

VOICE FOR CHANGE

Agrarian Communities' Action Plan On Climate Change

BIHAR

June 1, 2015

Introduction

The severe impacts of climate change have begun to appear in several parts of the world with intensity. India is exceptionally vulnerable, with 70 per cent inhabitants depending on climate-sensitive sectors such as agriculture, fishing and forests. The impacts are already visible, especially in agriculture, and will become more severe in the decades to come.

The State of Bihar is located in the Indo-Gangetic plains in central-north India, and its naturally fertile soil is one of the key assets of the State, and conducive to agriculture. However, agriculture and its allied sectors in Bihar are beset by many challenges, and climate change and its impacts are only likely to deepen these challenges.

□

What makes Bihar vulnerable to climate change?

- Around 90 per cent population live in rural areas where agriculture and animal husbandry are primary livelihoods
- Area under cultivation as a proportion of the total reporting area - 60 per cent (as compared to 47 per cent for the country as a whole)
- 81 per cent population is employed in agriculture production system
- Women contribute one-fifth of the total rural income
- Horticulture (Fruits, vegetables, spices, honey, medicinal, aromatic plants) occupies 15 per cent of land area but income generated from horticulture is much higher
- 237.3 thousand hectares of water area and 3200 kms of river constitutes around 3.9 per cent of the total geographical area of the state, fisheries based livelihoods has ample scope in Bihar
- Though there are such large water resources, there has been only a 10% increase (from 44.6 lakh hectares to 49.20 hectares) in total irrigated area over a period of eight years
- Access to irrigation facilities is low
- Most of the cultivated land is small and fragmented in holding
- Oriented towards subsistence production- 94 per cent under food grains
- The fertility of soil and abundant ground water resources enable the farmers of Bihar to produce a variety of crops, both food and non-food - cereals and pulses, oilseeds, fibre, fruits, and vegetables
- Around 50 per cent of net sown area is bereft of irrigation and dependent on rain
- Weak agriculture extension systems have led to poor transfer and adoption of modern efficient technologies
- Poor marketing and distribution chain with inadequate procurement, storage, and processing capacities have affected incomes and incentives
- Problems of flood (zone I and II) and drought (zone III) severely affect the income from agriculture on an annual basis
- The state has a larger number of buffaloes as compared to the country as a whole
- Ownership of the bulk of cattle by marginal and small farmers
- Approximately, 4.6 million households in the state are involved in fishing

Though the issue of climate change is among the highly visible agenda points in global policy debates, there is little participation of the people most affected by it. In India, it is yet to become a political issue, let alone an electoral issue. Further excluded from any dialogue are the people at the margins - the landless, small and marginal farmers, Dalits and tribals, rural women and children.

Research Methodology

To bring the voices from the margins to the forefront of development debates, Praxis facilitated a community-led research process in 13 habitations located in six districts across Uttar Pradesh, Uttarakhand and Bihar that enabled these communities to engage more substantively with climate change. In Bihar, the team visited three habitations (Asiya Gaon, Kharhar and Pattsharma) in Muzaffarpur district and two habitations in Sitamarhi district (Kodiahi and Banbhirwa).

Community-led research was carried out to map the realities, seasonal variations and changes over time in different aspects related to agriculture, livelihoods and coping mechanisms. Some of the tools that were used



include: social map and well-being mapping to understand the different vulnerabilities in the community, historical transect / trend analysis to map changes over the past few decades and seasonality matrix to understand differences that were seen from season to season.

In the subsequent phase, 13 members from the agrarian communities in these three states, including five from Bihar, were part of a Ground-Level Panel¹ process in New Delhi to collectively analyse the information collected and respond to the State Action Plans on Climate Change.

Community-led research

The team interacted with members from agrarian communities in the five villages of Bihar (as mentioned above). Taking the case of Banbhirwa village in Sitamarhi district of Bihar, the community-led analysis of climate change and its impact on agrarian communities is presented below. Using the social map, the community members documented the vulnerabilities of the households living in their village such as households that have irrigation facility, hand pumps and households in which members migrate for work. They also mapped the well-being of the communities based upon criteria they evolved.

Diagram 1. Reproduced social map of Banbhirwa village



¹ In July 2013, a Ground-Level Panel of 14 people living in poverty and marginalisation was facilitated by Praxis in collaboration with Participate in four countries, including India. The Panel responded to the UN High Level Panel's recommendations on what should replace the MDGs. This alternate development agenda evolved by the Ground-Level Panel was shared with officials, media and civil society in India and at international forums (<http://ow.ly/MF1t7>). The experience of the Ground-Level Panel process opened up possibilities for marginalised communities to inform global development debates from the vantage point of their lived experiences. Its objective is to ensure that the process of setting a framework includes actual dialogue with the perspectives of people who live in extreme poverty and who are most marginalised in any context.







