Climate Change, Differential Impacts on Women and Gender Mainstreaming: A Case Study of East Rapti Watershed, Nepal

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KEY WORDS

East Rapti watershed, gender mainstreaming, Gender Equality and Social Inclusion (GESI), Khairahani municipality, women intersectionality

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ABSTRACT

Women and water share a great deal of nexus in several ways. However, women have still minimal control over the management of water resources, making them more vulnerable to climate change. This paper assesses how climate change impacts differently across different women groups using an intersectionality lens, thereby exploring the situation of gender mainstreaming in water sector in three communities, namely, Karaiya, Basauli, and Dadagaun in Khairahani Municipality located in the East Rapti watershed, Nepal. In this perception-based study, we conducted three key informant interviews and household interviews with 45 women of different castes, ages, communities, education levels, and occupations. The results showed that different groups of women perceive climate change and its impact differently. For instance, women engaged in agriculture are more aware of the impact of climate change and are affected more by it because of changing trends in rainfall and temperature resulting in water shortage and flooding. On the other hand, they experience more physical and mental stress because of a higher responsibility of both agriculture and household . Despite 80% of female involvement in water user committees, there is a gap in participation by all groups of women. Irrespective of literacy and work engagement, women of Karaiya and Basauli, were less aware and active than Dadagau in various water development and management activities because of time constraints, family background, lesser interest, and awareness. Therefore, more efforts are required to achieve significant progress in gender mainstreaming considering intersectionality in the water sector and climate change.

1 INTRODUCTION

Women play a crucial role in water management. In Asia, women produce about 60% of food, making women the primary water user and manager in agriculture (Singh, 2006). However, only since the 1980s, gender has been widely recognized as a critical issue in irrigation and integrated water resources management. Before that, it was believed that no gender issues existed in the water sector except for domestic water supply issues (Van Koppen & Hussain, 2007). Moreover, the climate change phenomenon has pulled the attention of many researchers toward gender and social inclusion especially concerning women.Women need special attention as they have a higher mortality rate during natural calamities caused by climate change (Jonsson, 2011) because they are

less aware of defendingit. Thus attempting to tackle climate change without knowledge of gender will be inefficient, unjust, and unsustainable (MacGregor, 2010).

Women's identities are projected as fixed, centered and uniform (Resurreccion, 2013), ignoring other factors like age, wealth, class, and the ethnic affiliation that are often crucial (Djoudi, et al., 2016). Women are a heterogeneous group, with intersecting identities and social positions that result in the inequality in their access to resources needed for developing the responses to climate-related changes (Huynh & Resurreccion, 2012). The East Rapti watershed is reported with decreasing trend in streamflow due to increasing population, urbanization, and climate change that could cause serious implications on water availability and food security in this watershed (Pandey et al. 2020). Therefore, an intersectional lens has been applied to climate change for water resources; further, its differential impacts on women and gender mainstreaming in water sectors in the East Rapti Basin is analyzed.

Intersectionality analysis was first used in the early 1990s in critical race theory to respond to binary gender analysis (Cho, et al., 2013; Djoudi et al., 2016). "Intersectionality refers to the relationship among multiple dimensions of social relations and is regarded as an analytical tool to understand how intersections of social differences such as gender, class, age, ethnicity, and others between and among women and men can produce differentiated results or practice" (Huynh & Resurreccion, 2012). Utilizing an intersectional approach can help to better target impacted women with their roles and responsibility, thus making it easier to identify appropriate adaptation based policy (Hall, et al., 2016). This study is perception based. "Perception is the subjective process of acquiring, interpreting and organizing sensory information" (Lavrakas, 2008).

It is essential to explore the influence of gender mainstreaming in the level of understanding of climate change in different categories of women. Global Water Partnership (GWP) defines gender mainstreaming as a "strategy to include a gender perspective into operations, structures, and programmes, with the aim to positively affect gender equity in water use and governance at all levels" (GWP, 2014). Though women's critical role in water management is duly acknowledged and documented, they still remain marginalized from decision making and have slim control over the management of water resources (Grant, 2017; Miletto, et al., 2019), making them more vulnerable to climate change. Evidence from many countries, such as India, Laos, Nepal, Pakistan and Sri Lanka, show that women's participation in the Water User Association (WUA) is much lower than that of men (Wahaj, 2012). In addition, women are thought to be incapable of participating in meaningful ways because of a lack of knowledge and lower educationlevel, and they are assumed to be busy with other "female" activities (Meinzen-Dick & Zwarteveen, 1998). Most of the study is centric, but all women cannot be considered the same group. This study tried to explore climate change, water status, and its impact considering the women intersectionality approach, which is kind of a first study in the study area. Thus, 'this study aims to assess women's perception of climate change and its impact on water availability along with knowing the status of gender mainstreaming through women's lens.

2 METHODS

2.1 Study area

Khairahani Municipality was selected as a case study in the East Rapti watershed to analyze women's perception on the impact of climate change on water availability and gender mainstreaming. The rationale for the selection was that the municipality has lower water sufficiency i.e., water demand is much higher than water availability because of high population density. The Water User Association (WUA), stakeholders of different communities of Khairahani Municipality, has been identified for selection of study area from a key informant interview with the "Groundwater Resources and Irrigation Development Division in Khairahani, Chitwan". After communication with all accessible key persons of WUA, three communities, Karaiya, Basauli and Dadagau of Khairahani Ward 9, were selected as shown in Figure 1 because they are headed by a woman leader in the WUA who is active and involved in many social development activities such as the Drinking Water Committee, Farmer Managed Irrigation System, Tol Sudhar Committee, and Poverty Alleviation Committee. It was interesting to understand how the woman leader assumed her position, supervises and conducts various developments, what the positive changes and challenges in her job are. It was also essential to understand how she is empowering others, and what her influence as a leader in the development and constraints of water resources and climate change is.

The perception analysis presented here is based on case studies in three communities, Basauli, Karaiya and Dadagau. Basauli is mainly inhabited by the ethnic group Chaudhary (Tharu) and some other castes such as Lama, Bahun and others who migrated there for business. Karaiya is also predominantly a Chaudhary community and is adjacent to Basauli. Dadagau is about 1 km north of Basauli and Karaiyaas as shown in Figure 1. Dadagau is mostly inhabited by people who migrated from hilly regions such as Dolakha and Sindhupalchowk about 30-40 years ago. Geographically, Basauli and Karaiya are about 209 m above mean sea level (MSL) and Dadagau is 215 m above MSL.

