resources
- Scale up role of CSOs- watch dog role
- (give evidence and voice to Farmers, media, women)
- Smallholder farmers act as environmental custodians - *creates jobs - local people are trained and become involved as environmental educators, etc*
- Benefits from carbon finance cement community collective responsibility : - *incentive for people to conserve environment, - generates funds for community projects infrastructure and new market opportunities*

The Africa Bio-Carbon Initiative

Road to Copenhagen –visible impact

- 23-27 February 2009, New York, USA

Intergovernmental Preparatory Meeting (IPM) of the Seventeenth Session of the United Nations Commission on Sustainable Development (CSD-17)

- *Discussed policy options and possible actions to enable the implementation of measures and policies on agriculture, rural development, land, drought, desertification in Africa*

- 14-16 April 2009 Durban, South Africa

SACAU Policy Conference

- *Developed clear strategy on climate change and agriculture in Southern Africa*

- 6-8 April, Kadoma, Zimbabwe

COMESA Zimbabwe Climate Change Roundtable

- *Developed a consensus on the Africa climate change position*

- 4 – 6 April 2009, Lusaka, Zambia

Regional Conservation Agriculture Tour

- *Conservation agriculture's role in mitigation and adaptation to Climate Change promoted*

Climate Change and Africa

Status of African Farmers

- Small scale producers responsible for over 80% of staple food crops
- Women main food producers in sub-Saharan Africa accounting for:
  a) 70% of the agricultural labour force

b) 80% of food production
   - *64% of People Living With HIV and AIDS are in sub Saharan Africa (SSA)*
   - *75% of all Women LHWA are in SSA*

Wanjiku's Dream –Secure Livelihood

- Land Owned -1 hectare
- Crops- Staples & high values crops
- Yield Maize 3t/ha
- High quality seeds
- Fertilizer used: 0.7 of recommended levels
- Agricultural Implements hires a tractor, Owns 2 cows, and 5 goats

The Africa Bio-Carbon Initiative

Lessons for Barcelona

- Align research agenda with global climate calendar
- Include CSOs in main national negotiating delegations and form coalitions
- Highlight where Agriculture can be included & reinforced in negotiating text
- Ensure integration of African media in COP15 delegations to amplify African voice and hold governments accountable
- Support negotiating teams pre- and during negotiations
- Evidence for collective engagements in side meeting at COP16

What Needs To Be Done in 2010-?

- LULUCF inventory of emissions and rules explicitly include agriculture
- Agriculture and food security are part of actions in implementing the Copenhagen Accord
- Coherent mitigation plans with adaptation plans and poverty reduction strategies - key for agriculture which is often a priority sector in both NAMAs and NAPAs
- Use of best practice lessons from agriculture programmes to inform global and national policies
- Regional and national initiatives, such as CAADP are supported to integrate climate change into their policies and plans

Conclusion

Agriculture is the back-bone of Africa's livelihoods.

A climate change deal must include Agriculture, Forestry and Other Land Uses (AFOLU)

COP 16 -NO Agriculture is

NO GLOBAL DEAL

To endorse- Visit www.africaclimatesolution.org

Clarifications/comments

Questions:

1. *What opportunity is there for countries who have submitted their numbers?*
2. *How do you plan to engage the governments apart from the REC:*
   - *Policies are a continuous process hence the need to contumely engage them because they are the main client of research.*
   - *it's up to all those with stake in development to interact with government, farmers, private sector but it is important to understand that the government is at the centre and operates policy processes*
   - *Emphasise on sustainable development that increase productivity and avoid wastage.*

Question: *How are you involving the government in non-government issues?*

- *Communities managing their resources and putting the beneficiaries at the centre and consider the civil society as the watchdogs*

Question*: How do we integrate policies in agriculture from bio-diversity to avoid conflicts?*

- *Collective responsibility in engaging the policies in a sustainable manner and Climate Change is an opportunity for addressing these issues*

Question*: How is agriculture addressing adaptation ad mitigation synergies?*

- *Adapting success stories to sustainable increase agriculture*

3.2 Downscaling and its limitation on climate change impact assessments, by Sepo Hachigonta

By Sepo Hachigonta, University of Cape Town

Unfortunately, the presentation could not be transferred into the Word document. For viewing, please visit the CCAFS website.

Reactions and clarification emerging from the presentation

Questions*: Do you think there is potential for these efforts to feed into CCAFS?*

Response*:*

- *Try to communicate knowledge on climate and bridge the gap between research and assessment com*
- *Bring in the missing information to complement GCMs and critic will not come up with anything new that has not been observe in history.*
- *Reach out as many communities as possible and constantly use an updated websites on the downscaling*

3.3Enhancing adaptive capacity of Indian Agriculture to climate change: opportunities and constraints, by P. Aggarwal

Pramod Aggarwal, Indian Agricultural Research Institute, New Delhi, India

These impact assessments have uncertainties

- Possible errors in climate models, crop models and data used
- No link with change in future irrigation water availability
- No consideration of weather extremes
- Future technological developments, (e.g. in crop improvement), and socio-economic scenarios not considered

Projected impacts of climate change on Indian agriculture

- Increase in CO2 to 550 ppm increases yields of most C3 crops by 10-20%.
- A 1oC increase in temperature may reduce yields of many crops by 0-7%. Much higher losses at higher temperatures.
- Productivity of most crops to decrease only marginally/remain unaffected by 2020 but decrease by 10-40% by 2100.
- Possibly some improvement in yields of chickpea, winter maize, sorghum and millets.
- Less loss in potato, mustard and vegetables in north-western India due to reduced frost damage.

