



**WORKING
PAPER**

173

**COMMUNITY PARTICIPATION
IN RURAL WATER SUPPLY:
AN ANALYSIS USING
HOUSEHOLD DATA
FROM NORTH KERALA**

Nisha K R

**INSTITUTE FOR SOCIAL AND ECONOMIC CHANGE
2006**

COMMUNITY PARTICIPATION IN RURAL WATER SUPPLY: AN ANALYSIS USING HOUSEHOLD DATA FROM NORTH KERALA*

Nisha K. R**

Abstract

This study identifies the factors which influence users' participation in community-based rural water supply schemes in north Kerala using primary data. To capture the rate of participation, two forms of indices were constructed – one, to measure the attendance in the group meeting and other, for influence in decisions. The relative importance of locality, group and households characteristics that affect participation were analyzed using linear regression models. Among the three sets of factors, it was found that household characteristics were the most influential factors. The analysis shows that males were actively participating in the group meetings. Level of education and involvement of households in other local organizations were the other major factors affecting participation.

Introduction

Development experience over the last few decades and the increased concern of international funding agencies and NGOs in social sector have made community involvement an inevitable part of the development process. Community-based development projects assume participation of beneficiaries in the implementation and management of the schemes under consideration. Participation of beneficiaries in the project implementation is supposed to make the development demand-driven and effective.

Since water is a basic need, it was assumed for a long time that the responsibility of the provision of water supply should be entrusted to the government. But, the fiscal crisis of the governments combined with

• This paper is a part of PhD thesis of the author. The author gratefully acknowledges the comments and suggestions received from two anonymous referees.

** Doctoral Fellow, Institute for Social and Economic Change, Bangalore -72.
Email: krnisha@gmail.com, krnisha@isec.ac.in

structural adjustment programmes compelled most of the developing countries to look for alternatives in water supply management. Community-based development schemes emerged as a solution to the problems which came across in the state management of the resources. Hence, in the wake of decentralized planning process the state governments devolved the responsibility of providing basic necessities to local organizations. Under the new initiative of community water supply schemes, the beneficiary groups are responsible for planning, technology selection, and installing rural water supply facilities. Operation and maintenance of the structures created in the projects is also the responsibility of the beneficiaries. In this context, it is worth answering the question 'what factors affect the beneficiary participation in community-managed rural water supply schemes?'

Evolution of Community-based Water Supply Schemes in Kerala

Households in Kerala traditionally consider own wells, mainly open wells, located in the household premises as the main source of drinking water. These open wells dry up during summer and people have to walk a distance and spent time to collect water. The state government has taken keen interest in tackling the problem of water scarcity since its formation. Government intervention in drinking water supply system in Kerala can be classified under two categories: one, in the form of public/private taps provided either by the Kerala Water Authority (KWA) or Gram Panchayats (GPs) and the other, in the form of public wells, which, in most of the cases, were constructed by the local governments.

Kerala Water Authority is one of the main agencies for the design, construction, operation and maintenance of water supply in the whole state. KWA has been implementing piped water supply schemes based on surface and groundwater sources. It undertakes projects sponsored by multilateral funding agencies through the state and central government. It also executes bilaterally funded projects and accelerated rural water supply schemes on behalf of the government of India.

Decentralized planning process which started in the state in 1996 paved the way for local governments to take up issues related to drinking water. But, even before the implementation of decentralized planning the local bodies in Kerala intervened in the drinking water sector. Gram panchayats constructed public wells and small water supply schemes with technical assistance from Kerala Water Authority. Initiation of people's plan campaign provide more powers to district, block and gram panchayats to take up small water supply schemes with user participation. Besides, the state government decided to transfer all small rural water supply schemes, within the boundary of one GP, to the local bodies with associated powers to levy and collect user charges for providing water services.

The alternative institutional model introduced a new service delivery mechanism for the rural water supply in the state with the participation of beneficiaries. In Kerala, community-managed water supply schemes were implemented with the help of external funding agencies and central government. External agencies included World Bank and Royal Netherlands Embassy. Even though there was difference in the organisational structure, the process of implementation of water supply schemes was similar in all alternative set-ups. One of the important features of these community-managed water supply schemes was the distribution of responsibility to the users in terms of sharing capital cost and operation and maintenance duties of the schemes after implementation. More often ten per cent of the capital cost was shared by the beneficiaries and divided equally within the group. Contribution to capital cost could be given either in terms of cash or labour. Operation and maintenance (O&M) was fully the responsibility of the beneficiary group. Groups were collecting water tariff from all the users to cover O & M cost of the system. By rule, participation in group meetings and decision-making was mandatory in community-based water supply schemes. But there was not any negative incentive for those who couldn't participate in the group meetings.

Data set

Information for analyzing the factors affecting participation was collected through a field survey conducted in Malappuram district in Kerala. Five gram panchayats (GP), one from coastal, three from midland and one from highland were selected for the study. A sample of 310 households was drawn from the government (KWA), panchayat and community-managed water supply systems from the selected GPs. The sample includes 200 households drawn from the community water supply schemes (CWS), distributed among 26 Beneficiary Groups (BGs), 60 households from among the beneficiaries of KWA schemes and 50 from the GP schemes. Data were collected at the household level with the help of formal interview schedules. Additional information regarding the characteristics of the locality¹ was collected through informal discussions with senior citizens in each locality. The following sections of the paper consider the theoretical underpinnings of collective action and participation, factors affecting collective action and the empirical evidence from the field.

Collective Action and Influencing Factors

'Collective action will be a function of individual's incentives to contribute to the maintenance and abide by the rules and regulations, the capacity of the community as a whole to cooperate and to manage the incentives, and the overall policy environment in which the institutions must operate' (McCarthy *et al* 2002: 5). It has been argued that collective action was the activity which happened through an organization (Meinzen-dick *et al* 2002). People's/ user's participation was a necessary condition for the success of collective action. Singh (1992) has argued that there was no universally valid theory of participation. Participation in the project implementation was of different nature. Agarwal (2001) has distinguished different forms of participation in community-based management of natural resources. It could vary from mere membership in the beneficiary group to active involvement in terms of influence in decision-making and interactive participation which empowered the beneficiaries.

