

# Relevance of Autonomous Agricultural Adaptation to Climate Change: Survey Analysis of Bihar

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Evidence for Action: Aligning the Climate and SDG Agendas  
July 20, 2021



# Background & Motivation

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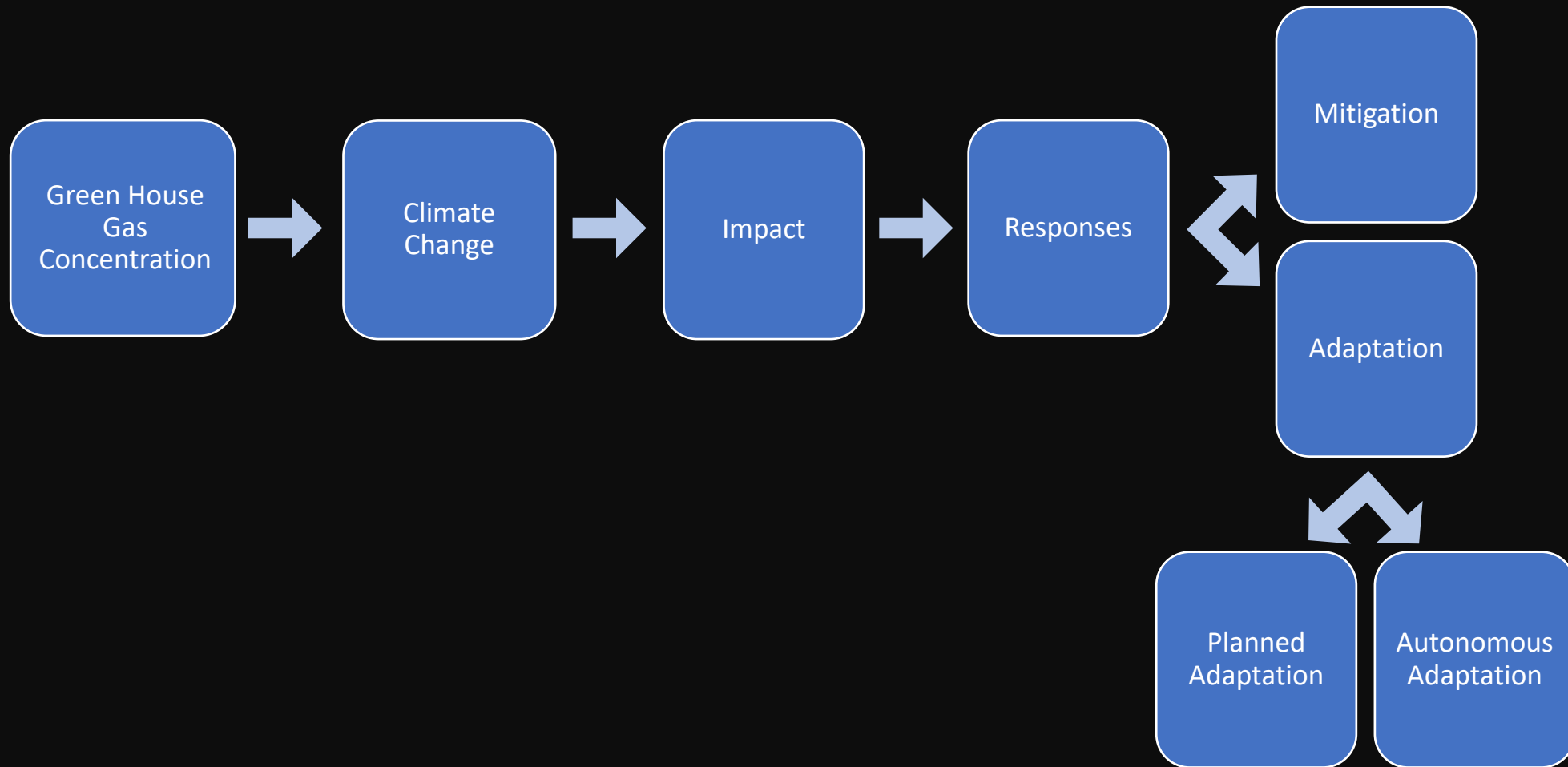
- Climate change signifies alterations that go beyond common atmospheric states leading to average rise in global temperature – commonly called “global warming”
- Earth’s mean surface temperature already risen by 1.1 degrees Celsius on average in comparison with late 19th-century – most of warming over last five decades
- Significant changes in rainfall patterns – receding or delayed arrival of monsoons or rising intensity of rainfall – often spread over fewer days
- Rise in frequency & intensity of floods, droughts, heat waves, & storms – consequence of changes in climate regimes
- Agriculture is an inherently climate dependent industry with prominent geo-climatic features
- Slowly altering climate patterns (changes in level & timing of temperature & rainfall) & extreme climate events (heating/ cooling degree days, extreme (high/ low) rainfall, flooding, droughts) disturb agriculture through influence on land & hydrological ecosystems
- Climate change posing grave concerns for India
  - average temperatures rising & precipitation becoming more uncertain & often, more intense

