

Climate Change, Agriculture and Food Security in the Indo-Gangetic Plain –
Developing Regional Scenarios

**Report of the first Scenario Development Workshop (Scen 1) for the
Indo-Gangetic Plains, held in New Delhi, 9-10 November 2010**

1. Workshop Objectives

- Launch the CCAFS Scenarios Development Process for the IGP
- Introduce rationale and process of developing scenarios for 2030
- Initiate the development of a set of scenario narratives for the IGP
- Plan follow-up activities

2. Workshop Programme:

Tues 9 Nov 2010 (09h00- 17h00)

1. Opening
2. Introduction to scenarios, and their development as a component of CCAFS – presentations by Polly Ericksen (PE) and Andrew Ainslie (AA).
3. Plenary discussion (questions and clarifications). Charge to break-out groups: JI
4. Tea/coffee break
5. Break-out groups x3 to identify the main drivers and their uncertainties in relation to food security and agriculture in the IGP in 2030 – AA, JI and PE to facilitate
=> **3 sets of most important 5 drivers and their uncertainties**
6. Lunch break
7. Report back and discussion - JI
=> **Consolidated list of drivers that are both important AND uncertain**
8. Tea/coffee
9. Three break-out groups to discuss the key features of the three drivers that are not uncertain for the IGP.
Charge to break-out groups: PE
=> **Key features of three drivers per group**

Wed 10 Nov 2010 (09h00-17h00)

1. Recap from yesterday
2. Report back from each group – presentation of the key features of the scenarios – PE
=> **Consolidated list of 3 or 4 scenarios**
3. Tea/coffee
4. 3 breakout groups each begin to elaborate at least two of the narratives. Charge to breakout groups: AA (AA, JI and PE to facilitate)
=> **Main elements of narratives for each scenario with timeline.**
5. Lunch
6. Report back – Check for overlaps and sufficient contrasts - AA
=> **Agreed set of narratives for scenarios**
7. Tea/coffee
8. Scenarios roadmap: Identify individuals to stay involved in the Scenarios Development process; timetable for 2011 – AA
=> **Agreed next steps**
9. Wrap up and evaluation of the Scenario development process over the past two days – JI, AA
10. Close and departure

3. Summary of outputs

3 sets of most important 5 drivers and their uncertainties:

Report backs from the 3 Groups:

Major drivers in the period 1980-2010 (i.e the past 30 yrs):

- The Green Revolution – use of fertilisers, good quality seeds, plenty of water with neither water quantity or quality an issue (with the result that water wasn't well managed)
- Reduction in food supply and poverty increased
- There were less people
- There was mechanisation and agriculture expanded into more marginal areas
- There was considerable movement of people to urban areas
- In the east, output from tea plantations was boosted by small growers
- Specialisation in the region has increased dramatically
- Oil is imported into the region, as a result of global trade and economic development
- Sustained unequal access to food security, with conflict fuelling this inequality
- Emphasis on rice-wheat cropping systems, (i.e. little diversification of crops) which was partly about the price mechanism management on the part of governments, with all the problems associated with mono-culture (pests, increased resistance, etc)
- Consolidation of holdings has started happening, because some people have moved and are working in the non-agric sector, which allows for specialisation and value-adding
- There has been an increasing problem of water quality – arsenic and salinity are serious issues
- Land degradation is an important driver

- Yields have levelled off in the past 10yrs
- Water management systems are poorly managed – increasing uncertainty regarding water availability; water pricing; governance of water is poor; little monitoring re. quantity
- Political turbulence in Eastern IGP is a driver of change in this region
- Upstream abstraction has caused water shortages **in Bangladesh**
- BUT, food grain production has tripled in the past 30 yrs **in Bangladesh**, through the introduction of technology, especially low-cost pumps for extracting water; high yield varieties, fertiliser use improved cultivation – at the cost of loss of wetlands and other degradation, high salinity and soil erosion
- Increasing population and urbanisation has reduced the land available for agric
- Uneven rainfall with frequent flooding **in B'desh**
- Disasters and extreme weather events
- **In B'desh**, there is also reduced soil fertility and changing seasonality

