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Gender Roles and Multiple Uses of Water in North Gujarat

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IWMI
International
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1. Background and Objective

Sectoral demand for water has been growing, with industry and urban water use being the fastest growing sectors. According to the Union Ministry of Water Resources (MoWR), 80 percent of India's utilizable water is devoted to agriculture, mostly in the form of irrigation. Demand from the domestic sector has remained low and accounts for only 5 percent of the annual freshwater withdrawals in India. The industrial sector in India is the second largest user of water, but it is not exactly known how much water these industries consume (CSE 2004). Competition is growing rapidly as a result of declining water supplies and growing sectoral demands. Allocation of water from public systems is not based on social, economic, environmental and fundamental rights considerations, and thus it is inequitable. Growing inequity in access to and control over water leads to conflicts among different sectors.

For instance, during the monsoon, water from irrigation reservoirs in Sauarashtra is reallocated from low-valued agricultural uses to high-valued drinking and industrial use by urban water utilities and private water supply companies. Such reallocation puts tremendous additional pressure on the already water-stressed rural areas. The better-off residents of cities around the world typically consume around 200 liters per capita per day (lpcd). It is believed that finding ways of providing similar quantity of water in support of the livelihoods of the rural poor is vital (Moriaty and Butterworth 2003). Even within the rural areas the existence of inequality persists among different sectors. As the absolute scarcity of water increases, access to water becomes inequitable.

Scarcity of water influences the social structure, in that water is distributed in accordance with the influential power of groups—caste, class and gender. The three types of stratification systems of the community have a strong relationship with water (Zwarteveen 1997).

The water requirements of the poor always extend beyond domestic needs. Productive uses of water at the household level include a range of small-scale activities that enable poor men and women to grow subsistence food, fruit and vegetables, rear livestock and undertake informal micro-enterprises.

Without access to sufficient and reliable water for productive uses in and around the household, people are excluded from a range of options that would otherwise enable them to secure their sources of food and income. At the most basic level, poverty entails a lack of opportunity.

In almost all rural communities in developing countries, it is primarily women and girls, who collect water, protect the water source and maintain the water systems, and store water. Women spend a significant amount of time with these activities. They also determine the use of water, and this decision-making has direct impact on the health of children and other family members.

Over the past several decades, development planners have assumed that women are only concerned about water for domestic purposes and men are responsible for productive water use. This underlying assumption has not only led to a number of unsustainable development interventions around water, but has also underestimated women's productive role. Because of this assumption, water projects neither explicitly focus on the need to promote equal balance of power between men and women nor recognize the need for equity in water allocation. Thus, water allocation has been gendered and in most cases women are ignored in terms of access to water. The allocation priority gets further deteriorated in times of scarcity and could become the cause of intra- and inter-household conflicts.

Recognizing the multiple uses of water in and around households, where women play an important role in the use and management of water, in agriculture and in small-scale activities that allow both men and women to grow more crops, vegetables and to rear livestock—is a mounting need.

This study tries to examine gender roles as both domestic activities and productive water users and how these roles help women improve their socioeconomic status. The specific objectives of the paper are: to examine gender roles and responsibilities of multiple water users with an estimation of actual water use for domestic and livestock purposes and to analyze the operational income and expenditure associated with water-based home enterprises.[1]

2. Survey Design

A comparative village-level case-study approach was used in the study. A total of nine villages, three from every block, were selected. These villages are similar in socioeconomic and physical attributes but different in terms of water supply. These villages of North Gujarat are famous for livestock rearing, which is considered a female domain. For the purpose of this study, villages in each pair were termed as either no- source or source villages based on the criteria shown in table 1. The survey covered a total of 90 respondents using different participatory research tools.

The roles of men and women were determined by actual physical labor in mean working hours per day in livestock rearing and irrigated agriculture. A daily routine diagram was also used, particularly while interviewing women in order to get a better idea of the total time allocation per activity per day. Participant observation also supplemented information on physical involvement. In addition, focus group discussions were held separately for both men and women groups.

In order to understand actual water use for domestic and livestock purposes the following method of computation was used; Per capita human use of water = total water for drinking and cooking per day/ number of family members+ (water use for sanitation and other household uses/ number of family members). Similarly, the daily water use for livestock was obtained by measuring actual water used for livestock in bathing, cleaning and drinking.

Table 1. Categorization of villages with their characteristics.

Category	Name of Village	Characteristics
No-source villages	Chodungri	• Women walk more than 1 km to fetch water for domestic purpose
	Marvada	• Most households suffer severe shortages of water
	Gonguvada	• Predominantly rain-fed agriculture
		• Supply of domestic water by a government tanker
		• Non-availability of green fodder
		• Common out-migration
Source villages	Khumbasan	• Most households have access to stand posts
	Kholda	• Households have private or partnership wells
	Khruksal	• Predominantly irrigated agriculture
	Dhonta	• Availability of green fodder
	Saklana	• Thriving dairy economy
	Magarvada	

[1]Livestock raising has been taken as a home-based enterprise in the study.