Climate change may also provide new opportunities

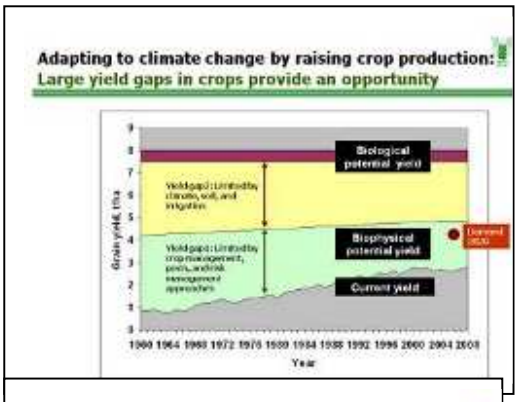
- Apple yields in Himachal have decreased due to inadequate chilling
- Apple cultivation shifted upwards
- Farmers changed to vegetables earning more income
- New varieties with lesser chilling requirement being introduced

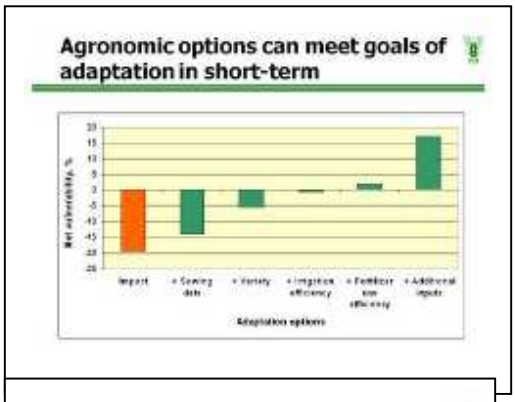
Adapting agriculture to climate change:

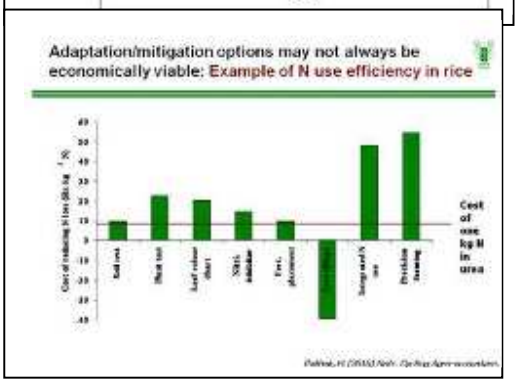
Setting goals of adaptation

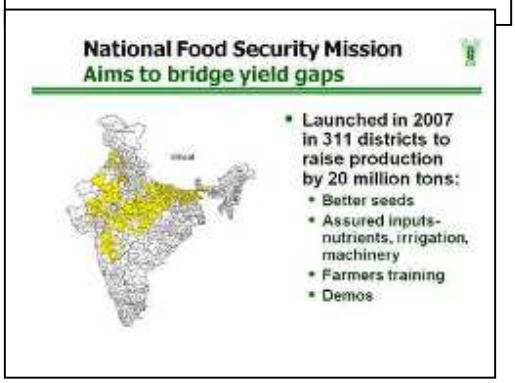
- Indian national agricultural policy aims a:
    - Growth rate of 4% per annum
    - Growth based on efficiency and conservation of resources
    - Growth that is inclusive and equitable
- Goals of adaptation
    - Producing more (diversified) food to meet demand
    - Stabilizing production in climate stressed seasons
    - Raising input use efficiency to address the increasing competition for land, water, capital, and labor settlements

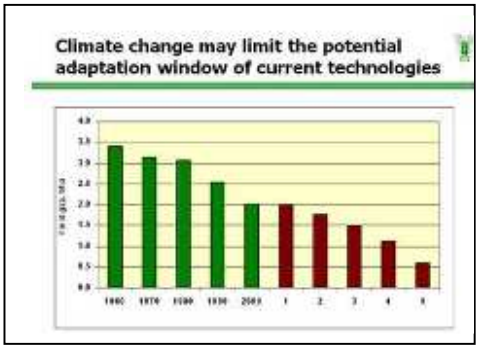
o Greater focus on poor









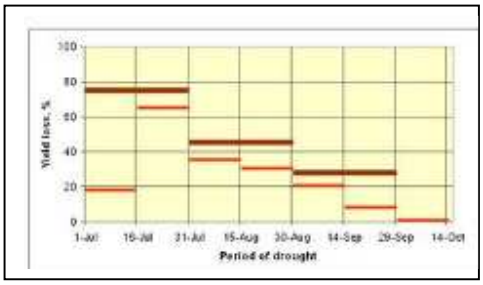


Managing current and future short-term climatic risks is crucial

Climatic risks are common in India

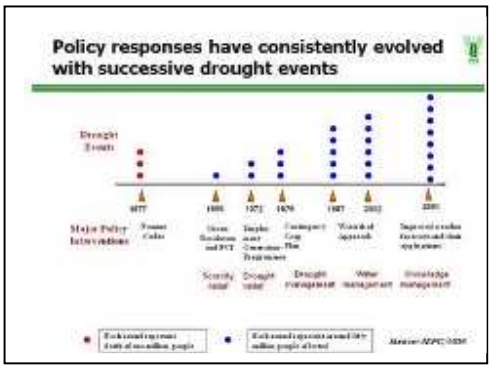
- 70% of land under cultivation prone to drought
- 12% of land (40 million hectares) to floods
- 8% of land (8,000 km coastline) to cyclones
- A major disaster occurs every 2-3 years
- 30 million people affected annually