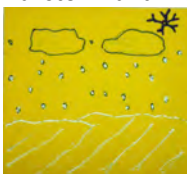



Table 1. Households in Banbhirwa arranged according to perceived well-being

Category	Households	Criteria
Relatively well off	8 of 84 households	<ul style="list-style-type: none"> • Share croppers • No irrigation facilities • Cattle sharing • Loss of livestock
Not so bad	47 of 84 households	<ul style="list-style-type: none"> • Youth migrate • Children migrate • Disabled member in the house • No toilet • No hand pump
Leading a relatively difficult life	29 of 84 households	<ul style="list-style-type: none"> • Indebtedness • Loss of assets due to indebtedness • Assets mortgaged • School drop out

To understand the community's experience of climate change, a participatory trend analysis was facilitated wherein, the respondents shared and collectively analysed changes over the past two decades in agricultural practices and associated factors.

The participants analysed the trends in different aspects of agriculture, climate and lifestyle. These are presented below.

Table 2. Trends in climate over the past decade

Parameter	2005-2015	Description
Monsoon rainfall (July –Sep) 	↓ 	2005: Earlier rainfall could be predicted as it used to rain during June-September. One of the respondents mentioned "assad ke mahine me barish hota tha" (We received rainfall in the month of July and August). Now: It does not rain during the monsoons, affecting agriculture. "Ab asad ke mausam me barsaat nai hoti." (We don't receive rainfall in July and August).
Erratic Rainfall (Feb-March) 	↑ 	2005: There was hardly any crop damage due to erratic rainfall. Now: Rainfall is erratic. The community sometimes experienced rainfall just before harvest that damaged crop.
Hailstorm and Frost: 	↑ 	2005: The respondent mentioned that earlier pala (frost) was not experienced in the mornings. Now: They mentioned that due to decline in temperature, dense fog covered the entire field that damaged the crops.
Drought 	↑ 	2005: The respondents mentioned that they never faced droughts before the 1990s. Now: The chances of facing a drought had increased tremendously. They mentioned that in the last 3-4 years the community had faced periods of drought.






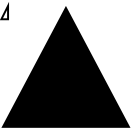






Parameter	2005-2015	Description
Rise in Temperature 	Δ 	2005: Earlier the temperatures were in accordance with the season. Now: One of the respondents said “May June ke mahine mein jab garmi hoti thi aabhi thandi lagti hai aur tabiyat kharaab hoti hai” (while earlier May and June were summer months, now we experience a chill in the air. This variance in temperature has led to people taking ill).

Table 3. Trends in agriculture and produce over the past decade

Parameter	2005-2015	Description
Seed 	Δ 	2005: Earlier, farmers grew multiple varieties of crops. Now: The farmers said that they were not growing the varieties of crops they grew earlier. The crops that had been totally stopped were corn and madua. Other crops that had been stopped were sweet potatoes (alwa) and potatoes (alu). Channa cultivation had also stopped. All these had been stopped due to the change in temperature that resulted not only in crop damage but also in the inability to harvest as the seeds were of poor quality.
Yield 	↓ 	2005: The farmers said that the produce in the past was more compared to the present. Now: When asked about the yield, a respondent said “Pehle aacha upaj hota tha, par ab mausam kathin hai aur ab kum upaj hota hai” (earlier we would get a good produce, but now as the climate has changed, the produce has gone down.
Livestock 	↓ 	2005: One of the respondents mentioned that earlier every household had 2-3 animals (cow, ox, and sheep). Now: Not even 15 households out of 80 had livestock. The major problem that they faced was getting fodder for livestock in times of green cover depletion.
Use of Chemical fertilisers 	Δ 	2005: The use of natural fertilisers was higher than the use of chemical. Earlier they mostly used cow dung as fertiliser. Now: The community has been using vermi-compost for the past two years. However, presently due to low income they are not able to rear livestock and as a result they do not have natural manure. They use chemical fertilisers such as DAP and urea. 2 kgs of DAP and 4 kgs of urea was used per kattha (0.05 acre).
Fodder 	. 	2005: Earlier fodder was easily available. One of the respondents mentioned “phele ghaas aur bhusa hota tha” (earlier there was grass and fodder for the livestock in plenty). They also mentioned that there

