3. Study Area and Socioeconomic Characteristics

The surveyed villages are located in Banaskantha district of North Gujarat, India. Three villages from three blocks, namely, Dantiwada, Vadgam and Palanpur, were selected. The total population of the studied villages ranges from 642 in Marvada (no-source village) to 4,440 in Khumbasan (source village). The cultivable area ranges from 40.47 hectares to 897.5 hectares. Population density varies from 156 to 547 per capita per square kilometer. Chaudary, Harijan, Muslim, Patel, Kodri, Rajput and Suthar with minority of Prajapati, Desia, Vankar and Vagar communities dominate the population in the surveyed villages.

The livelihood of the farmers in the study area is predominantly agriculture-based. Source village farmers grow crops in all three seasons. The majority of respondents of the source area grow millet sorghum, cumin, mustard, wheat and fodder. Other crops like castor, groundnut and pulses are also grown. For fodder, the majority of farmers grow alfa-alfa, which lasts for 6-8 months in winter and summer. Crops grown in Kharif (October through March) are usually rain-fed, but farmers were forced to irrigate their crops in the last Kharif due to the 3 preceding drought years.

Livestock rearing is common in the villages and women are significantly involved in this activity. A majority of the households rear buffalos and cows. The size of the livestock population varies widely within villages and among households. Basic statistics of the surveyed villages are summarized in Appendix 1.

Bansakantha is a socially and economically backward district in Gujarat. In Gujarat, droughts are estimated to occur every 3 years on average, and in 1999, a large part of Gujarat suffered from the worst drought experienced in 50 years. Banaskantha is one of the poorest and hardest hit districts in this respect with frequent droughts grinding down any interim livelihood gains.

The region receives a range of low to moderate rainfall and has arid to semi-arid climatic zones. The rainfall is highly erratic. The mean annual rainfall (1901-1990) varies from 578 mm in the Banaskantha district to 807 mm in the Sabarkantha district. The mean annual rainfall for the entire region is about 627 mm (GoI 2000). Groundwater is the major source of water in Gujarat.

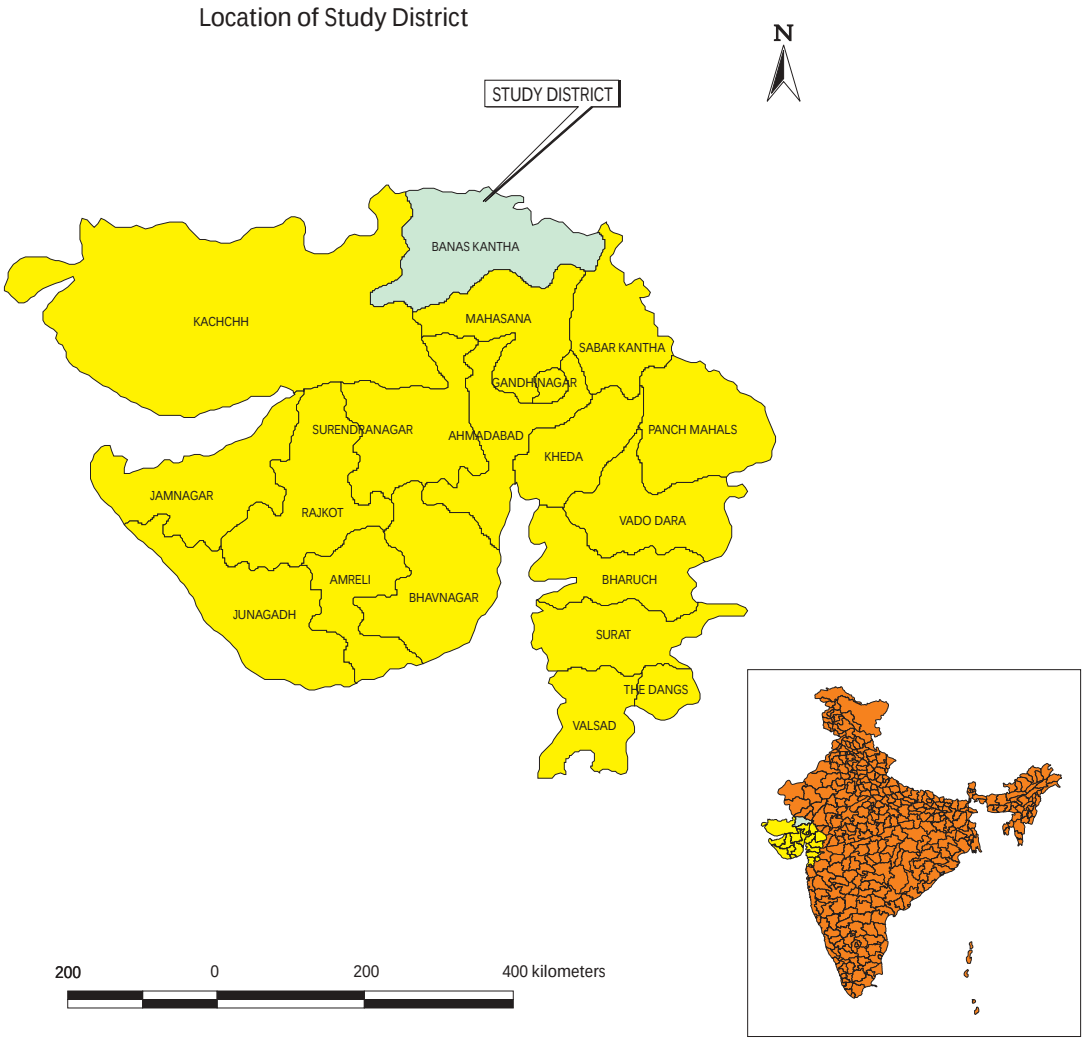
The types of groundwater extraction mechanisms used in Gujarat are dug wells, dug-cum-bore wells and tubewells. Dug wells and dug-cum-bore wells are used in the alluvial areas of North Gujarat for irrigation purposes. The total annual withdrawal of groundwater in Gujarat stands at 9,708.9 MCM, with maximum withdrawal in North Gujarat (IRMA/UNICEF 2000).