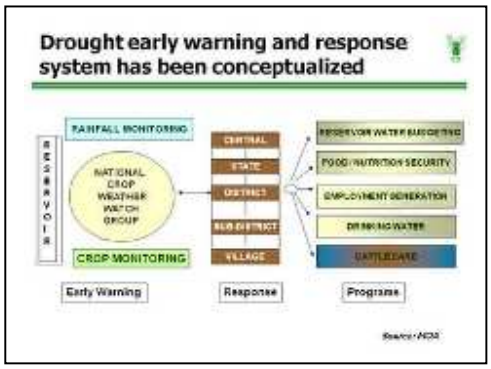
Short periods of drought can cause large yield losses: Sorghum in Rajasthan



Adaptation to increasing climatic risks: Assisting farmers to cope with current climatic risks

- Providing value-added weather services
  - Weak weather infrastructure; data protocols, storage, access and dissemination
- Promoting insurance for climatic risk management
  - scientific and economically validated schemes; weather derivatives; awareness
- Facilitating community partnership in food, forage and seed banks
  - Technical know-how; capital costs; reduced acceptance if successive years are risk free
- Compensating farmers for environmental services
  - Technical know-how; costs of production go up
- Sharing experiences across similar regions
  - Validation in new scenarios of development and climate risks





Despite such policy responses, climatic risks still cause considerable loss

Key reasons

- Widespread poverty:-Poverty (2005) Population at $2/day or less
- Limited human capital:- Human capital literacy rate
- Poor governance including limited stakeholder analysis, and dissemination of knowledge

Conclusions

1. Large yield gaps in all crops are an opportunity for meeting food demand in future even in the face of increasing climatic risks.
2. In short-term, several options relating to technology transfer and adoption can help improve adaptive capacity. Later, better adapted genotypes will be needed.
3. Climate change may provide new opportunities for growing crops in regions/periods not considered suitable earlier. Need to manage them.
4. Problems related to poverty, governance, institutions, and human capital limit agriculture growth today and can also limit adaptation to increasing climatic risks.

Some observations on the proposed Mega Program on climate change

- Clear identification of stakeholders:
    - Farmers
    - Policy Planners
    - Industry (e.g. insurance, carbon markets)
- Stakeholders interest in adaptive capacity:
    - Understanding vulnerabilities of the region
    - Overall enhancement of adaptive capacity (not agriculture alone)
    - Short-term action plans
    - Integrated, region specific solutions; and not by themes.
- New partnerships are required:
    - Other science departments (earth sciences, e.g.)
    - Development departments (e.g. irrigation and disaster management agencies)
    - Industry (e.g. insurance, carbon marketing)
    - Cooperatives (e.g. for food, seed and feed banks**)**

3.4 What types of Decision Support do we need? Building approaches that are useful to national and regional stakeholders, by Mark Stafford, CSIRO

By Mark Stafford-Smith, CSIRO

Outline

- In praise of Food *Systems* for delivering food security
- Adapting to climate change
    - Some key concepts in adaptation
- Decision support for decision making
    - Process as much as content
- Challenges and opportunities: Food Systems in the Earth System
- Link food systems, earth system science, scale issues, users of decision support, and development

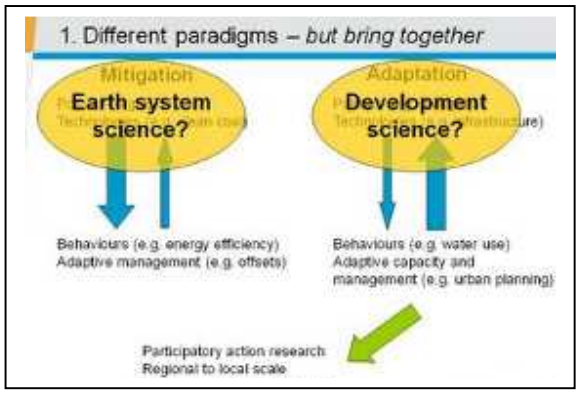
Some benefits of a food systems approach

- Identifies interactions of global change with food system
    - Focus on multiple vulnerabilities within the food system
    - Highlights under-emphasised aspects of the food system such as diverse food types and their sensitivity to climate change
    - Analyses feedbacks to the earth system from the food system (GHG, biodiversity, biogeochemical cycling, etc)
    - Highlights embodied water and carbon in food
- Allows analysis of multiple food system outcomes
    - food security
    - ecosystem services
    - social welfare

(GECAFS: Diana Liverman)

- "Cumulative changes, whole supply chains, transformative solutions…" Achim Steiner

Four concepts in adaptation



Brazil IGBP/ESSP-IAV meeting

- São José dos Campos, Nov 2009, mostly funded by Brazil
- ~89 attendees, from 24 developing countries (+5 OECD)
- Emphasised the importance for developing countries of:
  - Understanding the *adaptation options* arising from (and defining) vulnerabilities
  - Recognising adaptation to climate change may mean *development in a different direction* (not just more '20thC' development)
  - Building the links between adaptation, mitigation, development
  - Looking for real *opportunities* – e.g. leapfrogging technologies in communications, power systems, management standards, etc
  - Importance of genuine appraisal of *local knowledge* and its use where appropriate
- (Report at: http://www.ess.inpe.br/iavbrazil/)

Decision Support

- A process, more than a computer model
  - GECAFS experience
- Who for?