Considerable literature on common property management analyzes the conditions under which collective action becomes successful (Ostrom 1990; Oakerson 1992; Baland and Platteau 1996). Wade (1988) has mentioned that organizational success depended on factors like, i) boundaries of common pool resources, ii) technology, iii) relationship between resources and user groups, iv) characteristics of user groups, v) noticeability, and vi) relationship between users and the state. According to Uphoff (1999), four basic ubiquitous activities of organization (decision-making, resource mobilization and management, communication, and conflict resolution) were essential for mutually beneficial collective action. Without the above four activities, collective action became more difficult and less likely. Oakerson (1992) has identified four sets of factors attributing collective action:

a) Physical and technical attributes

This physical attributes include, jointness, exclusion and indivisibility. i.e. Jointness means the relative capacity of the resource base to support multiple users at the same time without one interfering with another or diminishing the degree of aggregate level of benefit available to the group, whereas excludability is the degree to which the commons permits the exclusion of individual users. Indivisibility is the physical boundaries of commons, which determine the minimal scale on which effective coordination can occur. Clearly defined boundaries foster collective action possibilities. In the case of water supply, the above mentioned three attributes differ according to the way in which water is treated, i.e. as public, private or common property good. Drinking water supply service assumes more of merit good nature rather than pure public good in most of the countries. The degree to which water can be managed collectively depends on the ability to exclude some, but not others (Narayan 1995). But she has pointed out that the degree of jointness adds complexity to determine the participants in negotiation.

In addition to the resource specific characteristics physical features of the service, like technical defaults and poor quality of

construction also affect collective action in community driven projects (Rajasekhar and Veerashankarappa 2003). Narayan (1993: 33) has argued that 'if the users feel that water is not of acceptable quality, delivery through piped water systems is unpredictable or breakdowns are frequent, users are unlikely to pay for or consistently use such water facilities'

b) Institutional arrangements

Institutional arrangements are subdivided into three types, i.e.,

- operational rules
- conditions of collective choice
- external decision-making arrangements

Even though the institutional arrangements can be differentiated, operational rules are nested in the conditions of collective choice and conditions of collective choice nested in external decision-making arrangements. External arrangements are mainly constitutional in nature. In a similar line, North (1981) has also distinguished different categories of institutions as constitutional rules, operational rules and normative behavioural codes. According to him, the constitutional order is, therefore, the first categories of institutions; which specify the fundamental rules for establishing the conditions of collective choice. Olson (1965) has argued that organizational rules ease success in collective action.

c) Mutual choice of strategies and consequent patterns of interaction

Individuals make choices considering the physical features of the commons, characteristics of relevant technology as well as the decision-making arrangements available to govern it. Patterns of interaction emerge from the joint choices made by the members in a group. As per Olson's (1965) 'Logic of Collective Action', large group size and heterogeneity make individual choices more costly and benefits less. According to him, (i) Group size is a root cause of collective action problems. The larger the group: a) more difficult it is to provide public goods, b) greater the departure of individual uncoordinated behaviour from optimality, c) smaller the collective provision level and higher the

cost of provisioning. (ii) 'In heterogeneous groups, there is a tendency toward arbitrary sharing of the burden of providing the collective good' (Olson 1965: 35). Wealthier members will bear a disproportionate share of the burden of collective provisioning. But, there are many counter-arguments to Olson's contention that collective action will be difficult under the above conditions (Ostrom 1990; Baland and Platteau 1996).

Another line of argument for collective action failure is that, in heterogeneous group cooperative norms, confidence and trust among members may be low. Ostrom (1990) has observed that size and composition of membership did not have significant effect on cooperative performance (cited in Vedeld, 2000). She has suggested that effective leadership could solve the problem of large groups. From the field setting she pointed out that group size and homogeneity were not a precondition for the success of collective action.

d) Outcomes and consequences

Equity and effectiveness are two forms of outcomes mentioned by Oakerson (1992). The presence of inequities may lead to the collapse of reciprocity resulting in less efficient use of resources. The success and sustainability of the community-managed systems depends on the sharing of benefits in an equitable manner (Kerr, 2002). Narayan (1995) has mentioned that, 'over time, as learning takes place, poor outcomes influence the pattern of interaction, which may eventually lead to changes in rules in decision-making arrangements'.

Collective Action in Rural Water Supply

Participation is taken as a proxy for collective action in the present study. Participation in any form of community schemes varies from mere attendance to active involvement in decision-making. Participation has been measured differently in the context of community water supply. Isham *et al* (1994) and Narayan (1995) have analysed participation in a hierarchical order with information sharing representing the lower end and decision-making and control representing higher end of the scale. The present study has been considered the following variables to capture participation.

Attendance in Beneficiary Group (BG) meetings: Attendance in BG meetings counts the number of members appearing in the group meetings irrespective of the extent of participation. The survey results show that (Table 1) a majority of the households (42.6) attended the meetings regularly. Nearly twenty five per cent of the beneficiary households had never attended the meetings.

Table 1: Percentage Distribution of Households by Attendance in BG Meetings

| <i>Attendance</i> | <i>Per cent</i> |
|-------------------|-----------------|
| Regularly | 42.6 |
| Occasionally | 32.6 |
| Never attend | 24.8 |
| Total | 100.0 |

Making suggestions and Influencing in decision: Making any suggestion or influencing the decisions in the group meeting is the higher degree of participation. But, a majority of the respondents was not offering any suggestion in beneficiary group meetings. Only 11.3 per cent of the sample respondents always made suggestions in the group meetings (Table 2). The percentage of households influencing the decision was also less.