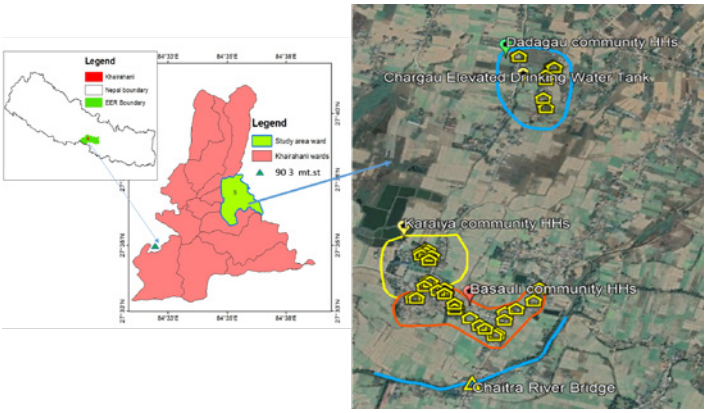

Figure 1: Location and associated details of the study area

Note: Representing Ward 9 of Khairahani Municipality and Google Earth image showing the three communities, Basauli, Karaiya and Dadagau, with the location of the households, Chargau elevated drinking water tank and other boundaries for easy visualization of the surveyed communities.

2.2 Sample size

For the sampling procedure, a stratified random sampling method[1] was used so that different strata of women based on age, education, occupation, community, and caste could be analyzed. In order to study the perception of different women on climate change impacts and within the strata, simple random sampling was adopted.

The three communities consisted of about 400 households. The sample size selected was about 80 households located around the center of the community.The peripheral households were excluded from observation for easy accessibility (Figure 1) and due to time constraints. Here one women was selected from every sampled household. The sample size was determined using Equation 1 (Israel, 1992).

$$n = \frac{N}{(1+Ne^2)} \text{ ---------- Eq.1}$$

Where, n = Sample Size (45 HHs), N = Population size (80 HHs), e = Margin of error (10% error).

2.3 Data analysis

In this study, both qualitative and quantitative research approaches were applied. Qualitative data was conducted from Key Informant Interviews (KII), in-depth household interviews, and observations. The household interviews generated quantitative and stratified information. This study conducted KIIs with one caretaker of the Chargau Elevated Drinking Water Tank of Dadagau community and two women activists in the WUA (one from each the Basauli and Karaiya communities). Household interviews were conducted with 45 women of different castes, ages, communities, education levels, and occupations. KII and household interviews helped analyze the real situations and problems of the top (key person) to the bottom (local people) class of the society on water availability and mainstreaming of different groups of women. The analysis of household data was conducted using Statistical Package for the Social Sciences (SPSS) software which is "a powerful, user-friendly software package for the manipulation and statistical analysis of data" (Landau & Everitt, 2004). The overall framework for gender analysis is presented in Figure 2. The disaggregated data collected on the women was their community (here community means people living in the same place in clusters), age, education level, occupation, and caste as shown in Table 1. Due to the differing sizes of communities and random selection of households, there is slight variation in the classification of the samples.

Table 1: Disaggregated data collected on the women in this study

Community	NoR	Age	NoR	Education	NoR	Occupation	NoR	Caste	NoR
Basauli	22	16-30	16	12 & Bachelor	10	Agriculture & livestock	23	Bahun/ Chettri	22
Karaiya	8	31-50	17	5-10 class	15	Household Only	12	Tharu	18
Dadagau	15	51 above	12	No Education	20	Job	5	Others	5
						Business	5		

Note: NoR: Number of Respondents. Here the number of respondents in each category is from the whole sample of 45 women, not within the individual communities.

1 Stratified random sampling: Stratified random sampling is a method of sampling that involves the division of a population into smaller sub-groups known as strata.

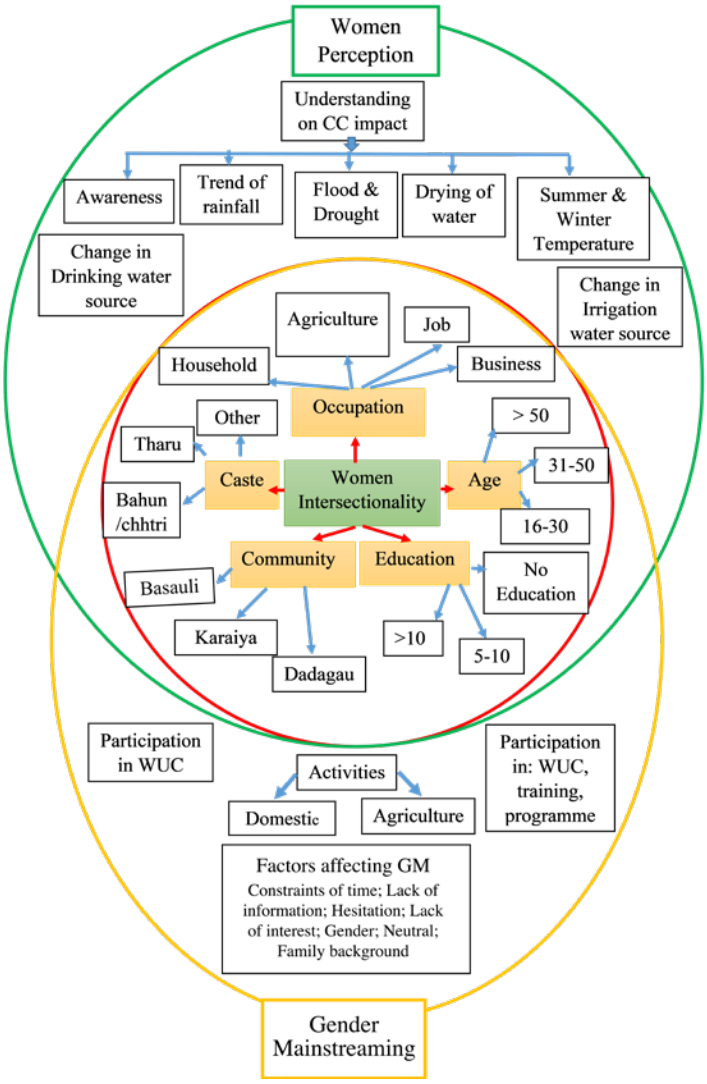

Figure 2: Gender analysis framework; CC: Climate Change; GM: Gender Mainstreaming; WUC: Water User Committee

Figure 2 shows the framework of this study. The study has two specific objectives:

i) To analyze the perception of different categories of women on climate change and its impact on water availability.

ii) To understand the status of gender mainstreaming in the water sector.