Most source villages have multiple sources of domestic water, including bore wells and government stand posts. But in both source and no-source villages, traditional water sources are almost non-existent, as excessive groundwater withdrawal, mostly by richer farmers, has lead to a rapid fall in water tables.

Access to groundwater is highly inequitable even in source villages. Many small and marginal farmers are deprived of direct access to groundwater. They sustain irrigated agriculture by purchasing water from rich well owners, while some of the better-endowed farmers invest in partnership wells and continue abstraction, enjoying unlimited access to groundwater. For instance, in the Khumbasan village, all the studied households irrigated their land using partnership wells for water extraction and allocation. Water allocation among the shareholders is done on the basis of their share in the total investment.

In villages where the wells are still yielding water, farmers irrigate their land. However, in villages of Datiwada taluka, water is sufficient only for domestic purposes, and is distributed by government tankers. Frequent drought and over extraction of groundwater resulted in the drying up of all the traditional water sources, and farmers are now finding it difficult to get to the water table even after boring/drilling 500 ft deep.

Figure 1. Gujarat map showing study area.



4. Result and Discussion

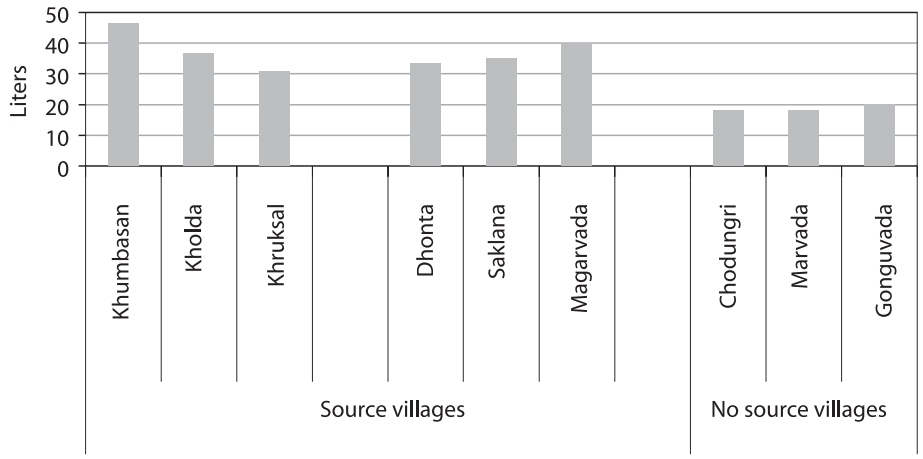
4.1 Women, water and basic needs

Water is a fundamental basic need and an essential resource for economic activities with strong cultural and symbolic value for millions of people in developing countries. A domestic water supply is universally acknowledged as not only a basic right, but a key development indicator. It is also accepted as an excellent entry point to reaching the poorest women, who have the responsibility of finding domestic water supplies. It is also widely recognized that water is vital for multiple and universally agreed-upon aspects of human well-being, such as health, economic security and freedom from drudgery.