Parameter	2005-2015	Description
		<p>was ample amount of green cover around the village.</p> <p>Now: The respondent mentioned “ ab ghaas aur bhusa nahi hai” (now there is scarcity of pastures and fodder for the livestock). The green cover has also reduced drastically. One of the respondents mentioned “Assaad ke mahine mein gaehu dal ke khilate hai” (During the months of June and July they mix wheat in the cattle feed due to shortage of fodder).</p>
<p>Soil Fertility</p> 		<p>2005: The soil fertility was dependent on floods. They mentioned that earlier there were floods and since the water did not stagnate, it replenished the soil and hence the produce was better.</p> <p>Now: The fertility of the soil still depends on the flooding of the plains. But due to dry spells, the fertility has come down.</p>
<p>Use of pesticides</p> 		<p>2005: Earlier pests infestations were negligible and hence crop damage was low.</p> <p>Now: The respondents mentioned that the crops were infested by pests and hence the need for pesticides. The major crops that were affected were arhar and masoor. One of the respondent mentioned “phasal mein mota mota kida hota hai, aur lahi jaha gira wahan phasal katham ho jata hai” (the crops now have pests that are big in size and once the lahi infests the crops, it destroys them). The pesticides used was “pheredone (which contains thymet, a poisonous content). One respondents said “Now, 100 grams of pheredone is used in 1 kattha (0.05 acres)”.</p>
<p>Irrigation facilities</p> 		<p>The respondents mentioned that they never had any mode of irrigation. They had a government bore well which had also gone dry. Hence they were dependent on floods, rains and water from the rivers- Gandhak and Adwara.</p>
<p>Use of technology/machines</p> 		<p>10 years ago: As the number of livestock was high, it was used for ploughing the fields.</p> <p>Now: The lack of livestock has led to the use of tractors for ploughing the field.</p>



Table 4. Trends in forests and wild animals over the past decade

Parameter:	2005-2015	Description
Forest cover 	↓ 	2005: The forest cover was dense in the earlier days. They mentioned that the forest was situated about 100km from the village. Now: The respondents mentioned that the forest cover had declined. This was evident from the fact that wild animals were coming out of the forest into their fields to feed on crops.
Crop damage by wild animals 	↑ 	2005: As the forest cover was dense, the wild animals did not come out in open and destroy the fields. Now: The major damage was caused by wild boars in the area. The respondents mentioned "Khod ke allu nikal deta hai" (the wild boar digs out the potatoes from the fields). They also mentioned that the nilgai destroyed and ate their crops.

Unsustainable practices have resulted in new challenges for communities

Communities have indicated changes which they are facing like issues with the amount of cultivation; decline in quality of crops; reduction in the amount of livestock; increase in the use of chemical fertiliser; growth in the intensity of pests; use of new modes of technologies due to the decrease in uses of traditional sources of energy like cow dung. The experiences in the four villages are listed below.

Table 5. Climate change and its impacts as experienced by agrarian communities in Bihar

	Thematic areas	Habitations in Bihar				
		Asiya	Banbhirwa	Kharhar	Kodiahi	Pattsharma
A	Climatic related changes					
1	Drought	Y	Y	Y		Y
2	Increased dry spells		Y			
3	Floods	Y	Y	Y	Y	
4	Erratic rainfall	Y	Y	Y	Y	Y
5	Unseasonal rainfall	Y	Y	Y	Y	Y
6	Frost/hailstorm		Y			
7	Rise in temperature	Y	Y	Y	Y	Y
B	Changes in farming					
1	Low productivity	Y	Y	Y	Y	Y
2	Increase in pest attacks	Y	Y	Y	Y	Y
3	Loss of cattle	Y	Y	Y	Y	Y
4	Increase in cattle diseases	Y	Y	Y	Y	Y
5	Increased use of fertiliser and pesticides	Y	Y	Y	Y	Y
6	Decline in food diversity	Y	Y		Y	Y
C	Changes in lifestyle					
1	Migration	Y	Y	Y	Y	Y



2	Increase in diseases	Y		Y	Y	Y
3	Increased drudgery of women	Y		Y	Y	Y
4	Increase in loans from moneylenders	Y	Y	Y		Y
D	Other vulnerabilities					
1	Landlessness	Y	Y	Y	Y	Y
2	Child labour		Y			
3	Lack of irrigation facilities		Y			
4	Ineffective implementation of social security and livelihood programmes	Y	Y	Y	Y	Y
5	Share cropping	Y	Y	Y	Y	Y
6	Cattle sharing	Y	Y	Y	Y	
7	Selling of land	Y			Y	
8	Non-receipt of compensation	Y	Y	Y	Y	Y
9	Cutting of forest/trees - Reduced tree cover		Y	Y		
Y indicates that a particular factor has been experienced in that village						
Source: Field interactions						

