

Ambio

Electronic Supplementary Material

Title: **The diversity of gendered adaptation strategies to climate change of Indian farmers: A feminist intersectional approach**

Authors: Federica Ravera, Berta Martín-López, Unai Pascual, Adam Drucker

Supplementary material 1

List of variables selected from recent literature to be used in the Canonical Correspondence Analyses (CCA) as explanatory factors, determining the adoption of different adaptive strategies. Note: to reduce heteroscedasticity, continuous variables were transformed into $\ln(x+1)$.

Variables	Literature	Description /measure	UK (N=135)	Bihar (N=176)
<i>Gender variables</i>				
Gender bias of respondent	Acquah-deGraf and Onumah (2011); Below et al. 2012; Fosu-Mensah et al. (2012);	Female respondent (Dummy, takes the value of 1 if respondent is female) (% HH =1)	51%	41%
Gendered decision making	Huynh and Resurreccion (2014); Opiyo et al. (2015); Ray-Bennett (2009); Sofoluwe et al. (2011); Deressa et al. (2008);	Decision making in agriculture is controlled by women (dummy, takes the value of 1 if there is control) (% HH =1)	42%	30%
Gendered task involvement*	Gbetibouo et al. (2010)	Main involvement of women in tasks of agriculture (dummy, takes the value of 1 if there is involvement) (% HH =1)	59%	37%
<i>Intersectional HH variables</i>				
HH size	Deressa et al. (2008, 2011); Opiyo et al. (2015); Sofoluwe et al. (2011)	Number of people in the house (n ^o) Mean (SD)	6.7 (2.9)	9.7 (4.6)

Variables	Literature	Description /measure	UK (N=135)	Bihar (N=176)
Schooling	Acquah-deGraf and Onumah (2011); Apata et al. (2009) ; Deressa et al. (2011) ; García de Jalón et al. (2015); Below et al. 2012; Opiyo et al. (2015); Gbetibouo et al. (2010)	Years in school completed by HH head (n ^o) Mean (SD)	2.9 (1.5)	2.5 (1.4)
Age	Acquah-deGraf and Onumah (2011); Deressa et al. (2008); García de Jalón et al. 2015; Hisali et al (2011) ; Below et al. (2012)	Age HH head (years) Mean (SD)	50 (15.6)	46 (14.9)
Caste / Social class	Onta and Resurreccion (2011); Huynh and Resurreccion (2014); Ray-Bennett (2009)	Respondent belong from different caste (ordinal from low=1 to high=3) (% HH)	Low=6% Medium=79% High=15%	Low=3% Medium=20% High=76%
<i>Social capital</i>				
Participation in agricultural extension/training programs	Below et al. (2012); Gbetibouo et al. (2010)	Participation (Dummy, takes the value of 1 if there is participation) (% HH =1)	46%	38%

Variables	Literature	Description /measure	UK (N=135)	Bihar (N=176)
Participation in informal networks/institutions	Below et al. (2012)	Participation (Dummy, takes the value of 1 if there is participation) (% HH =1)	51%	5%
<i>Access to assets (wealth)</i>				
Land access	Acquah-deGraf and Onumah (2011); Below et al. (2012); Fosu-Mensah et al. (2012); García de Jalón et al. (2015); Hisali et al (2011); Gbetibouo et al. (2010)	Cultivated land (own and rented land) (ha) Mean (SD)	0.4 (0.7)	1.4 (1.9)
		Land ownership categories (% HH)	Landless=1,6% Small farmers (<0.4 ha) =72% Medium Farmers (0.4-1.2) =21.4% Large farmers (>1.2 ha)=5%	Landless=6.7% Small farmers (<0.5 ha) =33.5% medium farmers (0.5-2) =42.8% Large farmers (>2 ha) =17%
Animals access	Deressa et al. (2011); García de Jalón et al. 2015; Opiyo et al. (2015); Sofoluwe et al. (2011)	Total number of animals owned (nº) Mean (SD)	4.0 (3.1)	1.8 (1.5)

Variables	Literature	Description /measure	UK (N=135)	Bihar (N=176)
Access to information	de Wit (2006); García de Jalón et al. 2015 ; Hisali et al (2011)	Level of access to information (from high=4 to null=0)	1.9 (0.6)	1.6 (0.8)
Access to irrigation	de Wit (2006); Deressa et al. (2011); Gbetibouo et al. (2010)	Level of access to irrigation (from high=4 to null=0)	0.4 (0.7)	1.8 (0.6)
Access to credit	Deressa et al. 2008; de Wit (2006); Fosu-Mensah et al. (2012); Hisali et al (2011)	Access to credit (Dummy takes the value of 1 if there is access; % HH =1)	40%	39 %
Off-farm income diversification	Acquah-deGraf and Onumah (2011); Nielsen and Reenberg (2010); Sofoluwe et al. (2011); García de Jalón et al. 2015 ; Nhemachena and Hassan (2008);	Number of off farm activities income-generating (n ^o)	2.6 (1.4)	1.8 (1.1)
On-farm income diversification		Number of on-farm activities mainly oriented to market (n ^o)	1.0 (1.2)	1.9 (1.6)
<i>Farm location</i>				
Distance to market place	Below et al. (2012); Garcia de Jalon et al. (2014)	Distance to close (farmers') markets (Km)	4.7 (4.0)	4.0 (1.4)
		Distance to town markets (Km)	39.4 (3.0)	21.0 (4.7)
Location (site)	Below et al. (2012); García de Jalón et al. (2015) ; Gbetibouo et al. (2010)	Agro-ecological zone (% HH in site 1 and % HH 2)	Site 1=70% Site 2=30%	Site 1=56% Site 2=44 %