Poor women disproportionately bear the burden of the unpaid chore of fetching water for domestic uses. In North Gujarat, women are almost exclusively responsible for domestic chores and for maintaining hygiene in their households. Water scarcity has a direct impact on the time that women and girls spend in water collection and hence on the time available for other work as well as on their access to water within the household.

In the source villages, majority of the villagers use government supplied water for basic consumption needs—drinking, cooking bathing, cleaning, washing clothes and utensils and sometimes even for livestock. The volume used varied among the villages according to their proximity to the water source (usually tap) and the size of the household. The average per capita water use per day for human use in source villages is 36.1 liters, whereas in no-source villages—where the only source is a government tanker— the water use per day per household is 18.6 liters (Figure 2).

Figure 2. Average human use per day.



Source: Survey, 2003.

Due to inadequate water for basic consumption in the no-source villages, women fetch water from nearby villages, where applicable, walking for more than 2 hours per trip. The physical strain of collecting water is doubly compounded during the peak of summer, when the temperature is up to 45°C, and women have to wait in long queues at water sources. This shows the precarious situation of women in no-source villages and also indicates how women are compelled to shoulder additional burdens for the welfare of their families.

In the no-source villages, 90 percent of the women are reported as having a very hard time in fetching water from other villages. Water distributed from the government tanker is not enough even for their basic needs. The poor people are facing inequality even in accessing water distributed by the tanker. They hardly get adequate water for consumption, whereas the rural elite are able to collect more than 40-50 liters regardless of their family size. This inequity is breeding social conflict among the users, and poorest women are the hardest hit.

4.2 Women, water and livestock

Rural women need access to water resources not only to carry out their domestic activities, but also to undertake potentially beneficial works for themselves and their families. Sometimes their needs are in direct conflict with those of the male members of households, although at other times their interests are shared or are complementary.

Livestock is not only a source of employment, income and food, but also critical to strong socio-cultural linkages in countries like India. These animals are given a place of importance by the society in recognition of their contribution to human welfare. Studies in India on gender roles

in livestock have indicated that activities like feeding, cleaning, milking, care of animals and administration of medicines are done mostly by women (WRI 2003; Niamir-Fuller 1994; FAO 2002). In all the surveyed villages, both men and women are found to be involved in livestock rearing activities.

When total activity related to livestock rearing is assessed at the household level, women are found to be significantly involved. Women also possess a good knowledge of various aspects of livestock production management. They know about each animal's production characteristics, feeding behavior and the need for good quality feed to achieve better production. Women's roles and responsibilities were observed in terms of total time allocation per day/ per activity (Table 2). The data show that women spend 5.3 hours per day in livestock rearing. In no-source villages, during the time of insufficient supply, women reported spending almost 3-4 hours per day to fetch water.

Table 2. Average time spent daily by women.

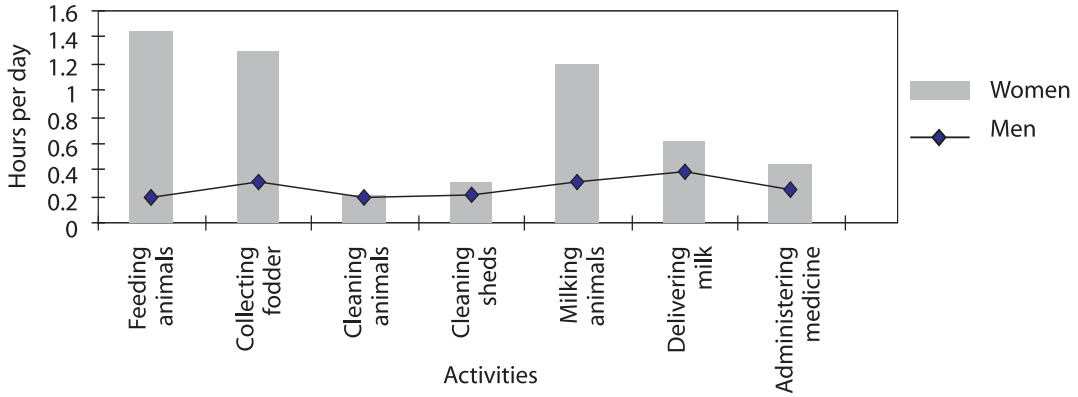
Activity type	Description	Average hours/day
Livestock rearing	Collecting fodder, bathing, feeding, milking, cleaning shed, delivering milk, medicine administration	5.3
Domestic	Cooking, feeding, child caring, washing utensils and clothes, house cleaning	5.2
Personal	Socializing, taking rest etc.	8.5
Other	Fetching water, working in the field	5
Total		24

Source: Survey, 2003.