Ground-Level Panel (GLP)

Subsequent to the field visits in Muzzaffarpur and Sitamarhi districts of Bihar, five members from the habitations came to Delhi to be part of the Ground-Level Panel on Climate Change and Agriculture. Community representatives de-jargonised climate change by relating it to their daily experiences and impacts on their lives; made informed opinions on SDGs and SAPCCs based on intense discussions for three days using multiple participatory tools and analysis with data collected from three states. They then prioritised solutions towards informing Governments to relook the SAPCCs and make a serious transition to demonstrable actions. This has enabled communities to evolve a people's action plan on climate change based on their lived experiences.

The Ground-Level Panellists were:

Ram Lachan Manjhi Sumitra Devi Shabnam Shail Devi Upendra Paswan	} Bihar
Urmila Devi Pyaari Devi Gulab Singh Prakash Chand	} Uttarakhand
Gajodar Ombiri Mohammed Iqbal Uma	} Uttar Pradesh



GLP's analysis of experience of climate change

The panellists engaged in a collective analysis of the linkages involved in climate change and agriculture. They reviewed the linkages made at Banbhirwa and added linkages where possible based on their unique experience. The following diagram presents these linkages.

Diagram 2. Causal loop of linkages between climate change, agricultural practices and lifestyles



The panellists noted some new linkages to the already existing ones.

The Bihar State Action Plan for Climate Change

The state has a net sown area of 59% and agriculture is about 1/5 of the state's total GDP. The Bihar State Action Plan for Climate Change (SAPCC) intends to define an overarching climate response framework and develop flexible sector specific response strategies and actions to overcome its significant vulnerability owing to its location in the Indo-Gangetic plains.

QUICK FACTS ABOUT BIHAR SAPCC	
Response strategy	Accelerating inclusive economic growth, promoting sustainable development, securing and diversifying livelihoods, and safeguarding ecosystems. Further, the strategy is not to be viewed as a standalone action; instead it will be integrated into the regular developmental planning process, keeping with the convergence principles articulated in the State's 12th FYP Approach Paper.
Community participation	No
Nodal agency	State Planning Board, though BAPCC was developed by Environment & Forest Department
Vulnerability study	No
Net increase in temperature	Temperatures in the Ganges basin are expected to increase by an average of about 2°C by 2050 and 4°C by 2100.
Tree Cover change	Land Under Tree Crops 240.52 ha (2006-07); 240.96 ha (2007-08); 242.86 ha (2008-09); Tree Cover: 2,369 sq km
Forest Cover	From 4832 sq.km in 1997 to 6845 sq.km in 2011
Annual Rainfall	1506.08 cm (2007) to 677.85 cm (2010)
Seasonal distribution of Rainfall	Patterns of seasonal distribution of rainfall can shift, and these can cause significant problems, especially for agriculture
Fertiliser consumption	32.25 lakh tonnes (2006-07); 39.08 lakh tonnes (2009-10); 40.36 lakh tonnes (2010-11) Mean fertiliser use intensity for 2009-10 - 166.7 kg/Ha, growth in fertiliser use



QUICK FACTS ABOUT BIHAR SAPCC	
	intensity (between 1999 and 2010) – 83.4%
Year wise damage due to climate change associated disasters	Flood (2004) <ol style="list-style-type: none"> Death toll of 885 human lives and 3272 animals was reported Crop damage was worth Rs 522.06 crore Loss of public property to the tune of Rs 1030.49 crore were reported 9.3 lakh houses were damaged Flood (2007) <ol style="list-style-type: none"> 650 people and 615 animals were reported to be dead 59610 houses were damaged 11.9 lakh hectare areas covering 10215 villages were adversely affected Damages of crop and public property were estimated as Rs 781 crore and Rs 643 crore respectively. Drought (2009) An amount of Rs 27.20 crore was spent on schemes of drinking water, implemented by Public Health and Engineering Department (PHED) due to occurrence of irregular monsoon and receding of the ground water level in some areas of the state.
GSDP Growth	Contribution (2011) <ol style="list-style-type: none"> of Agriculture to NSDP (%) 21.30 of Industry to NSDP (%) 4.63 of Services to NSDP (%) 74.07
Net sown area	From 60.5% (5665120 Ha) in 2006-07 to 59.4% (5554080 Ha) in 2008-09 with cropping intensity increasing from 1.36 to 1.38
Plan Outlay Gender Dimensions	Plan just states that specific and additional emphasis will also be placed on the role of women in agriculture and its allied sectors