In Nepal

- In 30yrs, we have moved from being food secure to regular food deficits – what has driven this?
- Emphasis on Green Revolution technologies, which have undermined environmental management
- An 'exclusive development path', which has increased the wealth gap
- Subsistence-based agriculture has been emphasised
- Deforestation is a major driver of land use change and degradation
- Land reform has been a driver – there has been fragmentation of land holdings and thus no economies of scale in terms of production
- Weather and climate variables have shifted – floods, droughts have increased and changes in seasons make agriculture more risky
- Population pressure on resources is a driver
- Soil erosion that has led to reduced yields is a driver
- However, food inflation has taken hold and this is leading to a reinvestment in agric by governments and people

Major drivers in the period to 2030 (i.e. next 20 yrs)

- Development and uptake of technologies that are cost-effective, simple and easily adopted by farmers –(this is uncertain, mostly around pricing of these technologies, because prices affect their accessibility)
- Labour migration, growing urbanisation and the shift from agricultural livelihoods
- The use of technology to drive a new/second green revolution and drive food security – including improved agric varieties tolerant to drought, floods, etc. What is certain is the development of these technologies, but it is uncertain whether they will be adopted
- Irrigation (under technology) is a key driver – it needs electricity and other infrastructure to achieve greater efficiency
- Water management (quantity and quality) is a key driver of food security to 2030
- The retail revolution is a key driver – the market is opening up for all sorts of food products
- Related to this is the changing diets (the nutrition transition), where people will consume more livestock products. Market forces will organise this important driver of change in the food system.
- Shrinking land holdings and declining land for agriculture in general will drive food insecurity
- The need to add value to basic foods through processing

- Global trade in food products (import/export policies of countries in the region and beyond) has driven food availability and the increased private sector investments in the food sector will be a driver to 2030 (low uncertainty)
- Population is increasing and this is a driver (where there is low uncertainty)
- Regional integration in economic trade and relations and political stability, also integration to achieve water management goals (eg. The sharing of water and benefits in the region between countries, including managing the Himalayan region) and poverty reduction targets – a key driver (major uncertainty)
- Environmental drivers include water quality decline (low uncertainty); soil and land degradation and the poor management of natural resources
- The knowledge and capacity to deal with climate change, including the availability of and awareness about environmental information – this will drive investments over the next 20 years (low uncertainty)
- On Food Security, the use of employment guarantee schemes by governments to alleviate poverty
- Governments contingency plans to ensure food security will be a driver in future, including the development of an integrated agriculture strategy for small farmers

In the plenary discussion, the following drivers were identified as important and uncertain:

- **Regional co-operation** (assumes political stability in 4 countries) – co-operation around water between countries and within countries; it was suggested that government co-operation is bi-lateral and limited and that person-to-person (farmer-to-farmer) co-operation is higher
- **Governance of water** – pricing, management of groundwater and surface water (in India, the inter-state allocations of surface water is regulated by tribunals); subsidy for energy to extract water; increasing demand and competition for water
- **Technology** – this is driven by the private sector, not by governments; in water management, irrigation, weather forecasting, ICT for dissemination through private and state investment; there is a disconnect between research and extension which leaves small farmers out of the loop (their accessing technologies have high costs and high risks)
- **Global Trade (especially of food)** – the WTO marches on, but there is uncertainty around restrictions and embargoes on the trade in food (grains, etc), especially in times of need
- **Empowerment of Women** (gender equality) – impacts on nutrition, food security, farming practices - the group then discussed whether the empowerment of women and the ‘feminisation of agriculture’ was actually uncertain and a consensus was reached that this empowerment is increasing due to education and that it is in fact certain to continue.
- Other drivers discussed were: (i) economic growth in India is at 9% p.a. which is leading to a more diversified food basket, but impacting on the affordability of food (ii) the massive investments being made in rural areas (iii) government subsidies of staple foods

The accessibility of technology was debated at some length and subsequently divided into:

1. The development or generation of technologies
2. The dissemination of new technologies
3. The adoption by farmers and others of new technologies

It was noted that the pricing of technologies is a big factor in the accessibility of such technologies to the end-users, be these small-scale farmers or others in the food system.