The perception of women on climate change and its impacts were analyzed with respect to two aspects: (i) understanding the change in the source of drinking and irrigation water; and (ii) understanding different aspects of climate change such as awareness, rainfall trends, flood and drought trends, water resource statuses, and summer and winter temperatures. The factors affecting gender mainstreaming in work activities in the domestic and agricultura sectors was studied by looking at the participation of women and men in the WUA and their participation in training programs/workshops related to water and climate change.

3 RESULTS AND DISCUSSION

3.1 Women's perception of climate change and its impact on water availability

This study tries to answer the following two questions related to the women's perception of climate change and its impact on water availability : i) How has the source of drinking water and irrigation changed, and what are the reasons behind it? ii) How do different women understand climate change and climat-induced changes such as its impact on rainfall, changing flood and drought conditions, drying of water resources, and changes in summer and winter temperatures.

3.1.1 Change in water source over time

3.1.1.1 Drinking water source

People have various sources of water to fulfill drinking water demands, but this is changing over time. Changing water sources were described distinctly for the three communities. Dadagau is a community of migrant people who migrated 30-40 years ago. They were mostly dependent on dug well water and some tube well water. When they first settled in their current location,there were problems with supply of drinking water and irrigation that construction of the"Chargau Elevated Drinking Water Tank (CEDWT)" in 2014 supply water through tap. Currently, all people of Dadagau use tap water because 87% of respondents experience drying of wells and poor quality of well water and 13% had to walk long distances to get water from common wells (Figure 3).

In the Karaiya community, before the construction of the CEDWT, people used tube well water. About 50% of respondents are currently using tap water because of its good quality. Approximately 13% of respondents experienced change in the quality of tube well water ranging from muddy to dirty water, especially during monsoon season. Some community members are still using tube wells because they still follow the old and blind beliefs of the senior family members and cannot be convinced to do otherwise. A 38% of the total respondents did not feel any change in quality and availability of drinking water. The probable reason is being unaware of the change in water quality, and some low-income families fall under the category who are dependent on community tube wells.

Similarly, in Basauli, before the construction of CEDWT, everyone used tube well water. However, after construction about 77% of the households are using tap water. A 68% of respondents consider it better quality than the tube well with improved health benefits and 5% of respondents experienced dry tube wells during the dry season.

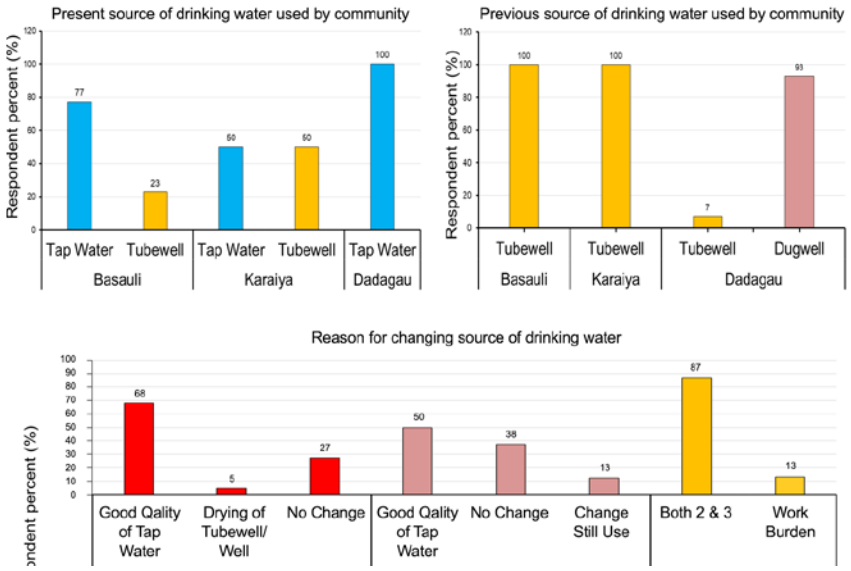

Figure 3: Present and previous sources of drinking water in the Basauli, Karaiya and Dadagau communities . The third graph shows the reason for changing the drinking water source.

Note: 'No change' means they have not experienced any changes in previous and current sources of drinking water. 'Change still use' means the respondents are aware changes but are still using the water source due to economic constraints or superstitious beliefs of a family member. Both 2 & 3 means drying of tubewell/well and poor quality of tubewell/well waterTheHere' previous source of d rinking water' refers to the water source before construction of the CEDWT.

3.1.1.2 Irrigation water source

Figure 4 shows current and previous water sources used by respondents for irrigation. In Basauli, 94% of respondents use shallow bores for irrigation. Before this, they were dependent on rainfall and surface canal irrigation as well as some groundwater. Here shallow tubewell is groundwater upto depth of 30 m. Similarly, in Karaiya all respondents are now using predominantly shallow bores whereas before that they were dependent on rainfall, surface canals and shallow bores'. Basauli and Karaiya have increased their usage of shallow bores because they do not have sufficient surface water during the dry season or easy access to groundwater.

The Chaitra River flows through Basauli as shown in Figure 1. Earlier the river was used for irrigation purposes, but recently its condition became critical due to the collapse of the Chaitra Bridge in 2017 resulting in flooding of agricultural land during monsoons and droughts during the dry season. Reconstruction of the bridge has not started due to various political issues. Moreover, due to gradual encroachment on the Chaitra River from urbanization, the natural flow of the river is becoming obstructed, leading to flooding in the lower plain area of Basauli and Karaiya.

