



Gendered Approach to Climate Resilient Agriculture: Technology and Policy-led Options

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ABSTRACT

The study measures the perception of rural women towards changes in farming practices, and women's involvement in agriculture in changing change context. Data were solicited from randomly selected 100 women households (WHH) from Madhubani district of Bihar, India. Survey of WHHs was undertaken using a basic set of mixed methods; combine a semi-structured schedule based survey with qualitative interviews and in-depth case studies. Study reveals that one-fourth of WHH (25%) involved as an owner cultivator followed by agricultural labour and share cropper & owner cultivator. WHHs (91%) perceived that total number of crops grown in last 10 years back had been reduced or stopped while other crops were also introduced as per suitability of crops in the area. Mostly WHHs (96%) changed the agricultural crops with some alternate crops. Fertiliser use in agriculture also changed (86%). Majority of them (80%) reported that seed rate of crops also altered. Change in labour use and machines in agriculture were also perceived. Hence, in the present context, there is need for a gendered approach. Study also documents some general & policy specific and technology-led actions for empowerment of WHHs.

Keywords: Gender, Climate resilient agriculture, Technology, Policy

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INTRODUCTION

Women have always performed important roles in agriculture; but their roles have changed over time. Women are the backbone of rural economy in developing countries and are responsible for 60-80% of food production (Mehra and Rojas, 2008). According to Food and Agriculture Organization (2011), women farmers account for more than quarter of the world's population. Women comprise, on an average 43 per cent of the agricultural work force in developing countries, ranging from 20 per cent in Latin America to 50 per cent in Eastern Asia and Sub-Saharan Africa. Yet, women have less access than men to agricultural related assets, inputs and services. If they have easy, timely and reliable access to productive resources as men, women can increase yield by 20 per cent to 30 per cent, raising the overall agricultural output in developing countries

by 2.5 per cent to 4 per cent. This gain in production can reduce the number of hungry people in the world by about 12 per cent to 17 per cent, besides increasing women's income. Throughout India, women are more likely to be engaged in agricultural work than men, but, since much of this work is informally done as part of family's subsistence, official statistics continue to grossly underestimate female workforce. The general pattern in Asia suggests that the poorer area, the higher is women's contribution, and that women generally farm small pieces of land. Over 75% of the daily time of a rural woman is spent on farming related activities. Factors such as recent institutional changes (such as economic liberalisation and commercialisation), new technological development and growing awareness of an impending food crisis, deepening poverty in specific 'pockets' or geographical regions, and above all, climate-related changes are affecting farming-based livelihoods in region. Future food security also needs to be understood within climate change. Hence, a close attention to gender aspects of farming systems is one part of new approaches. The study was undertaken to understand women's socio-economic attributes, involvement in farming activities, and perceptions towards changes in

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farming in climate change context.

As farmers, agricultural workers and entrepreneurs, women constitute the backbone of India's agricultural and rural economy. Yet, together with children they remain one of the most vulnerable groups. Women shoulder the entire burden of looking after livestock, bringing up children and doing other household chores (Sharma and Kashyap, 2014). Patel (2012) reported that extent of health hazards faced by farm women in farm activities include (i) 50 per cent in transplanting and 26.5 per cent in harvesting under farm activities (ii) 50 per cent threshing, 33 per cent drying and 67 per cent parboiling under post-harvest activities and (iii) 47 per cent shed cleaning, 23 per cent fodder collection and 27.5 per cent milking under livestock management. Their hard work has not only been unpaid but also remained mostly unrecognized. They perform on a daily basis the most tedious and back-breaking tasks in agriculture, animal husbandry and homes. They are invariably paid lower wages than men for the same agricultural work. Land ownership titles are most often in a man's name. Men often either take or dictate the decisions concerning farming and women have to compulsorily carry out. Farm produce is marketed commonly by men and that gives them complete control over household finance. More and more women are taking to farming as men are migrating to urban areas for work. But they are not getting access to credit as they do not have *pattas* (land titles). Only 11 per cent women have access to land holdings, that too, mostly as small and marginal farmers. With grossly inadequate access to education and technology, a host of other socio-economic factors have an adverse impact on the lives of women farmers in recent years. Despite their eagerness they have often not been able to take advantage of opportunities from new technologies, innovations and markets. The constraints and opportunities that women face in agriculture vary across the agro-ecological and geographical regions of country. Despite many policy reforms and interventions at macro level, gender issues have not received priority attention they deserve (Sharma and Kashyap, 2014). There is now growing realization and commitment of the global community to achieve more sustainable and broad-based agricultural growth by addressing gender related issues in agriculture through national, regional and global initiatives and partnerships (Suman, 2014). There is also greater degree of coordination, consultation and convergence of initiatives undertaken by international institutions, viz. Food and Agricultural Organisation (FAO), Global Forum on Agricultural Research (GFRAS), Consultative Group on International

Agricultural Research (CGIAR), regional forums and many National Agricultural Research Systems (NARS). Improving the role of women in agriculture has been at the forefront of many organisations including Indian Council of Agricultural Research (ICAR).