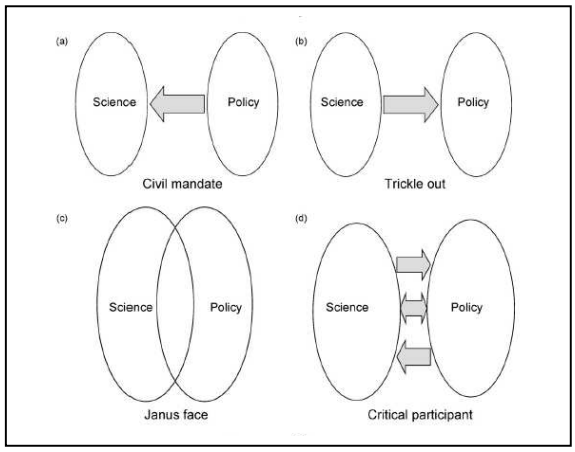
Who are the 'stakeholders'?

- Ultimately: clearly (rural) people of developing countries
- Proximately, *users* of DS are mainly framed as:
  - National decision-makers
  - International decision-makers
- These are not only government decision-makers
  - NGOs involved in supporting agriculture and livelihoods
  - Food distribution system and businesses
  - International trade, environment, market chain decision-makers
  - Even those influencing food aspirations of next generation
  - Global adaptation negotiators
- Policy is made in many places
  - Interest in MDGs, not agriculture production *per se*

Decision support for policy

- **Tends to emphasise methodology development over delivery**
  - Churchman '71 – "… tendency on designing inquiring systems is to bolster science & its research as it is conceived today"
  - Hammond '96 – "our main efforts have been directed towards developing better research methods for science … not been direct towards the needs of policymakers"
  - van Keulen '07 – "The examples still largely bear an academic character"
  - Rosing et al. '07 – "focus on methodology development rather than answering questions of specific clients"
- Tends to emphasise methodology development over delivery

- Tends not to be timely
    - Hammond '96 – "doubt over usefulness (of models) to policymakers largely because of length of time between initiation & appearance of results"
    - Hengsdijk et al. '98 – "Information comes too late and is not in line with the proposed policy plans"
    - Rossing et al. '07 – "… often come up with solutions for problems of yesterday due to the time needed to update data and rewrite models to new questions"
- Tends to emphasise methodology development over delivery,
- Tends not to be timely,
- And hence tends to have limited impact
    - Hengsdijk et al. '98 – "The contribution of QSA tools to the policy process is more difficult to assess, but seems less than glorious"
    - Rossing et al. '07 – "limited attention for model evaluation and impact analysis"
    - van Paassen et al '07 – "… but the exchange with stakeholders did not yet lead to a critical learning system approach"
    - van Keulen '07 – "The probably biggest challenge is to transfer the methodologies developed in land use studies to the unruly practice of land use policy formation and implementation"
- Tends to emphasise methodology development over delivery,
    - Tends not to be timely, and hence tends to have limited impact
- Despite all this:
    - Sterk *et al.* 2009. The interface between land use systems research and policy: Multiple arrangements and leverages. *Land Use Policy* 26: 434-442
    - Reviewed success (etc) of 11 policy/science DSS in ag. production / ecosystem services
    - Identified 5 different modes of effecting policy-science linkages
    - Related to primacy of science or policy, and convergent or divergent preconceptions of the role of science and policy



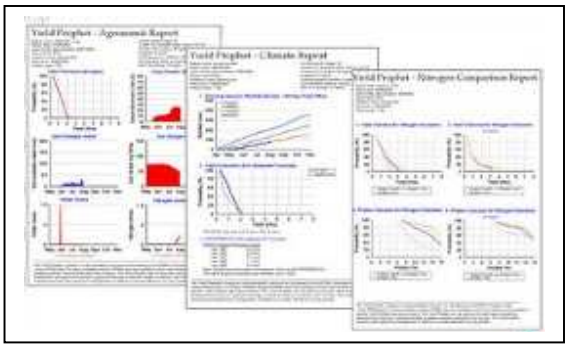
Summary - failings in Decision Support

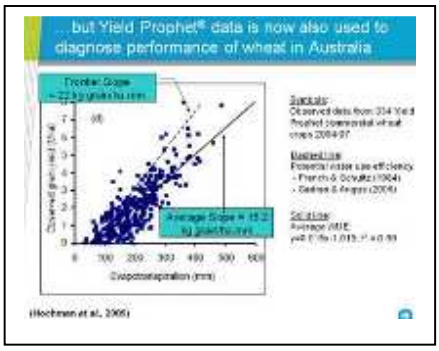
- Being driven by science alone (i.e. no clear users)
- Targeting the wrong decision-makers as users, or the right ones in the wrong way
- Failing to work across scales, given much source work in local case studies
- Omitting to identify and use the modes of engagement and leverage points