Table 2: Percentage Distribution of Households by Extent of Participation

| | <i>Making suggestion</i> | <i>Influence in decision</i> |
|--------------|--------------------------|------------------------------|
| Always | 11.3 | 10.3 |
| Occasionally | 26.5 | 25.2 |
| Never | 62.3 | 64.5 |
| Total | 100.0 (310) | 100.0 (310) |

Note: Figures in parenthesis indicate actual numbers

Influencing the location of water supply and tariff: It is possible that the beneficiaries (households) can be influencing the decisions regarding specific issues rather than influencing all the decisions. In the case of decisions relating to water supply, the location of the water supply and

monthly tariff are two important issues. The respondents were, therefore, asked the following questions which specifically related to the above issues. The questions asked were: first, whether the sample households influenced the decisions of location of water supply; second, whether they influenced the level of water tariff charged by the water supply source. The survey results show that the percentage of respondents influencing the decision of water tariff was high as compared to the decision regarding location of water supply (Table 3). But, in both the cases, the number of those influencing the decision, to a large extent, was less.

Table 3: Percentage Distribution of Households Influencing Decision

| | <i>Influence in deciding location of WS</i> | <i>Influence in deciding water tariff</i> |
|-----------------|---|---|
| Large influence | 5.2 | 4.2 |
| Medium | 8.4 | 14.2 |
| Little bit | 7.7 | 11.9 |
| Not at all | 78.7 | 69.7 |
| Total | 100.0 (310) | 100.0 (310) |

Note: Figures in parenthesis indicate actual numbers

Participation Index

Two different participation indices were prepared on the assumption that they gave a better picture on the involvement of beneficiaries in the community-based water supply schemes. For the purpose of constructing indices, weights were assigned to different levels of participation. The weighted sum of different participation level was taken as the participation index². The resultant participation index ranges from 0 to 100 with 100 representing the higher level of participation and 0 representing no participation.

Index for attendance in the meeting : The first index on participation considered mere attendance in the group meetings as well as the extent of making suggestions in the group meeting. This index was prepared by giving 25 per cent weight to the attendance in

meeting and 75 per cent weight to making suggestions³. This participation index thus represented the passive form of participation, in any of the decision-making activities, as the variables related to investment were not included in this index. The distribution of households by frequency of attendance index (Table 4) reveals that a majority of the households under the community scheme were participating in the BG meetings. Participation in the case of a majority of the households varied between low and moderate forms, implying that less number of households were involved in making suggestions regularly. Distribution of households by attendance index shows that only 36.5 per cent of the households participated well in community managed water supply schemes.

Table 4: Distribution of Households by Index for Attendance in the Meeting under Different Institutions

| Insti- tution | Index | | | | | Total |
|------------------|--------------------------|---------------------------|--------------------------------|----------------------------|------------------------------|-----------|
| | No partici- pation | Low partici- pation | Moderate partici- pation | High partici- pation | Active partici- pation | |
| CWS | 16.5 | 45.5 | 11.5 | 20.5 | 16.0 | 100 (200) |
| KWA | 86.6 | 6.7 | 3.3 | 1.7 | 1.7 | 100 (60) |
| GP | 24.0 | 42.0 | 6.0 | 24.0 | 24.0 | 100 (50) |
| Total | 24.8 (77) | 37.4 (116) | 9.0 (28) | 17.4 (54) | 11.3 (35) | 100 (310) |

Note: Figures in parenthesis indicate actual numbers

In the case of KWA schemes, there were no formal water users association. But grama sabhas in the locality provided an opportunity for the users to represent their interests and demands to the authorities concerned. However, only 13 per cent of the households benefiting from KWA schemes either attended or made any suggestions regarding water supply in the grama sabha meetings. A detailed analysis of these

households shows that all of them were using public stand posts provided by the KWA. None of the households having private household connection was attending any of the grama sabha meetings. In the case of GP provided water supply schemes, water user's association existed in an informal manner. Seventy-six per cent of the beneficiary households participated in these informal meetings. Among the households participating in group meetings, 42 per cent had low participation indicating that they were merely attending the meetings without making any suggestion.

Index for decision-making : The second index for participation considered only household participation in terms of their influence in decision-making in the location of water supply and monthly tariff. The index was constructed by giving 25 per cent weight to the influence in the location of water supply and 75 per cent weight to the influence in the monthly tariff of water supply⁴. The decision-making index represented households participation in decision-making and could be considered as active form of participation as compared to attendance in the meeting. Corroborating with the results obtained in the attendance index, more than fifty per cent of the households were not involved in the decision-making process (Table 5). Only 6.5 per cent of the households participated actively in decision-making with index value greater than 75.

Low participation in decision-making in community schemes was mainly because of the extended support of NGOs in the implementation process. In a majority of the cases, NGOs played a major role in the selection of technology for water supply and location of source. In some cases monthly tariff was also suggested by the NGOs initially. But later, beneficiary groups and committee were revising the tariff according to the cost of operation and maintenance. In the case of KWA, beneficiaries did not have any influence in the decision on location of water supply and monthly tariff. It was taken by the water authority at the state level. In the gram panchayat schemes the participation of households was very meagre.