National Research Centre for Women in Agriculture (NRCWA)—now renamed as Directorate of Research on Women in Agriculture (DRWA), Krishi Vigyan Kendra (KVKs) and Indian Council of Agricultural Research (ICAR) institutes have undertaken several researches and facilitated women in agriculture, there is simultaneous need to empower them in real sense of women empowerment. In India as in most developing countries, women are believed to be and treated as inferior to men. Moreover, as the lives of women and men are embedded in a matrix of unequal gender relations, a decrease in the gender inequality is necessary for an outcome of 'empowerment' for women. In other words, changes such as increased income, skills and self-confidence, may be better understood as enablers that promote women's empowerment. However, women, in order to be significantly empowered to achieve their perceived goal, firstly need authority at home, which in most cases they do not have. DRWA, Bhubaneswar has been engaged in developing empowerment process is methodologies for identification strengthened through educational of gender implications in farming intervention, transfer of systems approach and developing technologies, feasibility trials and women specific technologies under knowledge sharing different production systems. Most important research projects in area of gender study on agriculture and house economy among others include; (i) Development of extension methods for farm women in Easter India (ii) Standardization of women specific field practices (iii) Occupational hazards of farm women (iv) Improvement of storage practices of seeds and grains (v) Reducing drudgery of women in agricultural through women friendly tools/ techniques (vi) Management of coastal agro-eco-system affected by super cyclone (vii) Involving women in aquaculture to ensure nutritional and economic security and (viii) Mobilizing Self-Help-Groups (SHGs) to pursue income generating activities in agriculture and animal husbandry. Meena and Singh (2013) advocated actions for empowering the women in the changing climate situation which include: (i) Additional committed extension personnel are required, (ii) more women service providers needed, (iii) land title for women is needed, and (iv) efficient monitoring & evaluation system are needed. Strategies used for empowerment of women include development of technology kits and media mix for dissemination of

knowledge; development of software; programmes conducting outreach programmes, adoption of one village by each institutions and using participatory techniques like Participatory Rural Appraisal (PRA) for sustainable, self-reliant and people centred development that is socially acceptable, economically viable, efficient and ecologically sound for empowering rural women. Empowerment process is strengthened through educational interventions, transfer of technologies, feasibility trials and knowledge sharing.

Climate change is expected to impact on four dimensions of food security (Singh *et al.*, 2014) availability (geographical variations in availability of food crops, livestock, forest produce and fisheries), stability (weather extremes and climate variability harming rain-fed farming systems), utilisation (exposure to vector-borne diseases lowering people's capacity to utilise food effectively), and access (complex secondary impacts of climate change such as conflict and human insecurity, migration and rising food prices). Each of these dimensions has distinct and specific gender aspects. For instance when food availability decreases, women are more likely to be concerned over the well-being of their families whereas men may migrate in search of cash incomes. A shortage of water encourages women to focus more on securing drinking water and feel concerned over the health implications for their families, whereas men tend to focus more on securing water for farming. When traditional crops are no longer available in changing farming systems, women as primary providers of household food security are affected more strongly than men. Lastly, women may be more vulnerable in conditions of conflict, and may be left behind to look after the farm, while taking care of the children and the elderly and the livestock at home. It is however clear that women's work burdens have increased enormously, leaving them with little recreational or leisure opportunities. FAO (2011) noted in its report, a 'radical reorientation of agricultural research agenda' has become necessary. If the reality is a feminised agriculture, then efforts to improve agriculture must ensure that they lead to the empowerment of women and enhance gender equity, while at same time addressing gender-specific needs so that investing in women at the same time leads to more efficient and productive farming systems. Women in eastern region of India have conventionally been involved in farm work in two main ways: as wage labourers (primarily during transplanting, harvesting, and in processing) and as housewives (in supporting roles and in market gardening). As men move out of farming, new forms

of cropping arrangements are emerging and women's work burdens have intensified.