Wed 10 Nov: Day Two

In the morning discussion, the following points were raised:

- Regional co-operation will **never** happen in the IGP around water – look at the experience of the Paraka Dam/Barrage, which is a huge sticking point between India and B'desh and will be for years to come
- The point is that we have to consider the adaptation options under climate change for increased regional co-operation
- Regional co-operation on water management between India, Nepal and B'desh is increasingly spurred by wanting to neutralise the influence of China in the region
- It may be useful to split into 'normal' periods which have a government focus and 'disaster/crisis' periods, where there will be a farmer focus. It will be important to consider the role of the private sector and of NGOs that may step in to assist people in floods across national borders
- CCAFS is not only about crops, but about livestock, fish, forestry and agro-forestry – we need to be mindful of these sectors as well
- While there is a distinction to be made between groundwater (mostly national/local issue) and surface water (often an international issue), groundwater is not only a national/local issue, because abstraction of water in one country affects the water situation in another country
- Sea water incursion through sea-level rise will increase the fish population and increase the importance of this sector
- CCAFS needs to define food security for the IGP
- Technology development needs to feature more clearly

The three breakout groups were asked to discuss three critical and uncertain drivers (Regional co-operation; adoption of technologies; world trade in food) and to justify which ones to use as axes for the four 'worlds'. On the basis of the report-back, it was decided that two would be used as the axes, i.e global trade in foodstuffs and regional co-operation.

The four worlds were: y-axis = **Global Trade in Foodstuffs**; X-axis = **Regional co-operation**

1. Status quo in regional co-operation and free trade in food
2. Enhanced regional co-operation and free trade in food
3. Status quo in regional co-operation and restricted trade in food
4. Enhanced regional co-operation and restricted trade in food

World 1	World 2
World 3	World 4

The following would be assumptions common to all three groups and each of the four worlds:

1. Economic growth for the region was set at a steady (6 to) 8% per annum until 2030
2. There would be political stability in the region
3. Temperature would increase by 1 (to 1,5) degrees to 2030
4. Population increase would be 10-15% and urbanisation will increase
5. There would be an increase in CV of rainfall
6. Technology would keep developing and continue to be adopted

The three breakout groups were asked to consider three drivers/factors and generate one statement for each of them in relation to their World:

1. The governance of water
2. The empowerment of women
3. The development and adoption of technologies

DESCRIPTIONS OF THREE KEY BUT NOT UNCERTAIN DRIVERS (GOVERNANCE OF WATER, ADOPTION OF TECHNOLOGIES AND EMPOWERMENT OF WOMEN) IN BREAKOUT GROUPS:

World 1:

- Governance of water declines
- Development and adoption of technology – external technology is more successful than national or regional, but this varies by country
- Empowerment of women: greater economic opportunities for women; fewer landrights for women (??) – what about the impact of more mechanisation on women’s empowerment??

World 2:

- Agricultural growth increases, and there is more equitable distribution of income
- Governance of water: price of water will increase because higher demand (population increase, industrial use of water) and greater competition and therefore water use efficiency will improve and the governance of water will improve tremendously
- Adoption of technologies: technology adoption will increase; it will be cheaper and will be shared regionally
- Empowerment of women: improves, esp in NRM. The employment of women will increase and therefore the cultural barriers to women’s empowerment will come down, but how the legal rights of women and gender awareness will change is unclear (??)