Table 5: Distribution (%) of Households by Index for Decision-Making under Different Institutions

| Insti- tution | Index | | | | | Total |
|------------------|--------------------------|---------------------------|--------------------------------|----------------------------|------------------------------|-----------|
| | No partici- pation | Low partici- pation | Moderate partici- pation | High partici- pation | Active partici- pation | |
| CWS | 52.5 | 13.5 | 13.0 | 14.5 | 6.5 | 100 (200) |
| KWA | 100.0 | 0.0 | 0.0 | 0.0 | 0.0 | 100 (60) |
| GP | 86.0 | 8.0 | 2.0 | 4.0 | 0.0 | 100 (50) |
| Total | 67.1 (208) | 10.0 (31) | 8.7 (27) | 10.0 (31) | 4.2 (13) | 100 (310) |

Note: Figures in parenthesis indicate actual numbers

Factors Affecting Beneficiary Participation

Most of the studies on community driven water supply projects have analysed the relation between participation and project outcomes in terms of effectiveness and sustainability. Most of these studies have concluded that participation improve project outcome (Narayan 1995; Sara and Katz 1998; Isham and Kahkonen 1999, 2002; Prokopy 2005). Narayan (1995) has pointed out that the extent of beneficiary participation was determined by the characteristics of both the beneficiaries and the agencies. Two beneficiary characteristics she identified were demand and the degree to which beneficiaries were organised to their role. But, she had not tested empirically the factors affecting participation. Hence, it is worth identifying the factors which gave incentive to the households for participating in community water supply schemes in order to derive policies to implement the scheme successfully.

Consistent with Oakerson's (1992) framework discussed earlier, the present study has identified the factors which influence collective action as characteristics of the locality in which intervention had been made, characteristics of the group and the socio-economic background of the beneficiary household.

Characteristics of the locality : Geographical features and economic status of the locality were considered as the major locality characteristics pertinent to the study. Geographical character of the locality was consistent with the natural division of the state. By physical features, the state of Kerala can be divided into 3 natural divisions: (i) the low lands consisting of coastal areas, (ii) the middle land, and (iii) the high land. Since the water availability in these three types of area was different, participation of households in community-based water supply schemes vary with geographical area. It is expected that necessity of water is more in coastal and highland region and hence the participation. Economic status classifies the locality as developed and less developed. Qualitative information on the economic status was collected by considering locality's access to market, infrastructure facilities like road and electricity etc.

Group characteristics: *Group size* considers the number of members in the community group. Theoretically it is argued that large size of the group adversely affects the collective action in that group (Olson 1965; Ostrom 1990). Hence, the relation between group size and participation is expected to be negative.

Heterogeneity in caste is another important factor which affects collective action. Heterogeneity in the group can be of different nature like heterogeneity in interest, income, political affiliation, caste, class etc (Vedeld 2000). For and against arguments exist in the literature regarding the relationship between heterogeneity and collective action (Ostrom 1990; Baland and Platteau 1996; Vedeld 2000). The present study considers heterogeneity in caste.

Life span of the group measures the duration with which the group has been working. Longer period of working may influence positively to the collective action of the groups. Resilience power to overcome the conflicts and the capacity of learning by doing is the qualities commonly associated with groups of long-term survival. These long-term experiences generally make positive responses from the group members.

Leadership : It is argued that problems arise in the group due to large size, and heterogeneity can be solved with the help of effective leadership

(Vedeld 2000). The present study has classified a group with active leadership if one or two persons in the beneficiary group took the sole initiative to solve the conflicts and problems arising in the group. It is assumed that active leadership in the group advance the participation of other beneficiaries in the group.

Operational rules and accountability are the arrangements within the institution, which facilitate collective action. Olson (1965) has argued that organizational rules eased the success of collective action. Imposition of punishment for defaulting monthly tariff payment was considered as an indicator of the existence of operational rule in the group. Accountability was measured by combining two variables, namely, the receipt towards monthly tariff payment and maintenance of account book. Existence of rules and norms were expected to have a positive influence on the participation of beneficiaries in the community groups.

Household characteristics : *Size of the family*: As the size of the family increase the quantity of water needed also increase. Such a need influences the households to participate in the group meetings and decision making. The large family size increase the possibility that at least one member of the household could attend the group meeting regularly. Hence, the relation between household size and participation is assumed to be positive.

Sex of the head of the household and participant : A household being headed by a female has an added disadvantage of earning income in addition to the responsibility of managing the house. So the female headship of the household was supposed to reduce the participation in community groups. Female members of the household usually bear more hardship in fetching water. Therefore, it is assumed that if the participant of the meeting is 'female' participation in the meeting either in terms of making suggestion or influencing in decisions of water supply is higher as compared to men.

Education and Participation in other local organization : it is assumed that better education improves the awareness of public activities and hence the participation. The variable education was measured as the

percentage of household members with education higher than 10th standard. Similarly participation in local organization shows peoples' involvement in other organizations like women self help group, gram sabhas and other cultural and political organizations. It represents the strength of social capital in the locality. The study has assumed the percentage of household members involved in at least one of the local organization and assumed to be positively related to the participation.

Water availability of the household : Beneficiaries' participation in group meetings may be influenced by the difficulties that they face in fetching water. The household who did not own well and faced problem to collect water throughout the year is supposed to participate actively in group meetings.

Use of water : The purposes for which a particular household use the water supplied through the different schemes influence the participation. If the household use the water to a large extent for drinking purpose there is a possibility of higher participation.

Household infrastructure represents the *standard of living of a household*. To capture the standard of living of a household, three basic necessities were considered: type of house (*pucca* or otherwise), availability of electricity and individual sanitation facility within the household. If a particular household had *pucca* house, electricity facility and individual sanitation it was considered as having better living standard.

Occupation of the household head and per capita income : The occupation of the head of the household indicates household security in earning income. For casual workers like agricultural labourers, employment was not assured throughout the year. As casual workers and daily wage earners, their participation in meetings became more costly compared to those having regular employment. The present study has considered a dummy variable to capture the effects of occupation on participation. Higher per capita income raises the standard of living of the households. Also with higher income, it is assumed that the opportunity cost of participating in the group meeting reduces. Hence, per capita income is expected to have a positive influence on participation.

Outcome water supply schemes: Overall satisfaction and frequency of break down in water supply system: Overall satisfaction has been accounted for households' perception about the water supply scheme, whereas, frequency of damage has captured the effectiveness of water supply systems. These variables could be taken as a proxy for outcome of collective action. It has been argued that over a time, poor outcomes influence collective action adversely (Oakerson 1992; Narayan 1995). Hence, it is assumed that frequent problems with the water supply reduce people's incentive to be involved in community schemes.