The state's major income is from services, agriculture taking the second position. The Year wise damage due to climate change associated disasters is expansive. The panellists examined the SAPCC and added their suggestions to the action plan. The table below details the analysis:

THEMATIC AREA	SAPCC STRATEGIES AND ACTIONS	GLP'S RECOMMENDATIONS
Agriculture	<ul style="list-style-type: none"> ▪ Building institutional linkages - developing strategic plans ▪ Collating, disseminating and best flow management practices - expanding automatic weather stations to GP level and linking them to insurance mechanisms ▪ Resource conservation to minimise soil/water losses ▪ Improving irrigation efficiency - solar, wind power systems for irrigation ▪ Weather services, early/warning systems ▪ Integrated nutrient and pest management ▪ Conservation agriculture ▪ Capacity building of stakeholders ▪ Support women's role in adaptation ▪ Gender disaggregated data to enable gender specific planning and interventions 	<ul style="list-style-type: none"> ▪ Use of methods such as vermin-compost should be encouraged and propagated ▪ Small and poor farmers are usually excluded from government programmes. Government should pro-actively include them. ▪ Compensation should reach the poor and marginalised without it being usurped by influential people ▪ Share croppers should get access to benefits (subsidies) and compensation ▪ Women sharecroppers should get access to land ▪ Land to single women as sharecropper - Single woman cannot get more than 10 kattha of land. No one agrees to give ▪ Providing vacant government land as well as vacant land of landlords to poor for agriculture ▪ Consolidation of land (chakbandi) can strengthen farming as at present management of small scattered



THEMATIC AREA	SAPCC STRATEGIES AND ACTIONS	GLP'S RECOMMENDATIONS
		<p>landholding is a major issue</p> <ul style="list-style-type: none"> ▪ Government should ensure possession over the redistributed land as large number of Mahadalits have still not got possession over the lands allotted by the government ▪ Access to seeds and manure should be made easy ▪ Tractors and mechanised farming have posed a threat to agricultural labour as most farmers have started using tractors. Alternate livelihood should be provided to agricultural labourers
Water resources/ Irrigation	<ul style="list-style-type: none"> ▪ Water resource strategies ▪ Review hydrological and weather observation stations and services ▪ Ground water monitoring and geohydrology networks ▪ Monitoring erosion and carrying capacity ▪ Monitoring surface and ground water quality ▪ Adoption of modern technology ▪ State Water Policy Framework ▪ Revival and repair of traditional systems of water storage ▪ Conservation and micro irrigation ▪ Conservation of wetlands ▪ Involvement of PRIs ▪ Ground water recharge 	<ul style="list-style-type: none"> ▪ Bore well and electricity facilities for supporting irrigation ▪ Canals to improve linkages with the rivers so that irrigation can take place ▪ Lift irrigation provisions ▪ Sluice gates-enabled dams to release water as and when necessary ▪ Measures to combat floods that take place when the rivers from Nepal get flooded and the water is released indiscriminately ▪ Large scale irrigation solutions are not feasible nor preferred as the area is prone to flooding ▪ State instituted bore well system needs to be revived
Livestock	<ul style="list-style-type: none"> ▪ Action on hunger and poverty ▪ Implement agriculture road map with focus on farmers, not farms ▪ Address humanitarian dimension to agriculture as well as food security ▪ Transfer of technology and extension ▪ Income generation schemes ▪ Marketing - breed management ▪ Livestock entrepreneurship ▪ Strengthening of veterinary and dairy services ▪ Promotion of education, training and research ▪ Improved extension services ▪ Surface and ground water schemes ▪ Community-owned electricity operated tube wells ▪ Drought proofing ▪ Ground water monitoring ▪ Capacity building of functionaries ▪ Renovation of traditional irrigation system 	<ul style="list-style-type: none"> ▪ There is the need for dairies ▪ Need to look into livestock diseases as their numbers are already reducing and are also vulnerable to diseases ▪ Measures should be taken to provide fodder to prevent livestock death ▪ Efforts need to be made to increase the availability of grazing land - without pastures animal rearing is difficult ▪ Landless people do not have access to livestock rearing as a livelihood opportunity ▪ Tractors and mechanised farming have posed a threat to livestock rearing



Facilitated by



With support from



Adithi



Praxis Institute for Participatory Practices
BB – 5, Greater Kailash Enclave II, New Delhi – 110048
info@praxisindia.org | www.praxisindia.org | +91 11 2922 3588