Yield Prophet® - a yield forecasting system for Australian graingrowers

- Internet-based subscriber system to predict current wheat yields using APSIM
- Initiated by Birchip Cropping Group (grower group) with CSIRO / APSRU collaboration
- 2003 - 25 paddocks in one region
- 2004 - 68 paddocks nationally
- 2005 - 300 paddocks nationally
- 2006 - 500 paddocks nationally
- 2007 > 500 paddocks nationally
    - 120 individual growers (and their consultants)
    - 50 commercial consultants (and their grower clients)
    - 21 extension officers
    - 6 grower research collectives
    - 1 corporate client (ABB)

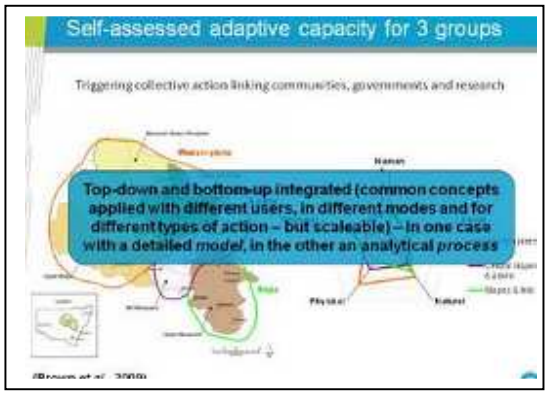
Yield Prophet generates paddock-specific reports for use by individual

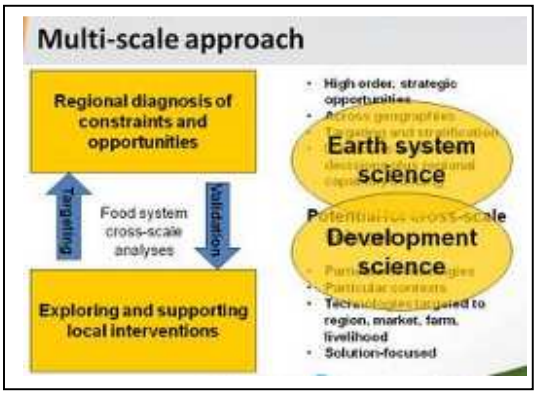


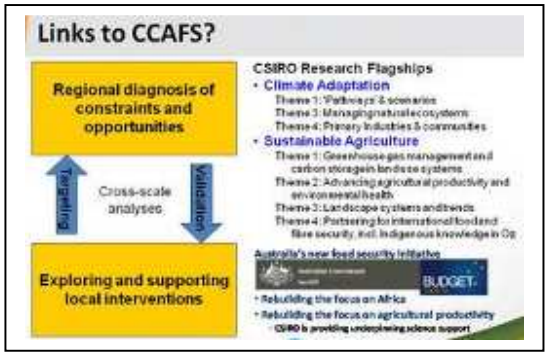


Top-down assessment of adaptive capacity of Natural Resource Management groups

- Using the Sustainable Livelihoods 5 capitals to define the analysis







Key messages for decision support

- Clarify the users (*vs*. the stakeholders) of the work
  - Engage them profoundly and understand their needs
  - Recognise their timeframes and choose commitments wisely
- Be founded in good science in what happens locally
  - Across the whole food system, not just production
- But frame at multiple scales from the start
  - From local to national and global – needs a model and typology for scaling up and down
- Avoid the failings of being method-driven and untimely
    - What are success stories from CGIAR/ESSP??

What is the Conclusion or vision?

- The most powerful outcome would be new and strong links between earth system science and development science, with food systems as a multi-scaled heuristic, and decision support systems really supporting decisions!

3.5 Linking Knowledge with action for sustainable development, by Bill Clarke, Harvard

By Bill Clark, Havard University

Learning from History?

- Extensive experience around the world in efforts to link knowledge with action in agriculture, but also health, conservation, regional development…
    - 20 years ago, agriculture in the lead Today, not.
    - What lessons from experience might be useful for MP7?
- Perspectives from an international research collaborative on common themes, best practices
    - Initiative on Science and Technology for Sustainability
    - Academy of Sciences of the Developing World (TWAS)
    - US National Academy of Sciences (NAS)
    - Sustainability Science Program (Harvard University)

Our findings so far…

Our studies revealed many different barriers that have inhibited effective mobilization of science to support development action, and many different pathways to overcome them

Four stand out as potentially relevant to MP7:

1. **Entanglement** of knowledge with power

2. **Misconceptions** regarding the relationship between basic research and problem solving
3. **Fragmentation** of the knowledge system
4. **Inflexibility** in a world of complexity & surprise

1) Entanglement of knowledge with power

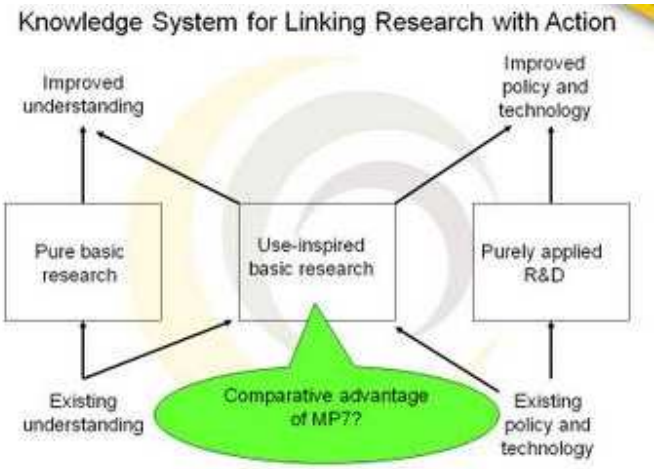
- Diagnosis (Why is there a problem?):
  - Most science can be pursued with little thought for its relationship to power, but when knowledge influences decisions, knowledge *is* power
  - With knowledge and power inseparably entangled, the real question is *whose* interests science will actually – and appear to – serve?
    - Farmers? States? Business? Researchers? Donors?
  - Those who feel their interests have not been taken seriously by research are unlikely to accept its findings
- Prescription (What needs to change?)
  - Definition of problem solving goals, setting of research agendas, and evaluation of progress must be done through processes that are inclusive of, transparent to, those with stakes in outcomes.
- Implementation challenges to MP7
  - Broadening the stakeholder dialog on agendas beyond CGIAR and donors (farmers [including women, urban], private sector, and universities?)
  - Clarify end vs. means: Food security? Sustainable agriculture / environmental services? Climate change?