Model

To test the relative importance of the factors which affected community participation in water supply schemes the following model was used.

$$P = f(L, G, H, O)$$

Where P is the participation index

L represents the characteristics of the locality

G represents the group characteristics and

H represents the socio-economic characteristic of the household

O represents the outcome of collective action

To assess the effect of each set of factors on participation it is hypothesized that

- Collective action in water supply is not associated with the socioeconomic position of water users and characteristics of the locality where intervention had been made.

The linear regression model was estimated using ordinary least square method with participation index for attendance and decision-making as dependent variables¹. All the locality, group and household characteristics were considered independent variables. The description of independent variables used in the model has been provided in Table 6.

Table 6: Description of Independent Variables

| Variable | Description | Representation of dummy variables | Frequency / Mean* | Expected sign |
|-------------------|--|--|-------------------|---------------|
| AREA | Geographical location of the household | 1 - Coastal Or Highland 0 - Midland | 46.8 | + |
| ECO_STATUS | Economic status of the locality | 1- Developed | 38.1 | + |
| GROUPSIZE | Group size | | 48 | - |
| HOMOGENEITY | Homogeneity in caste | 1 - Homogeneous | 22.6 | + |
| LIFESPAN | Number of months since the group has been formed | | 46 | + |
| LEADERSHIP | Active Leadership In the group | 1 - Active leadership | 38.1 | - |
| IMPOSE_PUNISHMENT | Imposition of punishment in the group | 1- Impose punishment | 10.6 | + |
| RECEIPT | Getting receipt for tariff payment | 1 - Yes | 51 | |
| FAMSIZE | Size of the family | | 7 | + |
| SEX_HEAD | Sex of the household head | 1 - Male | 86.5 | + |
| SEX_PARTICIPANT | Sex of the participant in the group meeting | 1 - Male | 34.5 | - |
| EDUCATION | Percentage of family members with education higher than 10 | | 13.71 | + |
| LO_PARTICIPATION | Percentage of family members participating in local organization | | 12.86 | + |
| USE_DRINKING | Water used for drinking purpose | 1 - Use water for drinking to a large extent | 42.3 | + |
| WATER | Scarcity of water | 1 - Perennial scarcity For Water | 41.9 | + |
| LIVING_STANDARD | Standard of living | 1- Better living standard | 68.4 | + |
| OCCUPATION | Occupation of the head of the household | 1 - Casual labour | | |
| PCI | Per capita income | | 13264.7 | + |
| SATISFACTION | Overall satisfaction of the scheme | 1 - Good | 73.2 | + |
| OUT_OF_ORDER | Frequency of breakdown | 1 - Never | 17.4 | + |

Note: *In the case of qualitative variables the frequency of the variable with value 1 has been given in percentages.

Results

In the first model, participation index for attendance has taken as dependent variable. The index shows the extent of households' participation in group meeting and making suggestion. The value of the index varied from 0 to 100, with 100 representing 100 per cent participation or active participation in the beneficiary group meeting. For analyzing the factors, the affecting participation index relating to attendance, only samples drawn from CWS and GP schemes were taken into consideration. Sample households from KWA schemes were omitted from the regression analysis as the household's participation in group meetings was very negligible. Only 13.4 per cent of the families participated in the group meetings and among the participants half of them had very low participation rate.

In the second model, index of participation in decision-making was taken as dependent variable. Index of decision-making also varies from 0 to 100, indicating higher the value of index, more active was the involvement in decision-making. This model was applied to the sample drawn only from CWS schemes as the participation index in decision-making was low or nil in the case of households which had benefited from KWA and GP schemes.

Initially, both the models were estimated with all the independent variables mentioned above. In the later stage, insignificant variables were omitted² from the model by doing a stepwise analysis. Estimated models and results after omitting the insignificant variables have been given below.

Model 1

$$pindex1 = \beta_0 + \beta_1 area + \beta_2 leadership + \beta_3 famsize + \beta_4 sex_head + \beta_5 sex_participant + \beta_6 education + \beta_7 lo_participation + \beta_8 use_drinking + \beta_9 water + \beta_{10} pci + \beta_{11} satisfaction + u_i$$

Table 7: Factors Affecting Participation in Attendance in the Group Meeting

| Dependent variable: Participation index for attendance in the meeting | | | |
|---|-------------|----------------------|-------------|
| Variable | Coefficient | Std. Error | t-Statistic |
| C | 3.09 | 10.42 | 0.30 |
| AREA | -6.25 | 3.96 | -1.58 |
| LEADERSHIP | -6.08 | 3.80 | -1.60 |
| FAMSIZE | 3.05*** | 0.66 | 4.64 |
| SEX_HEAD | 9.02* | 5.21 | 1.73 |
| SEX_PARTICIPANT | 10.79** | 4.04 | 2.67 |
| EDUCATION | 0.31*** | 0.10 | 3.06 |
| LO_PARTICIPATION | 0.56*** | 0.13 | 4.32 |
| USE_DRINKING | 13.59*** | 4.23 | 3.21 |
| WATER | -19.29*** | 6.17 | -3.12 |
| PCI | 0.00045* | 0.00 | 1.87 |
| SATISFACTION | 5.05 | 4.23 | 1.19 |
| <i>R-squared</i> | 0.29 | <i>F-statistic</i> | 8.74* |
| <i>Adjusted R-squared</i> | 0.25 | <i>D-W statistic</i> | 1.92 |
| N = 250 | | | |

Note: *, **, *** Significant at 10 per cent, 5 per cent, 1 per cent level respectively