Variables	Literature	Description /measure	UK (N=135)	Bihar (N=176)
Perceptions of change				
Perception of climate change drivers	Below et al.(2012); Gandure et al. (2013)	Number of weather related changes (T, rainfall etc.) perceived by a household within the last decade: $P_{ij} = \sum i(n)_j$ with: <i>P_{ij} = Number of perceived changes by jth household</i> <i>i...m = Changes of weather parameters</i> Mean (SD)	4.0 (1.1)	2.9 (2.0)
Perception of multiple drivers of change (including environmental change)		Number of changes (socio-cultural, economic, political, environmental) perceived by a household within the last decade: $P_{ij} = \sum i(n)_j$ with: <i>P_{ij} = Number of perceived changes by jth household</i> <i>i...m = Changes of parameters</i> Mean (SD)	9.7 (2.5)	8.8 (3.8)

* We developed the following categories of gender tasks division of work: “tasks mainly managed by men” (when more than 5 tasks over 9 were managed and controlled by men of the family), “tasks mainly managed by women” (more than 5 tasks over 9 were managed and controlled by women of the family), “tasks with shared management” (when tasks were managed and controlled by both men and women). In a few number of cases where less than five tasks had been identified as managed by one category, we assigned the more cited category.

Supplementary material 2

Social perceptions of main drivers, impacts and strategies adopted. Note: number of strategies is defined in Figure 2.

Drivers	Main impacts (% respondents)	Strategies adopted
<i>Uttarakhand</i>		
<i>Climate change</i> [increased temperature; more frequent droughts; later start of rains; uncertainty of climatic events and erratic monsoon; less overall rainfall; spring water changes; decreasing on snowfall]	Woman moves far away for NR (e.g. water, fuelwood) (82%) Yield decline due to climatic stress (67%) Woman works more in the field (57%) Food availability decrease (47%) Pest and diseases (41%) Change in growing season (12%) Loss of species/varieties (7%) Cropping change (7%)	Socio-economic and cultural (4, 7, 8, 10, 11, 12, 13, 15, 16, 17) / Ecosystem-based (18, 20, 21, 23, 24, 25, 26, 27, 28, 29, 30, 32, 34) / Technological (35, 37, 38, 39)
<i>Land use change and environmental changes</i>	Soil degradation and yield decline (91%) Woman moves far away for NR (e.g. water, fuelwood) (82%) Loss of forest cover (76%) Decreasing availability of fuel wood and other NWFP (42%) Land fragmentation (35%) Wildlife movement near to villages due to forest loss (6%) Decreasing pasture and fodder (6%)	Socio-economic and cultural (1, 4, 6, 10, 11, 12, 15, 17) / Ecosystem-based (20, 21, 23, 28, 30, 31, 32) / Technological (35, 36, 37, 39)
<i>Political and economic change</i>	High price of food and dependence from external	Socio-economic and cultural (1, 3, 4, 5,

Drivers	Main impacts (% respondents)	Strategies adopted
	intervention (76%) Woman works more in the field (57%) Out-migration and less labor force availability (46%) Increasing external interventions in seed and agriculture management(40%)	6, 7, 8, 9, 10, 11, 12, 15) / Ecosystem-based (18, 19, 33) / Technological (36)
<i>Cultural Changes</i>	Changes of customs, habits etc. (71%) Changing woman/man relations and expectations young people (46%) Less leadership in the village (16%) More willingness with environmental issues (10%)	Socio-economic and cultural (3, 9, 10, 11, 12, 15, 17) / Ecosystem-based (18) / Technological (-)
Bihar		
<i>Climate change</i> [increased temperature; later start of rains; uncertainty of climatic events and erratic monsoon; less overall rainfall; lower groundwater table; more frequent droughts; strong winds]	Woman works more in the field (60%) Yield decline due to climatic stress (43%) No changes in woman role/decision making (32%) Pest and diseases (26%) Change in growing season (14%) Woman moves far away for NR (13%) Land use and cropping change (12%) Food availability decrease/food crisis (10%) Loss of species/varieties (5%)	Socio-economic and cultural (1, 2, 4, 7, 8, 9, 10, 12, 14, 16, 17) / Ecosystem-based (20, 21, 22, 23, 24, 25, 26, 28, 29, 30, 33) / Technological (36, 37, 38, 39)
<i>Land use and environmental changes</i>	Increasing yield due to technological advances (71%) Land fragmentation/access to cultivated land (51%) Soil degradation and yield decline (14%) Woman moves far away for NR (13%)	Socio-economic and cultural (1, 2, 4, 6, 12) / Ecosystem-based (19, 20, 21, 22, 23, 28, 30, 31, 32, 33) / Technological (35, 36, 37)

Drivers	Main impacts (% respondents)	Strategies adopted
<i>Political and economic change</i>	<p>Out-migration and less labor force availability (92%)</p> <p>Increasing external interventions (NGOs and governmental) in seed/agriculture management (64%)</p> <p>Woman works more in the field (60%)</p> <p>High price of food, inputs, irrigation and seed (and associated corruption and risk on quality of seed) (30%)</p> <p>New policy of seeds: dependence from external sources, (20%)</p> <p>New opportunity to sell (15%)</p> <p>Increasing control /monitoring (11%)</p>	<p>Socio-economic and cultural (1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 16, 17) /</p> <p>Ecosystem-based (19, 29) /</p> <p>Technological (35, 38, 39)</p>
<i>Cultural Changes</i>	<p>Changing patterns of woman/man relations (64%)</p> <p>Changes of customs (46%)</p> <p>No changes in woman role/decision making (32%)</p> <p>More willingness with environmental issues (30%)</p> <p>Less leadership in the village (19%)</p>	<p>Socio-economic and cultural (3, 9, 10, 11, 12, 15) /</p> <p>Ecosystem-based (-) /</p> <p>Technological (-)</p>