

# **The Impact of Climate Change on Gender Inequality in India**

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This research paper assesses the impact of climate change on rural agricultural women in India. The hypothesis of this paper is that climate change affects both rural agricultural women workers and non-working rural women disproportionately compared to their male counterparts, which consequently worsens gender equality prospects in India.

## **I- Climate change trends in India**

India happens to be one of the most vulnerable countries to climate change in South Asia. India is predicted to lose 9-25% of its net farm income if temperature rises between 2 to 3.5 degrees Celsius (Inequality and Climate Change- Perspectives from the South (2014)), South-South Collaborative Programme, 2). Erratic rainfall trends, characterized by untimely and heavier monsoon periods, have caused flooding in several regions. This has been accompanied by a general drop in rainfall since the 1950s, making the dry years drier and the wet years wetter.

Droughts have the worst effect on crop production and are expected to intensify in the coming years. In addition, groundwater resources will dwindle, causing problems for India's mostly rain-fed agricultural system. Melting glaciers would disrupt the nature of river flows of several of northern India's rivers which would have implications for irrigation of crops and consequently, the amount of food that could be produced in their basins. Finally, a rise in the sea levels would trigger more storms, higher riverine flooding, cause saltwater intrusion in the coastal areas which would negatively impact agriculture, deteriorate groundwater quality and increase the incidence of diseases.

## **II- Rural women in agriculture**

According to the Food and Agriculture Organization (FAO), India has one of the highest shares of female workers employed in agriculture. More than 60% of women workers are employed in the agricultural sector as of 2010. The 2011 Census results reiterate the over-representation of women in the agricultural sector, mainly as agricultural laborers, where only about 35% of women workers work in alternate sectors.

Hence, any disruptions in the agricultural sector due to climate change in the form of lower

yields, more expensive systems required to respond to harmful effects of climate change and subsequent lay-offs would affect the women as a whole much more than the other gender since they have much lower sector and occupational mobility. Women perform about 70% of the farm work in India, work longer hours than men yet are paid lower wages than men for the same tasks ( Rao 2006,109). The situation has aggravated with the so called feminization of agriculture due to rural-urban male migration in search of better jobs. Tasks such as transplantation, weeding, harvesting and processing are mainly undertaken by women. For the same tasks, there exists a substantial wage gap between men and women which implies that men's labor is much more valued than that of women's. Consequently, in case of required lay-offs triggered by climate change induced reduced crop yields or much higher production costs, women workers are more likely to be fired than men workers.

### **III- Rural women and their contribution in the cultivation of climate change vulnerable crops**

Climate change has an impact on a wide range of crops namely rice, wheat, maize, sorghum, barley, chickpea, groundnut, horticultural crops, tea and cashew nuts among many others. This paper will analyze four crops: rice, maize, tea and cashew. A fact sheet published by the International Food Policy Research Institute states that for South Asia, the crop model forecasts that average yields in 2050 will decline from 2000 levels by about 17 percent for rice, and about 6 percent for maize because of climate change. Plantation crops are also not exempt from the wrath of climate change. Tea bushes are extremely sensitive to climate change since warmer temperatures dry the soil; there is higher incidence of new pests attacking the tea bushes and uncertain rainfall seasons affect water availability, forcing a lot of tea estates to switch to the more expensive, irrigation based system to maintain crop yields (Chang 2015).

Likewise, cashew plantations are heavily dependent on stable and favorable climatic conditions for a healthy yield in terms of both quantity and quality (Rupa, Rejani, Bhat 2013). In India, the majority of cashew plantations are concentrated in the Western Coast (Maharashtra, Goa, Karnataka, Kerala) and the Eastern Coast (Tamil Nadu, Andhra Pradesh, Odisha and West Bengal). Hence, its geographical location makes it highly susceptible to rises in sea level and since most of the cashew varieties are sensitive to salinity, their yields might be adversely impacted.

Romero-Paris (2009) asserts that female labor participation in rice cultivation is higher than men in countries like Thailand, Nepal and India with the participation being highest in rain-fed rice fields in Eastern India which is subject to abiotic stresses such as droughts, floods, salinity and where most of the women are illiterate. Hussain et al (2011) conducted an empirical analysis of women participation in farms in rural Kashmir. Their conclusions indicated that in the case of rice cultivation, apart from weeding and ploughing, all other agricultural operations

are dominated by women in the sample areas whereas for maize production, women are overrepresented in all the activities.

Turning to the plantation crops, tea and cashew nuts, their production also tends to be female labor intensive. The Indian tea industry's employment portfolio consists of 54.73% female employment as of 2010. Women workers are normally preferred since their softer hands are more appropriate for the delicate job of pruning and plucking the tea leaves ("Socio-economic Conditions of Women Workers in Plantation Industry", 72). Their wages are also output based as per the norms of fixed plucking such that they need to pluck a certain amount of leaves to get the minimum wage corresponding to that output level.

Eapen et al. (2003) thoroughly examine the cashew industry in India by exploring plantations in the major cashew producing states of Tamil Nadu, Orissa, Karnataka, Maharashtra and Andhra Pradesh. The Indian cashew industry is known to employ large numbers of women to process the nuts while men are mostly employed to maintain the plantations. These plantations are vital for the survival of women in those regions because they are one of the very few sources of income, they provide continuous employment for three months unlike any other crop (combining cashew growing with processing can generate employment for almost a year) and they employ people during the lean season in the absence of any other agricultural work. In the Panruti region of Tamil Nadu, only women are employed for shelling and mainly women are employed for peeling and are paid on a piece-rate basis. In Maharashtra, women make up 95% of the cashew plantation workforce and are mostly responsible for the collection of nuts, shelling- cutting, crushing, peeling and grading processes.