Model 2

Table 8: Factors Affecting Participation in Decision-Making

| Dependent variable: participation index for decision-making; | | | |
|--|-------------|----------------------|-------------|
| Variable | Coefficient | Std. Error | t-Statistic |
| C | -15.27 | 13.95 | -1.09 |
| AREA | -5.92 | 4.88 | -1.21 |
| LIFESPAN | 0.21 | 0.14 | 1.46 |
| IMPOS_PUNISHMENT | -13.18* | 7.19 | -1.83 |
| FAMSIZE | 2.31*** | 0.76 | 3.05 |
| SEX_HEAD | 7.82 | 5.91 | 1.32 |
| SEX_PARTICIPANT | 10.73** | 4.51 | 2.38 |
| EDUCATION | 0.34*** | 0.12 | 2.98 |
| LO_PARTICIPATION | 0.51*** | 0.15 | 3.29 |
| USE_DRINKING | 13.76** | 4.98 | 2.76 |
| WATER | -17.83** | 7.73 | -2.31 |
| PCI | 0.0005* | 0.00 | 1.89 |
| <i>R-squared</i> | 0.26 | <i>F-statistic</i> | 6.11* |
| <i>Adjusted R-squared</i> | 0.22 | <i>D-W statistic</i> | 1.80 |
| N = 200 | | | |

Note: *, **, *** Significant at 10 per cent, 5 per cent, 1 per cent level respectively

Influence of locality characteristics on participation : The analysis shows that locality characteristics did not influence beneficiary participation in group meetings and decision-making. The variable, economic status of the locality was insignificant, indicating that people did participate in beneficiary group meetings irrespective of the development status of the locality. The geographical area also was not showing any association with the participation of members in BG meeting implying that households in the coastal, midland and highland areas participated alike in the beneficiary group meetings.

Influence of group characteristics on participation : None of the group characteristics significantly influenced participation of beneficiaries in BG meetings and decision-making except in the case of imposition of punishment. Insignificant relationship of heterogeneity in castes implied that the existence of different caste in a particular group could not influence the beneficiary participation adversely. In other words, there was no caste based discrimination among the beneficiaries in the group. One of the reasons for this was the good educational level attained by the people in Kerala.

There was no difference in beneficiary participation both in small and large groups. The result of the study differed from that of earlier studies which established that in larger groups collective action became less effective. Existence of active leadership in the group was also not influencing the participation. Active leadership in the group showed a negative and insignificant relationship with the participation in the attendance of the group meetings. This might be because of the free riding mentality of the other members in the group. Existence of active leaders to solve the entire problems encountered in the group could reduce the involvement of other members in the meetings. Among the operational rules the imposition of punishment and distribution of receipt were not significantly influencing the rate of attendance in the meetings. But, imposition of punishment showed a significant and negative relationship with rate of participation in decision-making. Punishment

was imposing on those beneficiaries who defaulted the payment of monthly tariff. So, there was possibility that those who were punished for defaulting tariff might not attend the group meeting further or they didn't have any influence in deciding the monthly tariff.

Influence of household characteristics: Household characteristics were relatively more influential on the rate of participation in both attendance and decision-making. But, among the household characteristics, living standard of the households, occupation of household head and percentage of earners in a family were highly insignificant.

Family size was strongly associated with the participation of beneficiaries in group meeting as well as in decision-making. The estimated elasticity of participation (Table 9) with respect to family size shows that as the size of the family increased by one per cent, participation in attendance increased by 0.63 per cent and participation in decision-making by 0.96 per cent. Sex of the household head was another influencing factor affecting participation. The result shows that male headed households participated more in group meetings compared to the female headed households. Rate of participation in attending the meetings of the male headed households was higher by 9 per cent as compared to the female headed households. But, the gender of household head did not influence the rate of participation in decision-making. The sex of the participant as such was also an influential factor in deciding the rate of participation in attendance and decision-making. The results show that male participants' participation was more in group meetings and decision-making as compared to female participants. This was opposite to the common notion that in water related issues women had more influence as women suffered more in fetching water. But it was found that women got marginalized in beneficiary meetings even if the participation of the male members was only 34.5 per cent among the sample households.

Table 9: Elasticity of participation in attendance in the meeting and decision making

| Variable | Elasticity of participation in attendance in the BG meeting | Elasticity of participation in decision making | |
|--|---|--|-------|
| Life span | - | 0.583 | |
| Family size 0.630 | 0.961 | | |
| Percentage of family members with education >10 | 0.128 | 0.281 | |
| Percentage of family members participating in local organization | 0.213 | 0.396 | |
| Per capita income | 0.179 | 0.398 | |
| | High income | 0.270 | 0.615 |
| | Middle income | 0.126 | 0.234 |
| | Low income | 0.060 | 0.127 |

The percentage of family members with education greater than 10th standard and percentage of members involved in local organization were the other two important variables influencing participation. Both variables represented the social capital of that household. Social capital was considered as an important social condition that can facilitate coordinated action between individuals (Blomkvist and Swain 2001). Elasticity of participation with respect to educational level of the households show that as the level of education increased by one per cent the rate of participation in attendance increased by 0.13 per cent and influence in decision-making increased by 0.28 per cent. Similarly, increase in the number of family members involved in other local organizations increased participation in BG meetings. The elasticity of participation in water user groups with respect to participation in other local organization shows that one per cent increase in the participation in other LOs, enhanced the attendance in group meetings by 0.22 per cent and decision-making by 0.40 per cent.

The purpose for which water was used had higher influence on participation rate as compared to all other variables. As per regression results, if the household was using water for drinking purpose, to a large extent, their participation rate in the group meeting increased by 13 per cent. But, the water scarcity of the household decreased the participation rate by 19 per cent. One of the reasons for this might be that a majority of the households facing water scarcity fell under low income category with a per capita income of Rs. 2000 to Rs.12000 (Table 10). Hence, participation of these households in the BG meetings was costly and involved high opportunity cost for the beneficiaries.