World 3:

- Greater drive for self-sufficiency
- Governance of water: steep increases in the price of water due to scarcity of water – this will lead to improved water use efficiency or will it (??) More national government control plus greater pressure to produce more food might mean water governance deteriorates (??)
- Adoption of technologies: less opportunity for the development and adoption of technologies, but technology improves to overcome constraints, although it is nationally driven
- Empowerment of women: less participation of and mobility on the part of women [than in World 2 or 4]; greater use of indigenous technology; not clear that there will be improvements in education (?) and micro-finance (?)

World 4:

- The governance of water: the price of water increases [but less than in World 2), so water use efficiency increases
- Empowerment of women: this will increase
- Development and adoption of technologies: this will be substantial, driven by pressure of the global restriction on food trade

Description of World #1 in 2030:

- Status quo in regional co-operation
- Improved global trade in agriculture and food
- High empowerment of women
- Poor governance of water at the regional level
- In 2030, there will be:
- A drop in agricultural production
- Demand for food is very high (food security is poor), so food staples have to be imported and swings in prices will be high
- Management of resources improves because of women's empowerment, esp at local level
- Millions (including 'empowered women') seek alternative employment outside agriculture
- Private sector moves in to invest in water management, including irrigation and energy provision
- Deterioration in management of water and land resources

Description of World #2 in 2030:

- Much improved regional co-operation
- Restrictive global trade
- High empowerment of women
- Regional level water governance improves, but not at micro-level
- By 2030:
- Insufficient rise in food production in the region, but some countries move ahead on food security
- Food becomes more expensive and inequality increases, leading to social tensions
- Regional economic growth increases – the private sector co-operation in the region improves – there is greater exchange of technology and expertise that helps to improve livelihoods and economic opportunities; there is less military expenditure and more investment in infrastructure and social wellbeing
- Empowered women ensure better local level NRM
- B'desh and Nepal get a share of the Indian economic markets
- Improved water governance helps the conservation of wetlands, etc and irrigated lands expand

Group #2 : what would drive the status quo scenario in regional co-operation to 2030?

- Increased extreme weather events mean 2010 management of Ganges is increasingly driven by national interests
- Increased international security concerns means nations tighten borders
- Political change at national level – less well disposed towards regionalisation
- Previous investments in dams to control river flow does not want to be wasted/politically unacceptable
- Local and environmental opposition to new water sharing infrastructure drives the status quo
- Desire to sell to world markets would be reduced if regional trading bloc
- Regional institutions deemed to be ineffective – better to 'go it alone'
- Mindset of politicians
- Vested interests

Group #2: what factors would drive enhanced regional co-operation to 2030?

- Growing influence of China drives India to develop more regional co-operation to balance power in the region
- Realisation of potential to share technologies encourages a regional approach
- Increased C.V. – more and major disasters that can be better managed by regional co-operation
- Sharing resources may be more cost-effective
- Enhanced private sector investments in Nepal and B'desh by Indian conglomerates (eg. Tata group) will drive political moves to regionalisation
- Increases in literacy will break down national stigma
- New ICT/social networking will drive political integration
- Regional growth will result in surpluses to export to neighbouring countries. This will be facilitated through regional trade agreements
- India wants to benefit from B'desh cyclone Early Warning Systems
- There will be greater sharing of transport facilities

What is the role of technology as a driver?