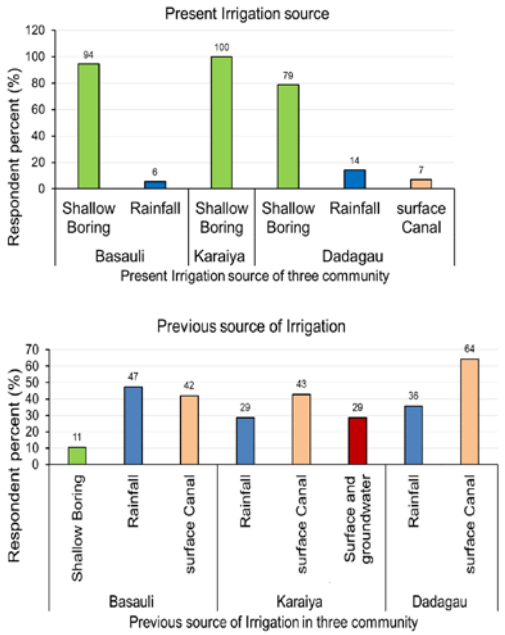

Figure 4: Type of present and previous sources of irrigation for the three communities

In Dadagau, people were dependent on wells, rainfall and natural canals. However, gradual declines of surface water and drying of wellscompelled the people to use shallow bores . Presently, 79% of respondents are using shallow bores and 7% use surface canal while the remainders are still dependent on rainfall. Since Dadagau is a hilly region, in most of the places shallow bores are installed there is no water. Some respondents said that due to the Chargau Water Tank, there might not be water in their bores because of differences in water levels. However, the water availability and quality nhas improved because of increased groundwater extraction.

The people have recognized at climate change and additional anthropogenic activities affect water availability, but they adapted by changing their source, drinking water from the elevated water tank, and irrigation with water from shallow bores. However, we cannot ignore the reasons behind changing water sources. Though these changes are small in the current situation, future water management needs to be planned in a sustainable way.

3.1.2 Understanding the impacts of climate change

The major factors considered in this study for understanding climate change and its differential impacts are awareness of climate change, rainfall trends, water-induced disasters, and climatic events such as changing temperature regimes. These perceptions can help clarify which categories of women are facing the impacts of climate change, are unaware of it, and are vulnerable to it.

3.1.2.1 Awareness of climate change

About 67% of respondents had heard about climate change. The 16-30 age group was more familiar with the phrase

"climate change" because they are more educated than the 31-50 , and above 50 age groups. In the oldest category, only 33% of respondents had heard about climate change or had noticed the changing rainfall patterns, environmental pollution, decreasing crop yields, and diseases in crops. In terms of the level of education, all respondents with a higher education were familiar with climate change. Aside from studying it in college, they were exposed to climate change at work, through the news, social media, and by self-realization. A 47% of the respondents with secondary education (5-10 class)were not aware of climate change due to limited knowledge and since they were only being engaged in household activities. However, there is a slightly increased percentage of respondent of 60% aware on climate change with the "No education" respondents because they are mostly the eldery and senior citizens, such as mothers and mother-in-laws, who are exposed to agricultural activities and developmental programs in their community. Figure 5 represents the responden's awareness of climate change based on age and education.

3.1.2.2 Rainfall trends

A 51% of the total respondents noticed an increasing trend in rainfall volume, while 27% of respondents felt a decreasing trend. A majority of the respondents who noted decreasing rainfall trends are from Dadagau because they are facing problems with irrigation water. A 9% responded that there was no change in rainfall, and 13% have not realized the change means they have not felt any change in rainfall , which is mostly the response of women who are not engaged in agriculture or other outside work. Among the respondents engaged in agriculture, 65% noted an increasing impact of changing rainfall patterns. Majority of respondents of all occupations have felt changes in rainfall patterns and reduced water levels in the river during required times. The respondents who noticed a decreased impact these are from Dadagau community where there is less availability of water so they noticed decreasing impact on agriculture due to heavy rainfall (Figure 6). As per rainfall data collected from 'Department of Hydrology and Meteorology (DHM), Nepal' at rainfall station 903 (Jhawani) from 1988-2017, despite fluctuations in precipitation levels, an increasing trend was