Table 10: Distribution (%) of Household by Water Scarcity and Per capita Income

| Water availability | low per capita income In rupees (2000-12000) | high per capita income In rupees (>12000) | Total |
|--------------------|--|---|-----------|
| No problem | 35.3 | 64.7 | 100 (17) |
| Water scarcity | 62.3 | 37.7 | 100 (183) |
| Total | 60.0 (120) | 40.0 (80) | 100 (200) |

Note: Figures in parenthesis indicate actual numbers

The above argument can be reinforced by the relationship between per capita income and participation rate. Results show that as *per capita* income increased participation rate also increased, but by infinitely small per cent. Elasticity of participation with respect to per capita income shows that as income increased by one per cent, rate of participation in attendance increased by 0.18 per cent and influenced in decision-making by 0.40 per cent. Computation of elasticities for low, middle and high income categories shows that influence of higher income group in decision-making was very high as compared to low income category (elasticities were: low income - 0.13; middle income - .23 and high income – 0.62). It shows that those who influenced the decision of location of water supply and tariff, to a large extent, belonged to high income category.

Stepwise regression analysis of both the models shows that among different set of variables, household characteristics were the sole important factor which influenced participation. Within the household characteristics, sex of the participant in group meetings and the educational level of the households were the most important variables influencing the rate of participation and decision-making.

None of the outcome variables were significantly influencing the rate of participation in group meetings as well as decision-making. The possible reason for this was that once the beneficiaries were satisfied with the existing arrangement, their interest in participating in the group meeting reduced, provided that there was no departure from the existing arrangement at any given time.

Summary and Conclusions

The study has tried to find out the factors affecting community participation in rural water supply schemes using primary data collected from 200 households in Malappuram district, Kerala. Indices of participation were prepared to capture the rate of participation in beneficiary group meetings of community-based water supply schemes. Two forms of indices were constructed - to capture the participation, in general, and the extent of involvement in decision making. In both cases, distribution of households by participation index shows that percentage of households actively participating in group meetings and in decisionmaking was less.

Separate regression models were estimated in order to identify the factors affecting participation. In the first model, participation index for attendance was taken as dependent variable and variables representing locality, group and household characteristics were taken as explanatory variables, whereas the second model considered participation index for decision-making as dependant variable. Among the three sets of factors, the analysis shows that household characteristics were the most influential in affecting collective action. Within the households' characteristics, sex of the participant as well as the educational level had the most important bearing on participation. The analysis shows that male participants had

active participation in group meetings as compared to their female counterpart. Similarly, participation increased with households' level of education and involvement in other local organisations. Per capita income of the household had negligible impact on participation. But, among different income class households, the higher income category of households had a larger influence on the decision-making. Contrary to the expectation, the water scarcity of the household negatively influenced the participation in group meetings. While considering the basic hypothesis of the study, we accept that there is no relationship between community participation and geographical characteristics of the locality. However, beneficiary participation is influenced by household characteristics.

The results of the study show some deviation from the existing literature on collective action. Studies on collective action and resource management emphasized the importance of group characteristics like, size of the group, homogeneity in the group, presence of active leadership and organizational rules in the success of collective action (Olson 1965; Baland and Platteau 1996; Vedeld 2000). But, none of the group characteristics significantly influenced the participation of beneficiaries in the rural water supply schemes. Physical characteristic of the locality was also not showing any association between participation in the meeting and decision-making. Insignificance of group characteristics in this study may be mainly due to the resource specific features of the product under consideration. In this study, water supply, as a resource, provided less incentive for participation compared to other resources. In water supply context, once the system was installed and functioning without any interruption, it was observed that households' were less interested to participate in the meetings. Increased water demand of the households mainly drives them to participate in the community-managed schemes. As it is mentioned in the beginning majority of the households in the state depend on own well for domestic water needs. Piped water supply in most of the cases is only a supplementary to private own wells of households especially in summer season. This also may contribute positively to the high significance of household characteristics.

Narayan (1995) has mentioned that the main reason for lack of participation in large scale was the unwillingness to frame the issue in institutional terms. She has argued that boiling down the issue of water supply to merely a technical problem reduce the participation. In such circumstances, participation became an add-on task which could be taken up whenever it was convenient and required for the participants. But community-based water supply institutions can empower the people through developing their capacity in various social interfaces during their participation in these institutions. Especially poor sections of the society can be significantly benefited from the socialising and empowering capacities of these community-based institutions. Hence, considering community-based water supply institutions as an option for social development can lead to better outcomes.

Notes

¹ A beneficiary group area consists of 70 to 150 households, including users and non users of community water supply schemes. So, one beneficiary group area is considered as a locality.

² Since influence in decision-making in two particular issues specific to the water supply context was considered in the construction of indices, the influence in decision-making, in general, has not been taken into consideration.

³ Weights were calculated using DEFINITE package by giving first preference ranking to making suggestions in the meetings and second to the mere attendance following the typology of Agarwal (2001). Agarwal has argued that consultative form of participation (being asked an opinion on specific matters without guarantee of influencing decisions) is the higher level of participation compared to passive participation (attending the meeting and listening in on decision-making without speaking up).

⁴ The decision on the location of water supply was mainly of technical in nature whereas decision on monthly tariff reflected the household's willingness and capacity to pay for water. In the case of community-managed schemes, engineers of supporting organizations mainly helped the beneficiaries with regard to location of water supply. Decision on location of water supply was taken once in the entire lifespan of the group. But, the decision on monthly tariff needed frequent revision,

with the changes in the cost of operation and maintenance, even though NGOs influenced the decision on monthly tariff in the initial stages. For this reason, the variable named influence in location of water supply was assigned less weight.

⁵ In strict statistical terms, this is not advisable for two reasons. First, classical linear regression model assumes dependent variable is stochastic in nature. While preparing the index, the present study combined two or more qualitative variable. Combining two or more qualitative variables will lead to loss of randomness associated with the original variables. Second, if the index is used as a dependent variable in regression model, the interpretation cannot be exactly like that in the case of OLS or logit models. The study has continued to use participation as a dependent variable in order to get a comprehensive picture of factors affecting participation and draw policy implications. However, while interpreting the results particular attention has given to address the second problem.