Similarly, data on the gender division of labor in livestock rearing show that the total mean working hours of women was significantly higher than that of men in all the surveyed areas. Women's significant involvement was seen in activities like feeding, collecting fodder, milking and delivering milk (Figure 3).

A majority of households in the surveyed areas are sustaining their livelihood basically from livestock income during the time of drought and monsoon failure. No-source farmers are prioritizing animal husbandry over irrigated agriculture because of water scarcity.

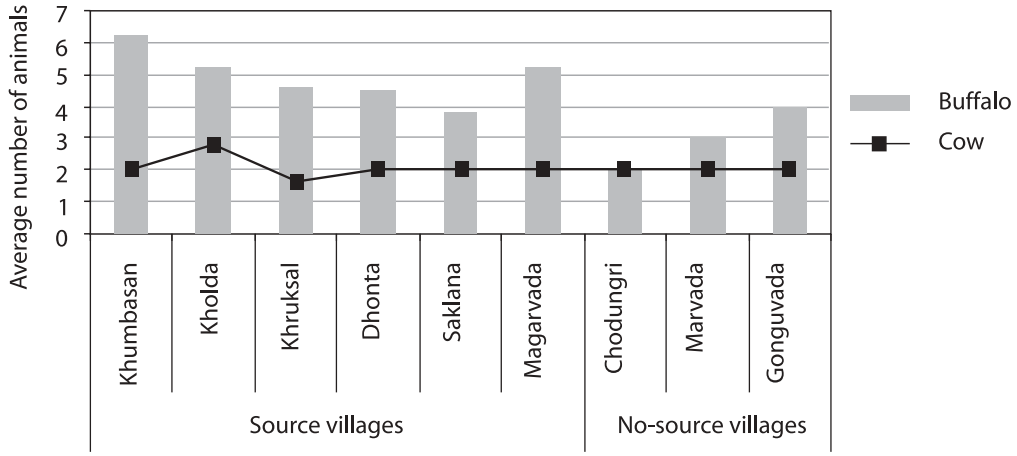
Figure 3. Average hours spent on livestock rearing, by gender.



Source: Survey, 2003.

In North Gujarat, livestock are integrated into smallholders' livelihood through mixed farming systems. The average number of cows and buffalos in the source villages is three and six, respectively, compared to two and three in no-source villages (Figure 4).

Figure 4. Average number of livestock.

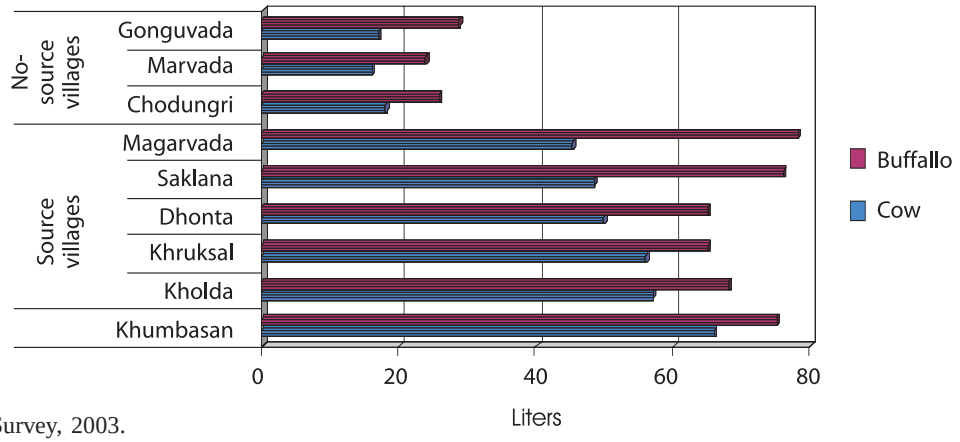


Source: Survey, 2003.

In no-source villages, the drying up of most wells has severely affected the average size of livestock holding. This implies that the growing scarcity of water has started affecting the dairy industry, which has been sustaining the rural household economy since the monsoon failed to arrive in the villages of North Gujarat.

Livestock is an important consumer of water. In rural areas, people raise livestock as an essential enterprise for supplementing their family income. In order to understand water allocation for livestock, average water use per day per animal was calculated. The data reveal that average drinking water use for a buffalo and a cow is 35.7 and 27.5 lpcd, respectively. Similarly, average water use for bathing and cleaning purposes for buffalo and cow are 35.4 and 26.1 lpcd, respectively. Thus, the total per capita water use for a buffalo and a cow in source villages is 71.1 and 53.6 lpcd, respectively.[2] Average water use by a cow and a buffalo in a no-source village is 14 and 20 lpcd, respectively (Figure 5).