Kerala boasts of the biggest processing capacity in India (this part of the production is almost wholly dependent on women labour) and is the largest exporter of India's cashew kernels. More than 90% of the workers are women while men are employed in much smaller numbers for tasks such as roasting, operating ovens and supervision. Over the years, the feminization of cashew production in Kerala has increased. However, although overrepresented in the industry, women workers are paid much less than male workers since most of their operations are paid on a piece-rate basis (more susceptible to reductions in crop yields due to climate change) whereas men get daily or monthly wages for their activities. Even when female workers are paid on a daily basis, they earn less than their male co-workers.

The above analysis suggests a much higher vulnerability of women to reduced crop yields of the four analyzed crops induced by climate change compared to men. The reasons are lower sector and occupational mobility, lower pay than men for the same tasks and hence, greater likelihood to be sacked in times of rationalization and a more direct link between wages and crop yields. Furthermore, a much smaller proportion of women are cultivators as opposed to men, highlighting low levels of land holdings and their dependency on employers. Another cause of excessive vulnerability is the fact that women have minimal trade union protection

which would mitigate, to a certain extent, the higher risk of getting laid off, of having to accept lower wages or to work longer hours. In the agricultural sector, a mere 31.56% of workers belonging to a trade union are women (Census 2011).

#### **IV- Indirect effects of climate change on women labor force participation, education, nutrition and empowerment**

Climate change has several indirect effects on rural women since they are primarily responsible for supplying water and firewood for cooking and heating. Droughts, erratic rainfall patterns, storms make these activities much more tedious and time consuming, leaving them with very little time to learn skills and harness their income earning potential.

Brenkert and Malone (2003) used a Vulnerability- Resilience Indicator Prototype (VRIP) to quantify climate change vulnerability and adaptive capacity for most Indian states. The VRIP was a model consisting of seventeen indicators which included climate-sensitivity indicators (negatives) and the coping-adaptive capacity indicators (positives). It is interesting to observe that typically, over 90% of women in most of the states most vulnerable to climate change, as per the VRIP indicator, (Andhra Pradesh, Maharashtra, Madhya Pradesh, Goa, Tamil Nadu, West Bengal) spend most of their time on domestic activities (Census 2011).

The breakdown of the sensitivity indicators shows that water sensitivity constitutes the major chunk of sensitivity in all states which reaffirms that fact that lower water availability would necessitate more time to collect water, leading to a higher opportunity cost in terms of literacy and income earning potential. Sekhri (2013) brings out an important link between water availability and literacy rates for women in India. She posits that literacy rates are almost five percent higher for women in villages that have easy access to water, with no impact on male literacy rates and that as the distance to the drinking source increases and greater time is spent collecting water, female literacy rates decline.

Apart from being a favourable outcome on its own, higher levels of female literacy are desirable for improvements in other aspects of gender inequality such as a reduction in son preference. India is known, as a country, to be biased towards male offsprings, reflected in the high rates of female infanticide, mostly prevalent in rural areas. Pande and Malhotra (2006) find out that village female literacy and the level of schooling of the mother has a significant negative effect on son preference, meaning that an increase in rural female education is associated with a lower preference for the male child. In turn, reduced son preference has a chain effect on the proportion of female children being burdened with household chores. Under normal circumstances, a greater proportion of girls have to do household chores in India compared to boys but a son preference in the family increases that incidence. Lin and Adsera (2012) depict that when a mother's ideal proportion of sons among her children increases from 0 to 1, the average weekly housework gender gap increases by 2.5 hours. Therefore, water

availability affects female literacy rates which in turn affect son preference which subsequently affects female burden of household work, thereby female welfare.

Finally, another indirect effect of climate change is on the female marriage age and dowry requirements. By comparing rice households in rural India (much more female labour intensive) to wheat households, Mbiti (2006) finds that positive rainfall shocks (favourable climatic conditions) are associated with a higher number of prime age females in rice households, since the value of female labour goes up. Empirically, a one standard deviation increase in rainfall lowers the marriage rate of young adult females by nearly 10 percent and decreases dowries by 11.5 percent relative to wheat households. One of the indicators of low female empowerment is definitely the very young marriage ages of women, therefore later or delayed marriages represent a positive impact for gender equality prospects in India.

## **V- Conclusion**

This paper assesses the impact of climate change on gender inequality in India. The findings suggest that climate change has both a direct effect on gender inequality in terms of lower wages, mainly dependent on output, higher risk of being fired during streamlining operations, less occupational mobility than men due to lower literacy and their traditional role in the household which restricts urban migration to a greater extent than for men, lower trade union protection and lower perceived value of their work by employers reflected in gender wage differentials as well as an indirect effect. The indirect effects on gender inequality are captured in the form of lower literacy, early marriages, less time for activities other than domestic chores such as leisure, learning new skills, participation in the public sphere, greater involvement in the labour force, possible incidence of higher son preference and a larger burden of household chores on female children, all of which have a significant impact on gender inequality, female welfare and female empowerment.

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