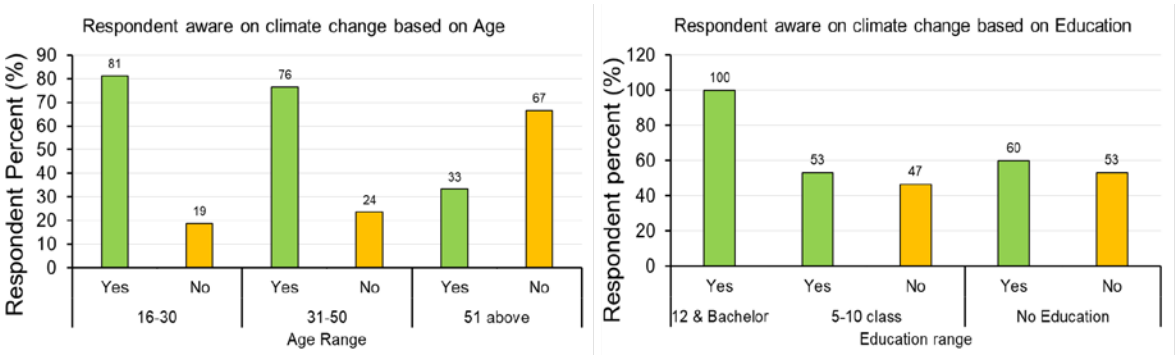

Figure 5: Respondents who are familiar with climate change

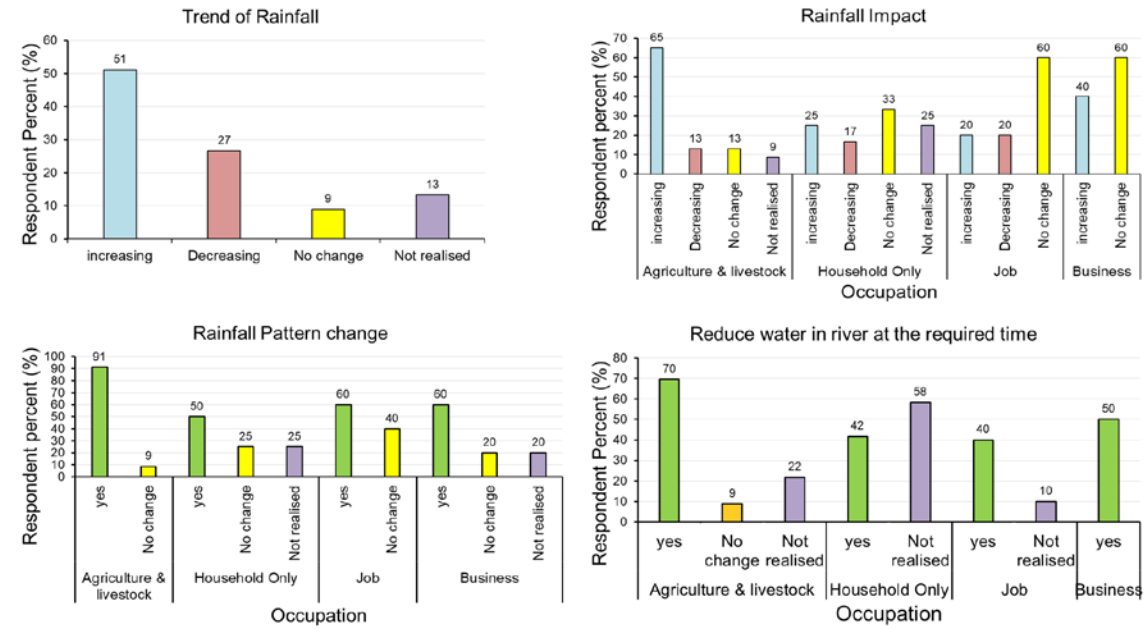

Figure 6: Rainfall trends, rainfall impacts, rainfall patterns, reduced water in the river at a required time.

seen (Figure 7). Statistically the rainfall has increased by 28% from 1998 to 2017.

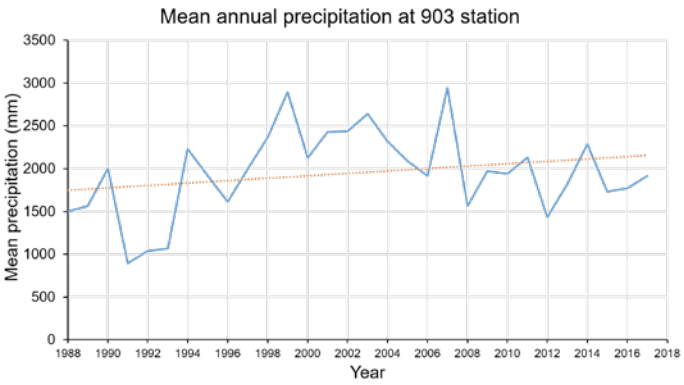

Figure 7: Mean annual precipitation station (DHM, Nepal)

3.1.2.3 Drought and flood trends

A very few people in Basauli (5%) and Karaiya (13%) saw an increase in drought because both communities lie on plains where there is high availability of surface and groundwater. However, in Dadagau 47% of respondents felt an increase in drought conditions,and 40% of respondents were impacted because of dried bores and decreasing water levels in wells, which affects agriculture. In contrast, more respondents of Basuli and Karaiya are facing increased flooding. According to their perception, the reason for flooding is river encroachment and heavy rainfall. However, in Dadagau 13% reported flooding but with no impacts. The percentage of respondents facing droughts and floods are presented in Figure 8.

3.1.2.4 Temperature trends

It is better to recognize perceived summer and winter temperature changes by occupation because awareness is impacted by whether respondents work, indoors or outdoors.