The women in Madhubani---one of the districts of Bihar also affected through recent changing of the climate across the globe. To understand the climatic condition of the study area is there is need to understand the climatic condition of the district. Madhubani has moderate and healthy climatic conditions with 3 well marked seasons, pleasant winters, hot & dry summer and rainy season. Winter begins in November and continues up to February, though March is also cool. Westerly winds and dust storms begin to blow and the temperature goes up to about 42^o Celsius. Monsoon breaks in middle of June when temperature begins to fall and humidity rises and continues till end of September or mid-October. Madhubani gets more rain than its adjoining districts and maximum rainfall is between mid-July to mid-August. District also receives some winter rains. The low lands in the district generally produce only one crop in a year. Rice fallows are not possible as soils become baked and hardened when left uncultivated. District is mainly a paddy and sugar-cane growing area and like other districts of North Bihar, is depends on rainfall for its crops. Failure or premature cessation of rainfall is disastrous for the winter crops (especially rice) which are the main crop. A considerable part of district is flood-prone and standing crops are often affected by heavy rains as well as flood waters flowing out of Nepal.

MATERIALS AND METHOD

Study area

The Madhubani District is one of the thirty-eight districts of Bihar state, India (Fig.1). The district of Madhubani was carved out of the old Darbhanga district in the year 1972 as a result of reorganisation of the districts in the state. This was formerly the northern sub-division of Darbhanga district. It consists of 21 development blocks. Bounded on the north by a hill region of Nepal and extending to the border of its parent district Darbhanga in the south, Sitamarhi in the west and Supaul in the east, Madhubani fairly represent the centre of the territory once known as Mithila and the district has maintained a distinct individuality of its own. It is located at a longitude of 25^o-59' to 26^o-39' East and the latitude is 85^o-43' to 86^o-42' North. According to Census 2011, Madhubani district has a population of 4,476,044, roughly equal to the nation of Croatia. The district has a population density of 1,279 inhabitants per square kilometre (3,310 /sq mi). Its population growth rate



Source: <http://madhubani.bih.nic.in/>

Fig. 1: District Map of Bihar state

over the decade 2001-2011 was 25.19%. Madhubani has a sex ratio of 925 females for every 1000 males, and a literacy rate of 60.9%. Madhubani district is situated at height of 80 meters from sea. The district is characterised as: (i) Total area: 3501 sq. kms (ii) High flood level: 54.017 m (iii) Total cropped area: 218381 ha (iv) Barren/uncultivable land: 1456.5 ha (v) Land under non-agricultural use: 51273.24 ha (vi) Cultivable barren land: 333.32 ha (vii) Permanent pasture: 1372.71 ha (viii) Miscellaneous trees: 8835.90 ha (ix) Cultivable land: 232724 ha (x) Cropping intensity: 134.23 % and (xi) Average rainfall: 1273.2 mm.

Data generation

The study was undertaken at ICAR Research Complex for Eastern Region, Patna (Bihar)—an organisation of Indian Council of Agricultural Research during 2012. Data were solicited from randomly selected 100 women households (WHH) from Madhubani district of Bihar. Survey of WHHs was undertaken using a basic set of mixed methods; combine a semi-structured schedule based survey with qualitative interviews and in-depth case studies. For the purposes of this study, a specific sub-group of women within the major category of 'rural women-headed households (WHHs) women' was selected. While the term 'women headed households' is used within India usually to mean widows and abandoned women, a further category needs to be included for women who due to an absentee husband generally run the household on their own and, in some cases, make household decisions. However, excessive droughts and uncertain rains, rising input costs and market vagaries have forced many more men out of

farming than before. The situation forced the women to run the households, taking care of dependents, farms and livestock. Hence the term, therefore, was broadly defined in this study to imply those households where farm-level decision making is *de jure* and *de facto* done primarily by women. Male household members may be entirely absent, engaged in proximate off-farm employment, or have migrated outside the village for work. The schedules have been prepared to generate data on socio-economic attributes as well as on other issues like involvement in farming. Perception of WHHs was also measured to see the changes occurred in agriculture due to climate change.

RESULTS AND DISCUSSION

Socio-economic profiles of women headed households

The average age of WHH in Madhubani district was 35, lives in a kuccha hut made of either straw or mud. Only 3 WHH live in a pucca house. The women head of the households is most likely to be completely illiterate. Out migration is a consistent phenomenon across surveyed households; 58% households surveyed in Madhubani, at least one person had emigrated. The largest land in Madhubani was 0.4 hectare.