⁶ Variables were omitted by considering the following criteria: 1) multicollinearity among the variables; 2) significance level of chi-square statistics in cross tabulation of particular variable with dependent variable (The chi-square test in cross tabulation measures the discrepancy between the observed cell counts and what one would expect if the rows and columns were unrelated. If two sided asymptotic significance of the chi-square statistic is greater than 0.10, it implies that the differences in two variables are due to chance variation.); and 3) contribution of particular variable to the explanatory power of the model is not significant (variable is omitted if adjusted R-square increased after the omission of that variable from the model).

References

- Agarwal, Bina (2001). Participatory Exclusions, Community Forestry and Gender: An Analysis for South Asia and a Conceptual Framework, *World Development*, 29 (10): 1623 - 48
- Baland, J. M. and J. P. Platteau (1996). *Halting Degradation of Natural Resources: Is there a Role for Rural Communities?* Oxford: FAO/Clarendon Press
- Bardhan, Pranab (1993). Symposium on Management of Local Commons. *Journal of Economic Perspectives*, 7, (4): 87-92
- Blomkvist, Hans and Ashok Swain (2001). Investigating Democracy and Social Capital in India. *Economic and Political Weekly*, XXXVI (8): 719-31
- Briscoe, John (1996). Water as an Economic Good: the Idea and What it means in Practice. A Paper Presented at the *World Congress of the International Commission on Irrigation and Drainage*, Cairo, September.

- Isham, Jonathan, Deepa Narayan and Lant Pritchett (1994). Does Participation Improve Performance?: Empirical Evidence from Project Data. *World Bank Policy Research Working Paper*, No. 1357, Washington D.C: The World Bank
- Isham, Jonathan and Satu Kahkonen (1999). What Determines the Community-Based Water Projects. Evidence from Central Java, Indonesia, on Demand Responsiveness, Service Rules and Social Capital. *Social Capital Initiative Working Paper*, No.4. Washington D C: The World Bank.
- Isham, Jonathan and Satu Kahkonen (2002). Institutional Determinants of the Impacts of Community –Based Water Services: Evidence from Sri Lanka and India. *Economic Development and Cultural Change*, 50(3): 667-91
- Kerr, J. (2002). Watershed Development, Environment Services, and Poverty Alleviation in India. *World Development*, 38(8): 1387-1400.
- KRWSA (2000). *Project implementation Plan*, Thiruvananthapuram: Kerala Rural Water Supply and Sanitation Agency
- McCarthy, Nancy, Céline Dutilly-Diané, and Boureima Drabo (2002). Cooperation, Collective Action in Natural Resources Management in Burkina Faso: a Methodological Note. *CAPRI Working Paper No. 27*. Washington D.C: International Food Policy Research Institute
- Meinzen-Dick, Ruth, K.V. Raju and Ashok Gulati (2002). What Affects Organization and Collective Action for Managing Resources? Evidence from Canal Irrigation Systems in India, *World Development*, 30 (4): 649 - 66
- Musgrave, Richard A. and Peggy B. Musgrave (1976). *Public Finance in Theory and Practice* (2nd Edition). Tokyo: MacGraw – Hill Kongakusha Ltd
- Narayan, Deepa (1993). Participatory Evaluation, Tools for Managing Change in Water and Sanitation. *World Bank Technical Paper No. 207*, Washington D. C: The World Bank.
- Narayan, Deepa (1995). The Contribution of People's Participation: Evidences from 121 Rural Water Supply Projects. *Environmentally Sustainable Development Occasional Paper Series No. 1*. Washington D. C: The World Bank
- North, Douglass C. (1981). *Structure and Change in Economic History*. New York: Norton.
- Oarkerson, J. R. (1992). Analyzing Commons: A Framework. In Daniel Bromley (ed.), *Making the Commons Work*. San Francisco, California: ICS Press.

- Olson, Mancur (1965). *Logic of Collective Action: Public Goods and the Theory of Groups*. Cambridge: Harvard University Press.
- Ostrom, Elinor (1990). *Governing Commons - The Evolution of Institutions for Collective Action*. Cambridge: Cambridge University Press.
- Prokopy, Linda, Stalker (2005). The relationship between participation and project outcomes: evidence from rural water supply project in india, *World Development*, 33 (11) 1801-19.
- Rajasekhar, D and Veerashankarappa (2003) Role of local Organization in Water Supply and Sanitation Sector: a Study in Karnataka and Uttaranchal States, India, World Bank Project on Roles of Rural Local Organization, Bangalore: ISEC.
- Saleth, R. Maria and Ariel Dinar (2004). *The Institutional Economics Of Water: A Cross-Country Analysis Of Institutions And Performance*. Cheltenham, Edward Elgar publishing for The World Bank.
- Sara, Jennifer and Travis Katz (1998). *Making Rural Water Supply Sustainable: Report on the Impact of Project Rule*. UNDP: World Bank Water and Sanitation Programme.
- Singh, Katar (1992). Workshop Report: People's Participation in Natural Resources Management. *Working Paper, No.8*. Anand: Institute of Rural Management
- State Planning Board (2002). *Report on Kerala Water Authority*, Thiruvananthapuram: Government of Kerala
- Uphoff, Norman (1999). Understanding Social Capital: Learning from the Analysis and Experience of Participation. In Partha Dasgupta and Ismail Serageldin (eds.), *Social Capital: A Multifaceted Perspective*. Washington D.C: The World Bank.
- Vedeld, Trond (2000). Village Politics: Heterogeneity, Leadership and Collective Action. *The Journal of Development Studies*, 36(5): 105-34
- Wade R. (1988). *Village Republics - Economic Condition for Collective Action in South India*. Cambridge: Cambridge University Press.