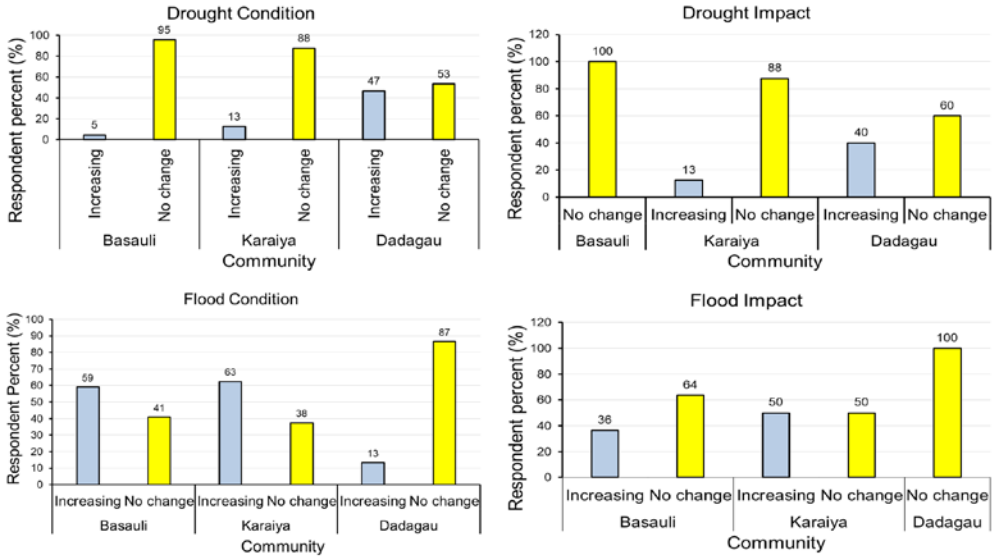

Figure 8: Drought and flood trends and impacts between communities

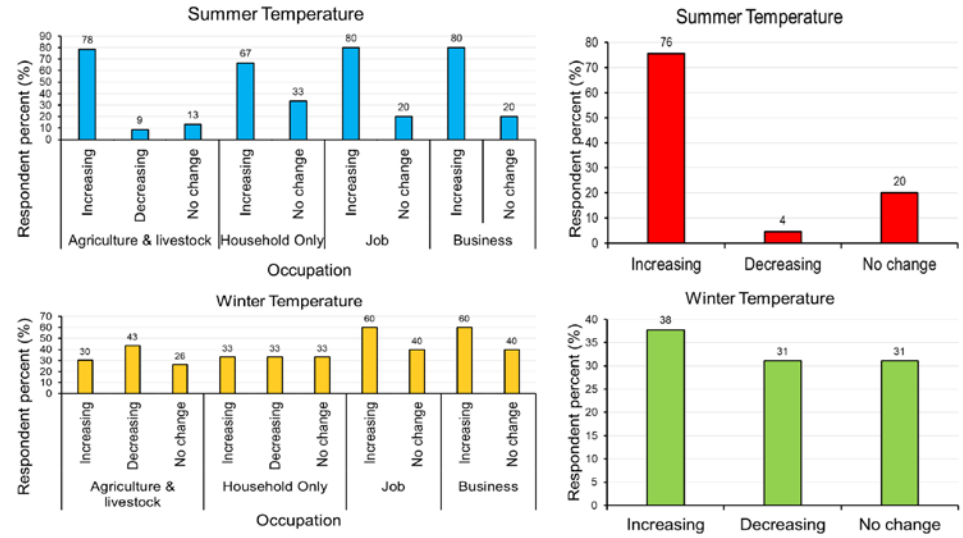

Figure 9: Summer and winter temperature changes

In the overall sample, 76% of respondents observed increasing summer temperatures and 20% experienced no change (Figure 11). As per temperature data analysis over 30 years (1988-2017) at the nearest meteorological station 902 (Rampur) (DHM, Nepal), the summers have had consistent mean temperatures with a slight fluctuation of 10Cthroughout the year (Figure 9). This increase in summer temperature has been observed by respondents of all occupations.

As for winter temperatures, 38% of respondents observed an increased temperature and 31% felt no change. As per meteorological data from DHM, Nepal, the mean winter temperature has a decreasing trend shown in Figure 10. Statistically winter temperture has been decreased by 10C. Further analysis by occupation shows 43% of agricultural workers observed decreasing winter temperatures, likely due to their engagement in field work. The householders, job and business holders observed a slight increase or no change in winter temperature.

3.2 Gender mainstreaming

From KIIs, more women are involved in development activities than men. About 80% of women are members of the Water User Association and in farmer-managed irrigation systems because of migration of male counterparts to a foreign country or working outside of the village. When this occurs, women are responsible for their household and community. While the leader of the community has a better understanding of gender mainstreaming in development activities, household interviews revealed there is still a lack of empowerment in some groups of women based on caste, age, occupation and education. The women of Chaudhary community, daughters in law, women involved in household work only, and women with lack of education and no education were less empowered. Moreover, they have found growth and development in engaging women and increasing awareness and involvement in water and climate change developemnt work as compared to 5-6 years ago. They have a strong vision to involve all categories of women in water resource development activities. Among the women leaders, a case study of one activist expressing her challenges, obstacles, and successes in community water resource development is portrayed below.

Figure 13: KII with Kali Tharuni

Mrs. Kali Tharuni, a 50-year-old woman of the Karaiya community is an activist and leader in her locality. She only has a primary school education, but she is involved in many development activities. It was not easy for her to come into this position. She faced several impediments from her family and society. Her exposure to social activities began when she got a letter inviting her to help with tax collection activities from her municipality office. She did not accept the job as she was scared and hesitant to communicate and attend meetings regarding such activities. However, one day due to some work, she went to the municipality office where an office member encouraged her to take the job because they saw potential in her. She started listening to news, familiarizing herself with social development activities and politics. In the beginning of her career, she struggled to convince her husband and other family members to let her work. She did not get support from her husband. He was possessive and did not like her looking beautiful while working or interacting with other men. However, her children supported her and condemned their father's attitude. One day, her husband tore all of her important official documents in a rage. The situation got so bad that she wanted to be separated from him. However, that was also not easy for women with children. So, she tried to handle the situation wisely. She began conducting official meetings at her house when possible and tried to win his trust. Gradually, her husband started to believe in her and her work. Now her husband allows her to go out, supports her and feels proud and happy seeing her work as a leader in many social development activities. This is the story of one woman who was able to convince her family members. Not all women have that same privilege. Though this problem seems small, it is one of the major factors hindering the empowerment of women. Some fight against the system, but some are stuck in it. Therefore, every woman should be empowered through gender mainstreaming in all possible sectors so that they can handle their own obstacles in their career development path.

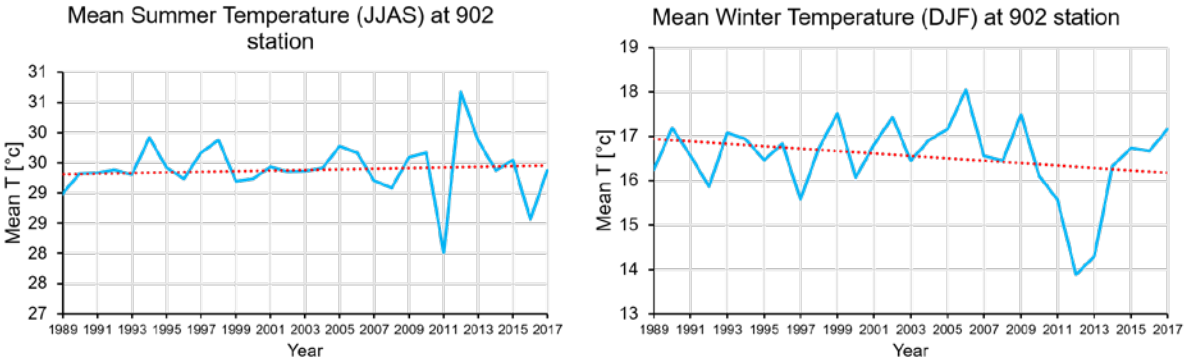

Figure 10: Mean summer temperature (Left side) and m ean winter temperature (right side)

Note: JJAS: June, July, August, September and DJF: December, January, and February

3.2.1 Gendered-dimension of water-related activities

3.2.1.1 Domestic water related work

Wome's occupations can be an indicator of gender responsibility for domestic water-related work as shown in Figure 11.Here, water-related domestic work means managing water in the kitchen, for livestock, gardening, and other similar activities. In all occupations, women are more involved in domestic water work. From the sample of 45 women, of the 51% of respondents engaged in agriculture and livestock, 87% of the females are responsible for doing water related domestic work in their houses. Of the 27% of women working in household activities, 92% of the females are responsible for domestic water work. Out of the 11% of respondents engaged in the job occupation category (eg: teaching, staff in institution, organization), 80% of females are responsible for water related domestic activities. In the case of women involved in business there seems to be some equality. Out of 11% of respondents, only 60% of females are solely responsible for water related domestic work. This is because they have businesses such as hotels, restaurants and shops where their husbands are also involved. In such cases there is somewhat less disparity in doing water related domestic work.