# Why Bihar?

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- Bihar is one of the climate vulnerable states in India
- In Bihar, climatic patterns shown notable variations over relatively short period – last three to four decades
- The state is one of the resource-abundant Indian states (in terms of groundwater, perennial rivers, alluvial fertile lands) among those located in the Indo-Gangetic Plains
- But its agricultural productivity is one of the lowest in the country
- Agriculture generates 20-21 per cent of Bihar's GDP
- It employs an overwhelming 90 per cent of its labour force
- Proportion of marginal & small farmers found to be a significant 92.5 per cent for Bihar
- Thus, performance of agriculture critical to ensure inclusive growth, poverty reduction & food security

# The Process & Way Forward



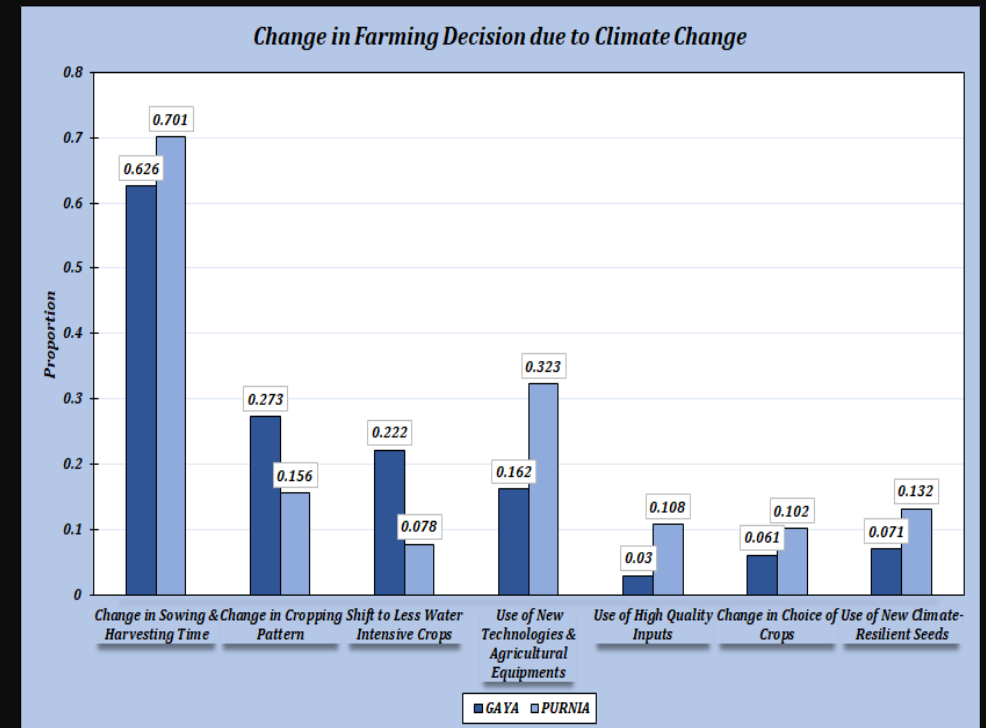
# Key Findings: Perception Analysis

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- Farming communities are discerning about climate change
  - 64.2 per cent of farming households in Gaya & 63.1 per cent in Purnia believe that climate change is happening
- Environmental hazards perceived to be most significant contributors to crop losses incurred by farmers – major ones being heavy rainfall and drought in Gaya & heavy rainfall and floods in Purnia
- Temperature changed towards a greater number of hot temperature days & greater intensity of hot days over a shorter span of time
  - greater number of hot temperature days is more of a long-run & gradual climate change phenomenon (over 20-30 years), while higher intensity of temperatures over fewer days a more recent climate change trend (over 5-10 years)
- Rainfall pattern changed toward a delay in monsoon, followed by more intense rainfall spread over fewer days
  - a significant (50 to even over 80 per cent) of respondents in both districts perceive that rainfall pattern changed in several ways – greater number of rainy days, heavier rainfall concentrated over fewer days, & shifting of monsoon rainfall (both early or delayed arrival) in comparison to the past 20 to 30 years