2. Misconceptions: Basic research vs. problem solving

- Diagnosis (Why is there a problem?)
  - Most science based programs continue to act as though basic research produces general knowledge that can then be "piped" or "extended" into solutions in specific field contexts…
  - But evidence shows that such "panaceas" fail (much) more often than they succeed
- Prescription (What needs to change?)
  - Need for a more historically informed model of the relationship between basic research and practical problem solving in the real world

Quadrant Model of Scientific Research

"Soaking and poking"	Pure applied research (Edison)
Pure basic research (Bohr)	*Use-inspired basic research (Pasteur)*



Misconceiving Use-inspired research: Implementation challenges to MP7?

- Make creative work on fostering **innovation** in "Pasteur's Quadrant" central to the MP7 concept
    - Get over worrying about an exclusive focus on "global public goods"
- Manage a creative tension between the
    - The "Bohrs" (ESPP?) who risk falling in love with the most exciting basic research (eg. climate change, genomics), and
    - The "Edisons" (NARS?) who risk falling in love with creating particular solutions for particular places (e.g. C sequestration by Sumatran oil palm)
- Adopt *dual evaluation* of MP7's work on a continuing basis
    - Publication / citation counts, etc. to reward fundamental advances in understanding *as certified by researchers*… PLUS
    - Outcome mapping (RBM) to reward specific solutions *as certified by users* at multiple scales and sectors (farmers to national negotiators)

3.) Fragmentation (system is less than sum of its parts)
    - Diagnosis (Why is there a problem?)
        - Different "partners" assumed to be working on different parts of the knowledge-action chain…
        - But sustainability is often a public good, with weak incentives to complete the chain from basic research through Pasteur' quadrant to solutions
            - Ask a university to invent the automobile?
    - Prescription (What needs to change?)
        - Need systems integration to identify missing nodes, links; construct incentives to engage partners to complete them

Implementation challenges for MP7?

- *Become* the systems perspective on the problem (?) and what is needed for its solution (not just its understanding)

- Apply a *supply chain* perspective to identify the full range of tasks that need to be done; and to
- Identify, engage and where necessary nurture the partners who can best address them
    - Farmers, Private sector, university, civil society?

4) Inflexibility (static systems, dynamic challenges)

- Diagnosis (Why is there a problem?)
    - Problems change faster than research programs
        - Problems really complex, poorly understood
        - Hard-wiring presumed causes, solutions into program names
    - Research programs focus on improving knowledge in the "lab," not practice in the field
    - Complacent attitude toward innovation (underinvestment)
    - Incentives to hide failures rather than learn from them
- Process prescription (What needs to change?)
    - Recognize that systems for advancing research / knowledge are not the same as systems for advancing learning, innovation, adaptation
    - To promote the latter, programs need greater ability to take smart risks, survive failure, adapt to surprise
    - This means providing "safe spaces" that encourage innovators to experiment, fail, but be protected from hostile takeovers

Implementation challenges for MP7

- What's in a name?
    - "CLIMATE CHANGE, agriculture and food security" vs "Building FOOD SECURITY in the face of climate changes"?
- Where is the MP7's comparative advantage in contributing to the *adaptive management* of food security in a (climate) changing world?
    - Designing monitoring/ evaluation systems of vulnerability?
- Get agreement with donors on the optimal failure rate for the innovative projects that a successful MP7 will need to foster.
    - It's not 'zero'…

Summary Challenges for Linking knowledge with action in MP7

Entanglement of knowledge with power

- Broaden the stakeholder dialog on MP7 goals beyond CGIAR and donors (farmers [including women, urban], private sector, and universities?)
- Clarify end vs. means: Food security? Sustainable agriculture / environmental services? Climate change?

2. Misconceptions regarding use-inspired research

- MP7 to produce knowledge or to foster innovation?

- If the latter, how to evaluate progress?

3. Fragmentation of the knowledge system

- What is the full "supply chain" of contributions to achieve MP7's goal?
- Which partners does MP7 need to do what parts of the job?

4. Inflexibility in a world of complexity & surprise

- Agreeing on a target rate of failure in MP7 R&D
- How to foster adaptive management, risk taking?