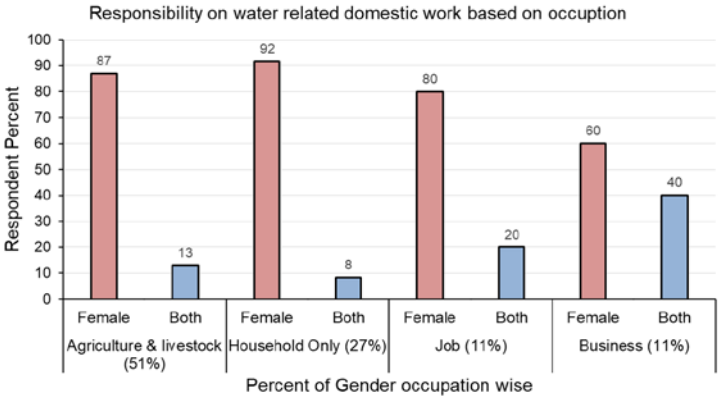

Figure 11: Gender responsibility in water related domestic work based on occupation of women

3.2.1.2 Agriculture related work

At the time of survey in 2019, there were rice paddies, mustard, maize, seasonal vegetables and some wheat cultivation. They had the same crops in earlier years, but the crop production has increased because of the new irrigation facilities. About 10 years ago, they could harvest a paddy field once a year, but now they are able to plant two crops of paddy fields. Of the 82% of respondents involved in agriculture, 85% have no fallow land because of increasing use of groundwater. About 10 years ago, 80% of respondents had fallow land because of dependency on rainfall/surface water which used to be uncertain.

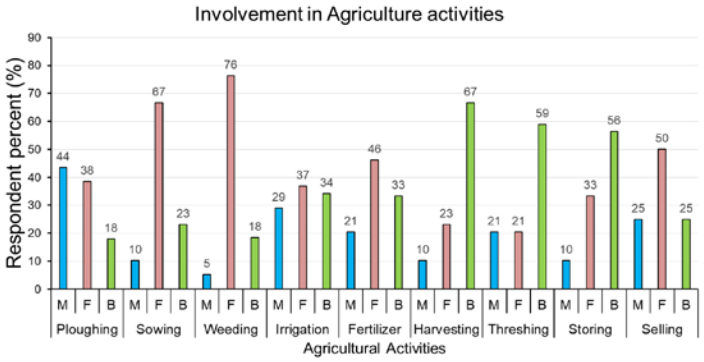

Figure 12: Agricultural activities performed by male (M), female (F) or both (B)

In agricultural activities, more men do ploughing compared to women. However, women are more involved in sowing, weeding, irrigation, and fertilizing than men. In harvesting, threshing and storing both men and women are equally involved. A majority of the agricultural work is done by women but in case of hard physical work in field, men help them. 22% of respondents sell the agricultural yield, and among them mostly females are responsible for this work. This is because, in most families, men are in a foreign country engaged in a job, business or managing a shop. Some women said their husbands do n't think that agriculture is their responsibility. Therefore, women play a major role in agriculture activities. From this result, it shows that the women engaged in agriculture and livestock have more work burden of both agriculture and household as compared to the women of other occupations.

3.2.2 Involvement in the Water User Committee

As shown in Figure 13, very few women from the sample are involved in the Water User Committee (WUC). Since we are talking about communities, WUC has been used in this paper rather than the Water User Association. Most of the women only participate in set meetings, which are organized monthly for members and every 6 months to a year for locals. In the sample, only two candidates are members of the WUC. Respondents who are 31 and above were the most involved in the WUC. After this age women are freer from childcare responsibilities and are mature and familiar with societal development activities. Younger women are going to school and some are married with more household and child care responsibilities. Therefore, the age of 16-30 shows slightly less involvement in WUC than women aged 31 and above.

As for education, 50% of respondents who have a higher education (12 and Bachelors) are involved in the WUC because of awareness and involved in job like being teacher, social worker. Only 13% of respondents with a secondary education (5-10 class) are involved in the WUC, likely due to less awareness of such activities. They are more engaged in household and agricultural activities. 15% of respondents with "No Education" are involved in the WUC because they are mostly senior women who enjoy charismatic authority in the community. In some cases, senior women are alone at home because their son and daughter-in-law migrate to

foreign countries or out of the village for jobs and business. In this situation, there is no one else in the family to attend meetings and programmes.

By occupation, those who have jobs and businesses are more involved in WUC meetings becuase they are educated, aware and know the importance of involvement. Job holding women also have support from their family, despite the limited amount of time they try to be active in such programmes. Women only involved in household activities do not get exposure to the outside world, so they have no interest or realized its importance. Moreover, the women who are involved in the household, agriculture, and livestock maintenance are less involved because they have larger work burdens and do not get time to attend such meetings.

By caste, the Bahun/Chettri women are more involved in the WUC than the other castes. The discrepancy seen in Tharu community shows that they have not understood the importance of such women empowerment activities in water resource management, hence they have no interest. However, the women who are involved said that women are more empowered than before in last 10 years and the number of women is greater in this Water User Committee.

3.2.3 Attend water security-related programs

The overall participation and involvement in water and climate -related programmes, and training is very low, as shown in Figure 14. However, cross-referencing with education, the women with higher education levels are more involved in water-related training and programs. Similarly, by occupation, there is more involvement by job holders and business women followed by the women with agricultural occupation. Women who are solely involved in household activities never attended such trainin and programs . This may be because there are still restrictions from the elderly at home and they have less free time and exposure to the outside world.