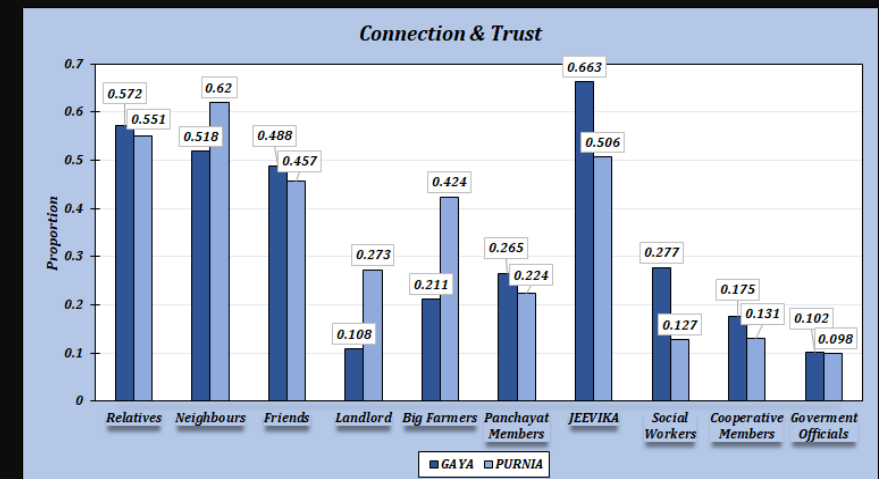
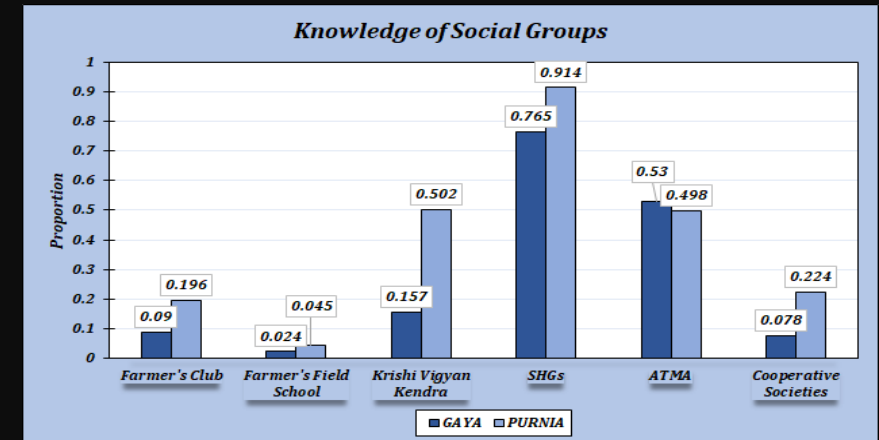
# Key Findings: Planned & Autonomous Adaptations

- Overall ordering of adaptation measures (due to gradually changing climate) relied upon – efforts towards climate change adaptation by farmers
  - shifting of crop sowing & harvesting time (adopted by 62.6 per cent in Gaya & 70.1 per cent in Purnia)
  - changing cropping patterns – crop-mix, multi-cropping/inter-cropping (27.3 per cent) & re-allocation of land from more to less water intensive crops (22.2 per cent) in case of Gaya, &
  - use of new technologies & agricultural equipment (32.3 per cent), & use of new climate resilient seeds (13.2 per cent) in Purnia



# Key Findings: Planned vs. Autonomous Adaptations

- Effectiveness of planned (versus autonomous) adaptation to cope with climate change found rather weak in case of both surveyed districts
  - dissemination of knowledge & capacity building ICT-enabled extension services, government workshops, agriculture related formal social groups such as farmers' clubs (FCs), farmer's field schools (FFSs), *krishi vigyan kendra* (KVKs), etc., quite low
  - compounded by lower level of acquired education, lack of awareness of such formal social groups & forums & costs of such programmes
- Exceptions were the role of SHGs & JEEViKA – found effective & trustworthy almost across the board
- A very promising finding of the study –
  - in Gaya, respondent households display trust & reliance (for their farming decisions) on advice & help received from JEEViKA; this was their top choice (as many as 66.3 per cent reported this to be the case), followed by suggestions/advice from relatives (57.2 per cent), from neighbours (51.8 per cent) & from friends (48.8 per cent)
  - in comparison, a higher proportion of Purnia households said that they trusted the advice on farming decisions from neighbours (62 per cent), followed by relatives (55.1 per cent), JEEViKA (50.6 per cent) & friends (45.7 per cent)





# Key Findings: Adaptation Channels

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- Inherent ability/ traditional knowledge has positive impact on rice & wheat yields
  - reinforced by households' responses on usefulness of traditional knowledge (an overwhelming 84.9 per cent in Gaya & almost entire sample, 99.2 per cent, in Purnia)
  - effectiveness of ancestral knowledge ranked between medium & very high for both genders found, around 33 to 40 per cent of respondents
  - impact of inherent ability channel supplemented by increases in literacy rate
- Community networks, in general, have a positive impact on both rice & wheat yields
  - a significant percentage of respondents in both districts perceive ICN to be very helpful (around 61.4 per cent in Gaya & 66.9 per cent in Purnia)
  - corroborated by households' responses on effectiveness of FCN & ICN – around 29 to 40 per cent ranked them between medium & very high
  - impact of formal community networks (FCN) reinforces with increase in literacy rate, but that of informal community networks (ICN) reduces with increase in literacy rate – may be due to weakening of social & local ties as members of farming households attain higher literacy levels & move away or migrate to other locations for alternative opportunities
- Higher the influence of community networks in agricultural adaptation, lower the impact of inherent ability & vice-versa – from regressions analysis



Thank you... 😊