Assessing Farmers’ Willingness to Participate in Campaign-Based Watershed Management: Experiences from Boset District, Ethiopia

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Abstract: This study assessed farmers’ perceptions of the outcomes of the Campaign-Based Watershed Management (CBWM) program in Ethiopia, and how this influences their willingness to participate in the program. Key informant interviews, a household survey, and the Google Earth Engine were used to collect and analyze the relevant data. Results show that farmers’ perceived outcomes of the CBWM program hardly motivated them to participate in the program. Particularly, farmers were not motivated by the physical effects of the program, because of the limited direct benefits to individual households, and destruction of previously developed micro-watersheds by frequent runoff and human and animal disturbances. Similarly, farmers were not motivated by the economic effects of the program, because of the limitations/absence of benefit-sharing mechanisms and resultant conflicts among farmers. The only motivating outcome of the program concerned its effect on personal capacities, which was particularly appreciated in localities that were vulnerable to erosion. The results of the study suggest the need to (1) better integrate actions at watershed level to come to effective water runoff control, (2) enhance the participation of all local actors to come to more effective area closure initiatives with transparent benefit-sharing mechanisms, and (3) give much more emphasis to capacity building as a cross-cutting component in the program. Hence, in order to enhance the willingness of farmers to genuinely participate in the CBWM, the program should adopt a more participatory and integrated approach.

Keywords: mass mobilization; soil and water conservation; outcomes; perceptions; willingness; Ethiopia

1. Introduction

Watershed management approaches became prominent in developing countries in the 1970s and 1980s in programs designed to manage soil and water resources through conservation measures [1,2]. The achievements of these programs have been measured in terms of quantity of soil and water conservation (SWC) structures. In Ethiopia, some success stories were documented, particularly with regards to the lengths of SWC structures and area of land enclosed for regeneration during the Derg regime—a communist government that ruled Ethiopia between 1974 and 1991 [3,4]. For instance, between 1976 and 1985, some 600,000 km of soil and stone bunds and 470,000 km of hillside terraces were constructed through campaign works. During the same period, 80,000 ha of steep slopes were enclosed for regeneration [5,6]. However, this initiative was not sustainable, mainly because little attention was given to rural livelihoods, and views and perceptions of farmers [5].

The current government has continued with campaign works as part of the national Campaign-Based Watershed Management (CBWM) program since 2011/12. The program is
carried out at the level of Kebele/village (the smallest administrative unit in Ethiopia, similar to a ward) administrative boundaries by means of mass mobilization of farmers. Given a shift in watershed management to a more comprehensive approach integrating both resource conservation and rural livelihood development in developing countries since 1990s [1], the program adopted community-based participatory watershed development as its main guiding principle [3]. The CBWM program seeks to cover a large area in a short period of time, to minimize costs, and to ensure farmers’ ownership of the program. It has three main elements: (1) identify one or more micro-watersheds every year, (2) construct SWC structures and plant tree seedlings in the micro-watersheds, and (3) enclose the micro-watersheds and hand them over to associations who will use, protect, or maintain the micro-watersheds. The government has been reporting success stories in terms of the area of land covered, lengths of SWC structures, and numbers of tree seedlings planted. However, a study that comprehensively assesses outcomes of the CBWM program is not available, as the existing empirical evidence on Ethiopia generally focuses on outcomes of project-based interventions that are carried out through food-for-work payments or incentives [4,7–9]. Equally important as qualitative outcomes are the actors’ perception of these outcomes, given that this often determines subsequent successful collective action [10–13] and sustainable land management [14,15]. Hence, next to quantifying outcomes, it is indispensable to also assess farmers’ perceptions of outcomes of watershed management initiatives. Though mass mobilization remains an essential strategy to engage farmers, the relationship between farmers’ perceptions of previous outcomes of the CBWM program and their willingness to participate in the program has never been assessed so far. This paper aims at filling this gap, and explores how farmers’ perceptions of physical works as well as changes in biophysical and socio-economic conditions influence their willingness to participate in the program.

2. Conceptual Framework of the Study

The CBWM program is a collective watershed management initiative since it relies on the mass mobilization of farmers for labor contribution. Considering this, selected literature on the effects of collective action in environmental rehabilitation activities [16,17] was examined to guide an assessment of the linkage between farmers’ perceived outcomes of the CBWM program and its implication for their willingness to participate in the program. However, a more specific conceptual framework that explains this relationship was not found. Much SWC-related research in Ethiopia is fragmented, focusing on biophysical [18–20] and economic returns [21–23] of project-based SWC structures. Hence, a more contextual conceptual framework is developed based on the collective action literature, SWC-related empirical evidence in Ethiopia, objectives of the CBWM program, and farmers’ expected outcomes of the program. The framework succinctly explains how different outcomes of a CBWM program are related to each other, and how this influences farmers’ willingness to participate in the program, as shown in Figure 1.

The framework shows that a CBWM program results in three outcomes: executed physical works, change in biophysical conditions, and change in socio-economic conditions. The program initially results in the physical works, which encompasses the lengths and quality of SWC structures as well as number and quality of tree seedlings planted in the micro-watersheds. Biophysical conditions involve the outcomes of the CBWM program in terms of controlling runoff, moisture retention, soil fertility improvement, and vegetation cover. The contribution of the program to biophysical conditions is dependent on the physical works. Socio-economic conditions could be short-term outcomes of the CBWM program such as farmers’ access to communal grazing land, access to grass, knowledge and skills, income from the sale of grass, and replication of the program to other localities. In the long-term, improved biophysical conditions could contribute to the improvements of agricultural production and productivity, which enhances socio-economic conditions of farmers. The framework indicates that farmers’ perceptions of the aforementioned outcomes will influence their willingness to participate in the program.
Figure 1. Linkage between outcomes of the Campaign-Based Watershed Management (CBWM) program and farmers’ willingness to participate in the program.