3.2.4 Addressing constraints in gender mainstreaming in the water sector

The findings from KIIs show that more than 80% of females are members of the WUC due to male out-migration for jobs and the influence of female leaders as mentioned in the case study. However, household interviews show gaps in the involvement of every category of women in the water resource sector. The main conclusions drawn from KII and household interviews is that every category of women has the burden

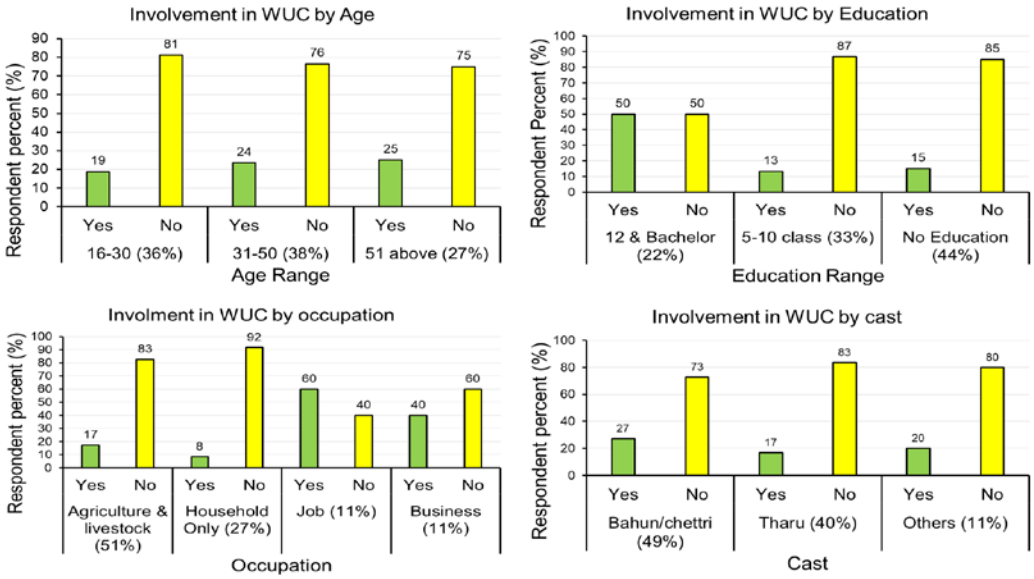

Figure 13: Involvement of different categories of women in the W ater U ser C ommittee (WUC) based on age, education, occupation and caste

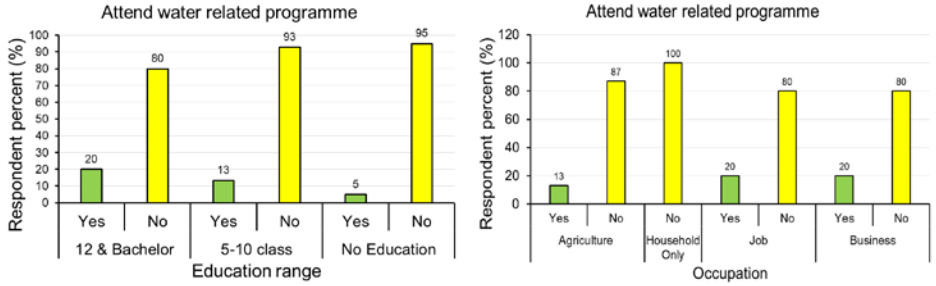

Figure 14: Attend training or programme related to water security

of household chores, outside of their job or business. Furthermore, a greater percentage of women from the Dadagau community are active and responsible participants in the water development sector than women from Karaiya and Basauli. Also, educated and middle-aged women are more likely to participate. The primary constraints observed in this study are lack of gender mainstreaming for medium and small budget programmes, lack of understanding of gender mainstreaming among stake holders, time constraints, lack of information, hesitation and insecurities, no family support, lack of education, and lack of interest.

From KIIs, the leaders expressed their struggle to include and encourage women, especially homemakers in the Chaudhary caste, mainly due to time restrictions and lack of support. Their efforts like supporting with finance, organizing awareness programme, motivating personally to include these women have not been as successful as expected. The chairwoman tried to include financial and other benefits to increase the participation rate, and these incentives have somewhat increased women's participation. Further focus can be put on regular training, awareness programmes and financial provisions or other benefits so that more women take interest in water resource development activities. The training programme should not only be women centric, but also involve both male and female members. Therefore, with mutual understanding of male and female members, it will help bring gender equality and gender mainstreaming in the water sector. The stakeholders lack understanding for the need of gender mainstreaming for medium and small budget projects; this can be addressed by providing training.

4 CONCLUSION AND RECOMMENDATION

Climate change perceptions and its observed impacts vary with different groups of women depending on their age, education, caste, community, and occupation. Irrespective of education, women engaged in agriculture exhibited a better understanding of climate change and a higher awareness of its impacts in the form of (i) changing rainfall and temperature trends; (ii) water shortages for irrigation; and (iii) flooding due to their greater exposure to nature and environment. The decreasing order of understanding about the impacts of climate change based on occupation is: women involved in agriculture, jobholders, businesswomen, and homemakers. Women in agriculture are experiencing greater stress due to increased climate change impacts such as from flooding during monsoon season in Basauli and Karaiya and water scarcity in Dadagau. These problem lead women in agriculture to be active in water development and management. However, a fair percentage of involvement is still not observed in agricultural women, a higher percentage of women who are job holders and business people are involved because education plays an important role in the likelihood of their participation.

Agricultural women are making an effort but their lack of education is a hindrance to understanding climate change scientifically. Despite 80% of female involvement in water user committees, there is a gap in women participating in all demographics. Irrespective of literacy and work engagement, women of Dadagaun, unlike Karaiya and Basauli, are more aware and active in various water development and management activities. Women from the latter two communities are relatively less active due to lack of time and interest, self-development to identify their rights and duty water and climate change, and family background. Nevertheless, wome's awareness has increased over the last decade like increasing awareness and number of women participation in development and management of water. More efforts are still required to achieve continued progress in mainstreaming gender, considering its intersectionality in the water sector.

Even in medium and small budget projects, we need to ensure that all groups of women are aware of climate change, its impacts and potential adaptation strategies. Currently, there is no effective measure for flood risk reduction in Basauli and Karaiya. Therefore, it will require cooperative engagement and negotiation between different stakeholders to initiate physical measures like the reconstruction of the Chaitra Bridge, checking the dam and dyke wall, and the initiation of an early warning system.

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