Further Information

- Keep up to date with work on knowledge for sustainability through the virtual *Forum on Science and Innovation for Sustainability*
    - www.sustainabilityscience.org
- Publish research results in the new Sustainability Science section of the *Proceedings of the National Academy of Sciences* of the US (articles immediately available free on line in >100 developing countries)
    - www.pnas.org/site/misc/sustainability.shtml
- Apply to spend a year with the *Sustainability Science Fellows Program* at Harvard
    - www.cid.harvard.edu/sustsci/index.html
- Let me and my colleagues know of your reactions, ideas
    - William_Clark@harvard.edu

Selected Publications

- Cash, David, William C. Clark, Frank Alcock, Nancy Dickson, Noelle Eckley, David Guston, Jill Jäger, and Ronald Mitchell. 2003. Knowledge systems for sustainable development. *Proceedings of the National Academy of Sciences* 100(14): 8086-8091.
- van Kerkhoff, Lorrae and Louis Lebel. 2006. Linking knowledge and action for sustainable development. *Annual Review of Environment and Resources* 31:1–33.
- Mitchell, RB., WC Clark, DW Cash. 2006. Information and influence. (In) *Global Environmental Assessments: Information and Influence*. RB Mitchell, WC Clark, DW Cash, and NM. Dickson, eds. Cambridge: MIT Press.
- Clark, W and L Holliday, 2006. *Linking Knowledge with Action for Sustainable Development: The Role of Program Management*. Washington, D.C.: National Academies Press.
- McNie, EC. 2007. Reconciling the supply of scientific information with user demands: An analysis of the problem and review of the literature. *Environmental Science and Policy* 10(1): 17-38.
- Kristjanson, P., R Reid, N Dickson, W Clark, D Romney, R Puskur, S MacMillan, D Grace. 2009. Linking International Agricultural Research Knowledge with Action for Sustainable Development. *PNAS* 106: 5047-52.
- Reid, R., D. Nkedianye, et al. 2009. Evolution of models to support community and policy action with science. *PNAS* (www.pnas.orgcgidoi10.1073pnas.0900313106)

- Clark, W.C., N.A. Szlezak, S. Moon, B.R. Bloom, G.T. Keusch, C. Michaud, DT. Jamison, J. Frenk, and WL. Kilama. "The GlobalHealth System: Institutions in a Time of Transition." Acting in Time Initiative Working Paper. Harvard Kennedy School. Cambridge, MA: Harvard University. March 2010. (Available athttp://www.cid.harvard.edu/sustsci/index.html

Clarifications and Remarks

1. *Explore the operation of performance economy*
2. *What are the assumptions we are making on the economic system which is claiming the global productivity. What recognition are we making of the role of the informal economy in helping the economic shocks*
    - *Details are not worked out. Indigenous knowledge on trying to understood issue*
3. *What strategies are we making towards this*
4. *How does ICRAF link to the CC*
    - *Focus on the development agenda and focus on smallholder farmers but not completely blind to rural agriculture and development*
5. *How do you do capacity building and utilization at the same time*
    - *The model should be rolled into the impact and research strategy*
6. *How to identify the countries to deal with in the region*
    - *Need to identify the criteria for identification of countries*
7. *Knowledge on CCAFs initiatives*
    - *Get farmer testimonials on how cc*
    - *Video snips on farmers on the web*
    - *Understand the way people are dealing with themselves in the CC*
8. *Where is the emphasize on women being central to this agenda in terms of land tenure?. Need for a strong gender analysis and Addressing women farmers needs*
    - *Gender issues to be mainstreamed into the policies*
9. *Challenge programme being cut out from the grassroots realities. The component to look at is what is happening outside in relation to smallholder farmers and avoid reinventing the wheel.*
10. *Where you will locate M&E regional coordinators and aren't they the ideal persons to deal with these issues discussed.*
11. *To what extend have you been able to integrate lessons learnt from other challenge programmes into CC*
    - *2011-2012- need to incorporate lessons learned into the preliminary results as opposed to creating new programmes.*
    - *Considering other sectors on cross-sectoral issues*
    - *Important to learn lesson from climate arena*
    - *Need to build on ongoing initiatives rather than creating new things*
    - *Regional coordinators location suggested in Nairobi, Niger*
    - *The regions should not be a CG agenda*

- *CP lessons through literature review and extracting lessons.*

4 Synthesis: Implications for the future directions of CCAFS

After a couple of presentations, the plenary was split into small groups to reflect on the issues raised in the presentations and come up with a few cards with reflection points. These were presented and clustered. Later a short synthesis was done.

Buzz groups discussions

What are the Implications / Opportunities / Innovative Collaborations for future Directions of the Mega program

IMPLICATION/OPPORTUNITIES for future directions of the Mega Program

What are the goals and anticipated impacts of the programme?

- Embed program in regional development initiative e.g. EAU, ECOWAS
- Get climate change into agriculture and agriculture into climate change
- Is the goal of agricultural development or economic growth achieving food security
- Cc has sensitized the entire world to think of agriculture as part of the global solutions for adaptation and mitigation e.g. smallholder and medium farmers collaboratively working together
- What program is MP7 addressing, Agriculture, Food security or climate change
- What are the assessments criteria?
- What is the impact? How far down is the development path
- Clarity on expected results. What is in a performance contract
- Building food security in face of climate change
- We are aiming for a better food system and not a perfect system.
- Mapping out the food system and identifying who else should contribute to building the car and bring them on board

How to link the programme effectively to the end-users?

- The need to develop a solid plan of outreach that effectively links CCAFS in terms of knowledge, information and technology to the end-users/ farmers
- Assessing systems performance as a whole (beyond yield) including non-linear interactions

How to link the programme to other CC initiatives and reach scale ?