Figure 5. Per capita water use by animals.



Source: Survey, 2003.

[2]Thrice a week is taken as the frequency of cleaning sheds and bathing animals for water use estimation.

Due to the limited supply of water by government tankers, women reported difficulties in providing enough water to livestock. In worse cases, women are even herding large animals in search of water and green fodder to nearby villages. If the water source is not available in nearby villages, women force their male counterparts to buy water for their livestock.

4.3 Women, water and irrigated agriculture

Rural Indian women are extensively engaged in agricultural activities. However, the nature and extent of their involvement differs with the variations in agro-production systems. The mode of female participation in agriculture varies with the land-owning status of farm households. Their roles range from that of managers to landless laborers. In overall farm production, women's average contribution is estimated at being between 55 percent to 66 percent of the total labor with percentages much higher in certain regions. In the Indian Himalayas, a pair of bullock works 1,064 hours, a man 1,212 hours and a woman 3,485 hours in a year on a one-hectare farm (FAO 2002).

There are only few activities in agricultural production in which women are not actively involved in the surveyed source villages. Women were basically found to be jointly involved in activities such as irrigation, chemical spraying, fertilizer application and land preparation with their male counterparts (Table 3).

Table 3. Percentage of irrigated agricultural activities by gender in source villages.

Activities	Men (%)	Women (%)	Jointly (%)
Sowing	3	59	38
Plowing	100	0	0
Irrigating	22	20	58
Applying fertilizer	55	16	29
Weeding	4	55	41
Harvesting	0	24	76
Threshing	17	7	76
Marketing	45	15	40

Source: Survey, 2003.

With groundwater being the only source of irrigation, more than 80 percent of the respondents in the source villages reported that the water level has been decreasing by 10–20 ft every year.

Water use for crops slightly varies between two talukas of source villages. This might be because of differences in soil type and the method of water application. Respondents used open channels, underground pipelines, or a combination of both, and plastic pipes to convey water to the field. Due to the alternative power supply schedule of days and nights every fortnight, farmers pump water into the tank—a majority of the farmers have constructed these surface tanks in their fields to have better control over the water supplies—and use them when required.

In no-source villages of Datiwada takula, farmers are totally dependent on rain-fed agriculture. Water distributed from government tankers is hardly sufficient for domestic and livestock purposes. Respondents reported that they are sustaining their livelihood from the dairy income brought home by women. Many farmers have migrated in search of work and sharecropping opportunities to support their families.

Though women are found to be significantly involved in irrigated agriculture, the revenue generated from agriculture is entirely controlled by men. This clearly separated intra-household activities according to gender. These activities, however, are not also separate from the water users' perspective, and this often impede women's access to and control over this scarce resource. For instance, men usually have a greater say in water provision for irrigated agricultural production, which in turn influence associations responsible for infrastructure and determining allocation schedules. Even production from women's fields and household gardens is often controlled by men to a certain degree, as is the availability of water for nonagricultural tasks. This bias allocation and control is even greater in times of water scarcity.

4.4 Women, productive activities and household income

As stated earlier, women in the surveyed villages are found to be significantly involved in livestock rearing. On an average, US$36.6 and US$57.2 is spent monthly on a cow and a buffalo, respectively (Appendix 2), taking into consideration the opportunity costs of all inputs. These figures depreciate drastically when the actual expenses incurred by farmers are exclusively taken into account. If green fodder is not available in-house, farmers allow their livestock to open graze elsewhere for the whole day, regardless of whether there is green fodder available anywhere in the village or not.

Farmers reported no practice of buying or selling green fodder in the villages, despite the shortage situation. Those farmers who still have some water in their wells, allow needy farmers to fetch water for livestock free of any charge. However, depending on the conveyance distance and volume of water, the latter may have to incur the cost of tractor rental. This type of transaction is only true when the former has a surplus of water.

Thus, the expenses for green fodder, water and labor are seldom incurred. Consequently, farmers only incur US$13 and US$20.4 on a cow and a buffalo, respectively. Costs are computed on the basis of daily expenses incurred on each livestock, except for veterinary services, which are incurred once in every 3 months on an average. If a farmer is a dairy cooperative member and calls a veterinarian through his/her institution, he/she has to pay US$1.36 per visit, while if veterinarians are called privately they charge US$5.2–US$6.3 for each visit.

Respondents cited this as one of the incentives for joining the dairy cooperatives. The analysis excludes the initial investment required for a cow or a buffalo, and this gives an idea of operational gains that have become an integral part of household livelihood strategy. Respondents said that they buy additional livestock out of the yearly savings they make.