WHH's involvement in farming

In developing countries, especially in rural areas, women play a major role in household and community survival strategies and contribute significantly to rural economy. However, with little education, many do not enjoy working on farms and resist undertaking agricultural activities even if there is a scope and need to do so. They rather prefer to take supervisory roles. Study reveals an interesting system of women sharecroppers (*bataiya*) in the study area who take land on rent for growing crops for the livelihood security of their families. It was found that about 12% WHHs were involved in such activities. Fig. 2 presents occupation-wise break-up of WHH in the study area. It reveals that among the WHH about 25% owned the land they cultivated, followed by agricultural labourers (18%) and share cropper & owner cultivator (14%). Further, about 13% employed labour on their farms, while 12% worked purely as agricultural labour on other farms, and an equal number were pure share croppers. Only a small number of WHH owned land and also employed labour (6%) as revealed by this study. This shows that a number of WHHs hire additional labour during the sowing and harvesting seasons. They take other WHH's land on share or give out their own to

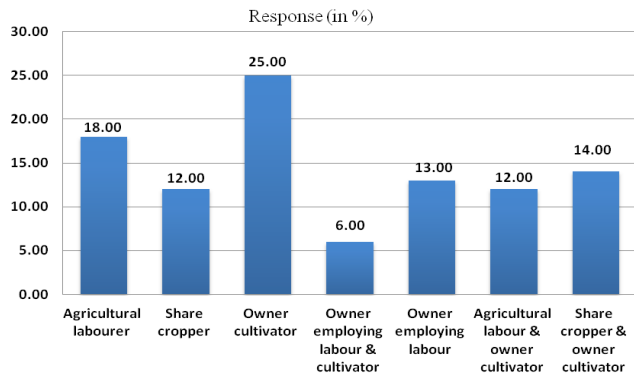


Fig. 2: Involvement of women headed households in farming practices, N=100.

others, if unable or unwilling to farm themselves.

Perception towards changes in farming practices due to climate change

WHHs' perceptions of change constitute the cognitive life world, which is evaluated and assessed through essentially subjective processes. Hence, no change can be absolute and entirely value-free. Perceptions are essentially imply the mental images of various conditions associated with farming experienced in a particular place and borne by particular resident of an area. Gender differences in perceptions arise from gender-differentiated roles in most rural, farming societies. As men move out of agriculture, and women take up the roles of farm managers, farm labour as well as carers and primary providers of food security at the household level, their behavioural environment changes. While more or less all WHHs believe that some changes have taken place, there are some significant variations within the districts with regard to individual criteria of change. For example, one major aspect of change in farming practices involves the shifting or delaying of the cropping season. A similar range of variation is observed with regard to another key aspect of change in farming practices: number of crops: has either declined or stopped growing, or new crops were introduced. Perceptions of WHHs towards change in farming system in climate change perspective were assessed. Study reveals (91%) that total number of crops grown had been reduced or stopped while other crops were introduced as per suitability. Mostly WHHs (96%) have changed the agricultural crops to suit in changed climate. The fertiliser use in agriculture too changed in the changing scenario (86%). One forth (80%) respondents reported that seed rate of crops also changed. Change in labour use and use of machines in agriculture were also perceived by 70% and 62%, respectively (Fig. 3). Districts

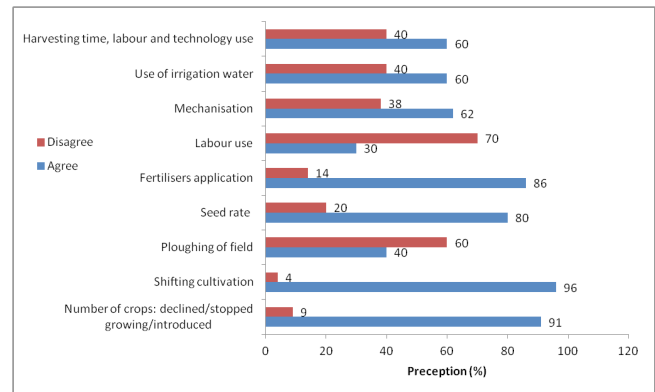


Fig. 3: Perception of women towards changes in farming practices due to climate change in Madhubani, Bihar, India (N=100).

wise differences are collated to provide a glimpse into the mental worlds of WHHs with regard to changes in farming practices in recent years.

CONCLUSION

Inclusion of rural women in scientific and technological endeavours and realizing women's intellectual potential is a big challenge in developing countries. Hence, creating multiple opportunities for sustainable livelihoods is a challenging task. In addition to this, there is need of some general & policy specific and technology-led actions for empowerment of the women. The general and policy issues include need based & skill oriented trainings; gender mainstreaming in research/extension and training; sensitization of male counterpart; impact assessment of gender contribution/projects; building social capital, ensure mandatory credits to SHGs, continued research on investment on women & their knowledge enhancement; and holistic education policy for women. However, women and technology-led actions include mandatory integration with KVK; use of information & communication technologies; diversification and risk reduction through integration of crop-livestock-fishery-horticulture based systems; better marketing channels, and emphasis on women friendly tools.

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