- Linkage across existing adaptation networks leading to learning

- Linking across scales of analysis and action
- Involvement of private sector in the partnership (insurance, FI, change markets)
- Innovative collaboration e.g. Relief organization, disaster risk management, authorities , farmers and NGO
- Implementation should focus on the role of partners in budget allocation

How to connect the programme to policy processes?

- How the benefits shall be shared from the programs
- Theme integration shall be a major issue in term of technology, policy and institutions
- Ensure establishment of a strong and elaborate policy with a subtheme that will address engagement of all players both as small-scale and big scale players in agriculture
- Take opportunity to venture more in policies by all means to ensure there are quantifiable improvements on them. This can be facilitated by implementing through TOR (contracts) if not affected by politics

How to make the programme flexible enough to pursue the real issues and outcomes?

- MP7 need flexibility defined in the contracts
- Define outcomes rather than activities
- Need greater flexibility in measuring outcome. Current table should invite failures like in the MP7
- Adjust management to handle complexity
- Broad, inclusive stakeholder approach and acceptance of failures
- Need to be able to change direction if needed and need to identify mechanisms for this

How to reach a meaningful inclusiveness and articulation of end-users in the programme design and agenda?

- Research findings should benefit the local communities through proper feedback mechanisms that is two way and collaborative
- Develop concepts and mechanisms in participatory way including different levels e.g. local, regional and national
- Identify research agenda from the clients (farmers) side and change the entire research paradigm
- Inside the CG and disciplines, there should be a direct CG and climate change cross mega program and outside there should be inclusion of societal partners
- Collaborations (innovative) program that should be community driven and not donor (stakeholder) driven
- Move from informing to engaging early and robust consultation process
- Deliberately working with the end-users (especially farmers) throughout the process and being flexible in the process e.g. bottom up VS top-down Vs etc.
- The CGIAR and MP7 must talk about power and why carbon farming may threaten smallholders

- Create room for end-users and service providers in the whole programme

How to influence policy and political will and championship?

- Future direction should be on adequate knowledge of the environment and climate condition because an average Nigerian farmer is inadequately informed about the climate change. Actions of modern techniques and technology are usually a serious problem in agriculture. The issue is not of right policies or programmes rather that of a strong political will and absolute patriotism on the part of people who are to implement the policies and execute the programmes.

How to develop robust data platforms and capacity for information sharing in the porgramme?

- Robust data sets are needed to be incorporated in the program
- Platform/protocol for data and information sharing needed
- Research and innovation technology that involve PHD students to conduct research from the focal points
- Capacity building and information sharing to involve policy level research, farmers and private sectors

How to use effectively the advantages of EESP and CGIAR communities in the programme?

- Integrating expertise and inter-institutional collaboration needed
- Maintain strong partnership with ESSP and global change research in general and work towards integration
- Link to the IPCC as an incentive for the researchers

How to balance the longer term trends with the reality of end-users

- Innovative in managing seasonal climate change variability through forecast dissemination that links forecast generators and end-users communities.
- Linking current climate adaptation pathways to future CC and adaptation to avoid mal-adaptation
- Addressing the Mega assumptions on the future configuration of society focusing on the shape and response
- Understanding dynamics of socio-ecological systems (Diagnostic assessment)
- Balancing short term needs e.g. smallholder food poverty vs long term necessities eg breeding perennial crops (implementation period)

How to broaden the agenda towards alternative production and economic systems?

- Climate change and other production systems (pastoralism, fishing) and other livelihood apart from crop production
- How to move from oil based agriculture to eco-agriculture that guarantees food security

• CCAFS agenda to engage in carbon markets and private sector
• Governance of the programme focusing on who is making decisions. How is the stakeholders' ownership reflected in the governance of the whole programme? Who are the stakeholders and where are they?
• Will intensification really reduce emissions locally and also in the whole system and should they be tested (when, when not0

5 Annex: Programme

CCAFS Conference Tuesday, May 4th 2010

Time	Agenda
08.00 - 09.00	Registration
09.00 - 09.30	Welcome remarks by *Thomas Rosswall*, CCAFS SC Chair*; Rik Leemans*, ESSP Chair and *Carlos Sere*, ILRI Director General
09.30 - 10.00	Climate Change, Environmental Management and Agriculture - *Achim Steiner*, UNEP Exec. Director
10.00 - 10.30	Enhancing Food Security in the face of Climate Change - *David Radcliffe*, European Commission representative
10.30 - 11.00	Coffee Break
11.00 - 11.30	*Climate Change, Agriculture and Food Security: A Proposed New Agenda for Research and Development – Bruce Campbell*, Director CCAFS
11.30 - 12.00	Discussions
12.00 - 13.00	Lunch
13.00 - 13.30	Articulating Africa-wide policy issues for adaptation and mitigation - *Lindiwe Sibanda*, FANRPAN
13.30 - 14.00	Downscaling and its limitation on climate change impact assessments - *Sepo Hachigonta*, University of Cape Town
14.00 - 14.30	The limits to adaptation in Indian Agriculture - *Pramod Aggarwal*, Lead author, IPCC.
14.30 - 15.00	Discussions
15.00 - 15.30	Coffee break
15.30 - 16.00	What types of Decision Support do we need? Building approaches that are useful to national and regional stakeholders. - *Mark Stafford-Smith*, CSIRO
16.00 - 16.30	Linking knowledge with action for sustainable development – *Bill Clark*, Harvard University
16.30 - 17.00	Discussions
17.00 - 17.30	Synthesis