Village dairy officials reported average fat contents of 4 percent in cow's milk and 7 percent in buffalo's milk. Farmers are paid for the milk based on the fat content. Milk containing less than 3 percent fat is rejected. Every incremental percentage content of fat (above 3%) fetches an additional Rs.1.70.[3]

Revenues have been calculated accordingly (Appendix 3). Farmers reported a general preference for green fodder over dry fodder, supported by the perception that the former fetches more and high-fat milk. Farmers in no-source villages have devised their own coping mechanism. Since they do not enjoy an adequate supply of green fodder and water, they feed their livestock with a combination of dry fodder and feed. Farmers even reported feeding livestock with soaked dry fodder.

[3]US$1 is equivalent to Indian Rupees (Rs.) 47.50.

Costs of labor hours for women are never considered as "real" costs since women are never paid for their contribution. Opportunity costs of water and green fodder are also never considered. Going with local practices and omitting these opportunity costs, a family in source village will bring home US$26.9 from cows and US$158.4 from buffalos.

The no-source village farmers are not able to realize this earning potential yet, as they are trapped in a vicious cycle of less water, less fodder, less animals, less milk, and of course, less income. As a result of less milk production, farmers having two cows and three buffalos just manage to cross the break-even point and generate US$22.7 monthly. Members of these households reported being employed under government relief schemes—which are offered from time to time in the no-source distress villages—to support their living. In such schemes, the farmers are offered daily wages in exchange for their labor. Those not employed in these schemes often resort to seasonal and/or prolonged migration to find paid labor elsewhere.

Women do most of the livestock rearing related works, such as, cleaning sheds and animals, collecting fodder, grazing, feeding animals, milking, carrying milk to the dairy, etc. Data revealed that more than 90 percent of women in both source and no-source villages collect the fortnightly payment for milk and take custody of that money at home. They reported that this money is being used for household expenses as well as for children's medical and school fees, where applicable. The majority of women (60%) reported that male members of the family have to approach the female custodian for money for their personal or other use.

No-source village farmers reported that in the absence of irrigated agriculture, livestock is helping sustain their livelihoods, and farmers in water abundant areas agreed that livestock is the only cash generator throughout the year. Thus, in any case, livestock has been playing a very crucial role is making cash available to the rural families in times when they need it most. Above all, it has not only helped improve women's access to and control over resources, but has also empowered them with decision-making opportunities related to the use of available household resources. Lack of women's access to and control over resources has been cited as one of the greatest gender biases in many South Asian villages. This example of rural Gujarat has, thus, offered an interesting insight on how the socioeconomic status of women has been enhanced due to the introduction of village dairy cooperatives.

It can be clearly inferred that women's access to and control over resources increased their intra-household bargaining power. Women's involvement in productive activities like this give them much greater bargaining power within the household in terms of their input in all aspects of household decision-making. Two explanations can be offered for this phenomenon. First, women who participate in productive activities make measurable contribution to the household income and second, they are more likely to control their assets, while women engaged only in domestic activities do not make any economic contribution to the household and their domestic work is seriously undervalued. A weak bargaining position not only affects a woman's own welfare (i.e., determining what is in their best interest in terms of resources—water, money, time, labor or other materials—at their disposal.) at an intra-household level and their fall-back position in community, but also limits their access to and control over resources.

Hence, improving women's bargaining power would strengthen their socioeconomic status and could change gender-based norms and perceptions. It also implied that norms and perceptions are changeable and can be usefully viewed as endogenous, although most of the time they are ignored. It is clearly reflected in the study how traditional household customs—governed by the patriarchal ideology of devaluing women's contribution in support of the household and community—have been changed by the altering of the social hierarchy.

It can be argued that women's involvement in an activity like livestock rearing not only sustain rural livelihood, but also strengthen women's bargaining power leading them towards empowerment. Interestingly, the most essential input in this enterprise is water, while the value of other inputs cannot be denied. The data also revealed how the scarcity of water is affecting this enterprise, in no-source villages, leading the rural community towards uncertainty. This explicitly portrays why there is a need for a proper and demand-responsive water allocation strategy in rural areas.

In addition, the recognition of women's need for water as productive users will increase their independent entitlements and will help determine their individual bargaining position in inter- intra-household arenas. Otherwise, the trend towards the devolution of water resource management even to the lowest level of political organization may not benefit women who have little influence at family and community levels. In this respect, NGOs Nongovernmental Organizations) and CBOs (Community-based Organizations) have critical roles to play in facilitating women's participation at all levels of water management as productive users. Recognizing women as productive users may thus become an increasingly critical entry point towards their empowerment.

As argued by Agrawal (1997), rural person's bargaining power would depend especially on five factors: private ownership and control over assets; access to employment and other income generating activities; access to communal resources; access to traditional external social support systems; and, access to support from the state or from NGOs.