- Technology is very important, but the richer farmers have better access
- It seems that there risks for the farmer in adopting new technologies – this accounts for the sometimes indifferent uptake of new technologies
- Farmers' capacity, their economic capacity, climate conditions and other factors affect adoption rates
- Generation and adoption of climate forecasting technology will definitely improve, although this will be mostly state-led
- Communication and agric extension will improve. In terms of dissemination, there is a large role for non-state actors, both private sector and civil society (NGOs, CBOs & farmers groups)
- Private sector role in providing seed for rice and wheat and other inputs will remain uncertain, as they will do this only where they see profit
- Micro-insurance is required to ensure the adoption of new technologies
- The private sector will make a more sustained contribution to the provision of technology than NGOs, which operate in more short-term ways with limited monitoring of their impact
- Fertilizer in B'desh was subsidised by the state but 'badly' distributed by the private sector – they also require state monitoring
- At the level of the state, technology sharing is limited by patents and other regulations, such as quarantine restrictions, so technology sharing happens more at farmer-to-farmer levels
- Sharing of minimum/zero tillage machinery (and other RCTs- Resource Conserving Technologies) are there, but they are often adopted by bigger farmers. The uptake of RCTs is pushed by international agencies, with government support and with the private sector running the distribution – there are also other examples of PPPs (public-private-partnerships) that have worked well.
- There is also market-led uptake of technology, such as mobile telecoms and the hi-tech production of strawberries in India
- Consolidation of land will mean specialisation and corporate farming, which will help the private sector deliver technology to farmers

What role would World Trade in Food play in 2030?

- **The features of free trade in food** include:
- Liberalisation of trade, which assumes yield surpluses in cereals (that can be traded)

- It means an export orientation for other foods and a freeing up of important restrictions, through the removal of tariff and non-tariff barriers
- It means that the WTO will have resolved or will be in a position to resolve all disputes in relation to commodities
- It will mean high level intergovernmental co-operation on staples

The implications of free trade are:

- Equitable distribution of food declines
- Production will be stimulated through the market – Natural resource degradation may well result
- Prices are sure to increase and/or become more volatile with negative impacts on the access of the poor to food staples
- There is likely to be more production for export
- This raises questions about which farmers will benefit?
- Will there be an increase in jobs?
- It could result in improved bi-lateral co-operation in the region
- It could lead to more processing being done locally

By contrast, the **features and implications of restricted global trade in food** and foodstuffs include:

- The WTO cannot resolve trade challenges, so there is no removal of trade barriers across the world
- There is less movement of surplus staple foods
- Countries impose export barriers in scarce years
- Mistrust continues
- The EU quotas are in place and there are SPS standards
- It raises questions about who the major players in agricultural investment will be? Governments are likely to invest in staples, or at least focus their policies here, with farmers doing the actual investments; private actors will go for high value investments

Workshop closure

In closing the workshop, John Ingram thanked everyone for their participation. Those who expressed interest to stay involved in the scenario development process through 2011, were asked to sign up for this. The facilitators indicated that the second workshop would probably take place around May-June 2011. It is envisaged that by this time, an effort would be made to identify a wider range of other stakeholders in the food system in the IGP and invite these people to attend and participate.

People who attended the Scenarios Development workshop

No.	Name	Affiliation	Would like to stay involved	Email
1.	Manoj Khanna	Water Technology Centre, India	Yes	mkhanna@iari.res.in
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21.	Vijoy K Mallick	Min of Agriculture and Co-operation, Kathmandu		
22.	Dhruba Pant	IWMI, Kathmandu		
23.	Dilip Jung Shah	Agric Development Bank, Nepal		
24.	Guy Howard	British High Commission/DFID		
25.	Adlul Islam	ICAR Research Comp for Eastern Region		
26.	M.A. Khan	ICAR Research Comp for Eastern Region		
27.	Sachid Maden	ITC		
28.	Alok Sikka	National Rainfed Authority of XXX		

29.	H. Pathak	IARI, New Delhi		
30.	S.C. Bhan	India Meteorological Department		
31.	Chitta Ranjan Dutta	Integrated Research & Action for Development, India		
32.	VUM Rao	CRIDA, Hyderabad		
33.	Ann Kristin Koehler	CCAFS		
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35.	Julian Ramirez	CCAFS		
36.	Kevin Coffey	CCAFS		
37.	Michael Misiko	CCAFS		
38.	Moushumi Chaudhury	CCAFS		
39.	Andrew Ainslie	CCAFS		
40.	Polly Ericksen	CCAFS		
41.	John Ingram	CCAFS		