These five factors impinge upon a person's ability to fulfill subsistence needs outside the family. The greater a person's ability to physically survive outside the family, the greater would be her/his bargaining power at least in relation to resource sharing for subsistence within the family. Inequalities among family members with respect to these factors would place some members in a weaker bargaining position relative to others. Gender is one such basis of inequality.

5. Conclusion and Policy Implications

The paper analyzed micro-level situations of no-source and source villages of the Banaskantha district of North Gujarat and explained gender roles and responsibilities in multiple uses of water. In relation to household activities, women are solely responsible for all domestic chores and the welfare of the family. The study provided a clear picture of women's physical involvement in collecting water during times of shortage and particularly of the time and energy they spent in collecting water, especially in no-source villages.

Women are found to be significantly involved in livestock rearing in both source and no-source villages. With respect to this, women's contribution was more than 70 percent, compared to the male involvement of less than 30 percent. Similarly, overall involvement of women in irrigated agriculture was greater than that of their male counterparts in source villages.

Income generated from livestock was collected and controlled by women, as they were responsible for household expenditure. This clearly shows that given appropriate institutional support and access to resources, rural women can sustain their household economy by participating in productive activities. In particular, the study revealed how women's economic contribution to the household strengthened their bargaining position and empowered them to make household decisions.

It can also be inferred that if water supply is improved, it not only saves time previously spent by women to collect water and reduces women's drudgery, but also helps generate additional household income.

In developing countries like India, fundamental issues of the social sector are gaining prominence. Basic needs, particularly those of rural poor, continue to attract the attention of planners and policymakers. Such needs like an improved domestic water supply are fundamental to community development and in turn, the socioeconomic development of rural men and women.

The paper reiterates the fact that recognizing women's multiple roles as domestic and productive water users is an important aspect to consider in integrated water resource management (IWRM), and this aspect should not be overlooked by planners and policymakers. And, to ensure efficient, equitable and sustainable water use, to reduce poverty and to improve the well-being of communities, irrigation and water resources policies need to take into account all uses and users of water for better allocation policies.

6. Appendices

Appendix 1. Basic statistics of surveyed villages.

Source village						
Taluka	Name of village	Total pop.	Total household	Area (sq km)	Cultivable land (sq km)	Livestock pop.
Palanpur	Khumbasan	4,440	836	1,409.07	500	1,350
	Khodla	2,905	740	2,561.2	2,217.9	1,346
	Khruksal	1,925	400	1,775	1,537.5	1,451
Vadgam	Dhonta	1,985	393	568.7	359.0	380
	Saklana	1,855	336	1,338.6	1,119.05	435
	Magarvada	2,157	408	2,624.9	1,997.25	4,147
No-source village						
Dantiwada	Chodungri	842	137	591.77	225	530
	Marvada	642	79	390.67	100	375
	Gonguvada	687	104	308.81	51.49	482

Source: Field survey, 2003.

Appendix 2. Livestock cost composition.

Particulars	Unit/qty/ animal/day	Cost/unit (Rs)	Total cost/ month (Rs)	Unit/qty/ Animal/day	Total cost/ month (Rs)
	Cow			Buffalo	
Green fodder	3.5 kg	2.5	262.5	10 kg	875
Dry fodder	3 kg	3.2	288	5 kg	480
Amul dana	2 kg	5.2	312	3 kg	468
Veterinary	Once in three months	65	22	--	22
Water	53.6 ltrs	0.038	61	71.1 ltrs	81
Labor	5.3 hrs*	5	795	5.3 hrs	795
Total Cost			1,740.5		2,721

Source: Survey, 2003

Note: US$1 = Rs 47.50

* Rs 40 is taken as daily wage for women, which is the going rate in government relief work in rural areas.

\# Respondents of no-source villages buy water from near-by villages and just pay for transportation fee at the rate of Rs 150 for 4,000 liters. This has been used as the basis of calculation of charges paid for water.

Appendix 3. Livestock revenue.

Particulars	Cow	Buffalo
Source Village		
Average milk production/day/animal	5.14 ltrs	6.23 ltrs
Average number of animals	3	6
Total milk production/month	462.6 ltrs	1,121.4 ltrs
Total monthly revenue from milk	Rs 3,145.68	Rs 13,344.66
Average monthly revenue per animal	Rs 1,048.56	Rs 2,224.11
No-Source Village		
Average milk production/day/animal	3.12 ltrs	3.7 ltrs
Average number of animals	2	3
Total milk production/month	187.2 ltrs	333 ltrs
Total monthly revenue from milk	Rs 1,272.96	Rs 3,962.70
Average monthly revenue per animal	Rs 636.48	Rs 1,320.90

Source: Survey, 2003.

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