3. Materials and Methods

3.1. Study Area

This study was carried out in Boset District in the Central Rift Valley of Ethiopia. The District has experienced an increase in soil erosion rates over the past decades, with annual rates of 31 t ha$^{-1}$ in 1973 and 56 t ha$^{-1}$ in 2006 [24,25]. Among the 33 rural Kebeles in the District, Ararso-Bero, Sara-Areda, and Qachachule-Guja were selected based on their performance in the CBWM program. According to Reference [26], Ararso-Bero is the best performing Kebele in the District, while Sara-Areda and Qachachule-Guja are moderate and weak, respectively, when considering ownership, quality, and quantity of watershed management activities as criteria. These Kebeles are adjacent to each other and there has not been another environmental rehabilitation initiative in the Kebeles, other than the CBWM program.

3.2. Methods of Data Collection

In order to collect the data, a mixed research method was employed. Key informant interviews and a household survey were conducted between August 2016 and February 2017. Google Earth Engine was also used to estimate some outcomes (area of micro-watersheds, lengths of SWC structures, vegetation cover). Subsequent paragraphs describe specific methods employed for data collection.

Key informant interviews were conducted to assess local actors’ view of the outcomes of the CBWM program, focusing on quality of physical works, biophysical conditions, and socio-economic conditions. Interviews were conducted with 28 purposively selected informants partaking in the CBWM program including experts at the Boset District Natural Resource Management and Protection Unit, a local supervisor, Kebele administrators, extension workers, leaders of development teams, and village elders. They were selected based on their degree of influence and involvement in the program as well as their availability during fieldwork.

The household survey largely drew on input data obtained from key informant interviews. It was used to assess the perspectives of farmers, focusing on farmers’ rating of the quality of physical works as well as changes in biophysical and socio-economic conditions. It was also used to assess farmers’ willingness to participate in the program. A structured draft questionnaire was developed and pilot
tested in the field. Necessary adjustments were made to the final version of the questionnaire based on the lessons obtained from the pilot study. Both the pilot study and actual survey were conducted by six trained data collectors, and household heads were the main respondents of the questionnaire. A proportionate stratified systematic sampling technique was used to select 351 households (125 from Ararso-Bero, 122 from Sara-Areda, and 104 from Qachachule-Guja) from 4068 households living in the three Kebeles (1449 in Ararso-Bero, 1414 in Sara-Areda, and 1205 in Qachachule-Guja).

Google Earth Engine was used to estimate the area of micro-watersheds, lengths of stone bunds and soil bunds, and change in vegetation cover using images taken in 2009 and 2016.

3.3. Methods of Data Analysis

3.3.1. Outcomes of the CBWM Program

The analysis of outcomes of the CBWM program was based on data obtained from key informant interviews and Google Earth Engine to substantiate the views of the informants. Data obtained from the key informant interviews were organized into themes following interview guides and a separate transcription report of the results was prepared. Descriptive statistics were used to present areas of micro-watersheds, lengths of SWC structures, and vegetation cover.

3.3.2. Farmers’ Perceptions of Outcomes of the CBWM Program

Factor analysis was used to extract some concrete uncorrelated factors or latent variables from 15 items that assessed farmers’ perceived outcomes of the CBWM program, as shown in Table 1. The items were mainly obtained from the key informant interviews that preceded the household survey (see Section 4.1). Kaiser–Meyer–Olkin measure of sampling adequacy (KMO) and Bartlett’s test were carried out to explore if using factor analysis was appropriate for the data at hand [27]. The KMO was highly promising with 0.849 (>0.5 is acceptable), and Bartlett’s test of sphericity also showed that the correlation matrix is appropriate for factor analysis ($\chi^2 = 2406.65, p = 0.000$) [27].

Table 1. Description of indicators of farmers’ perception of outcomes. SWC: soil and water conservation.

| No. | Households’ Perceived Outcomes                  | Values | Mean | Range |
|-----|-----------------------------------------------|--------|------|-------|
| 1   | Quality/proper construction of SWC structures | 0      | 0.98 | 2     |
| 2   | Compatibility/appropriateness of planted tree seedlings | 1      | 0.86 | 2     |
| 3   | Survival of planted seedlings                 | 2      | 0.93 | 2     |
| 4   | Effect on runoff control                      | 3      | 1.30 | 2     |
| 5   | Effect on moisture retention                  | 4      | 1.25 | 2     |
| 6   | Effect on soil fertility improvement          | 5      | 1.34 | 2     |
| 7   | Effect on vegetation cover                    | 6      | 1.25 | 2     |
| 8   | Obtained knowledge                            | 7      | 0.69 | 1     |
| 9   | Obtained skill                                | 8      | 0.76 | 2     |
| 10  | Constructing SWC structures on their own      | 9      | 0.44 | 2     |
| 11  | Access to communal land                       | 10     | 0.75 | 2     |
| 12  | Access to grass                               | 11     | 0.93 | 2     |
| 13  | Income (birr)                                 | 12     | 0.05 | 2     |
| 14  | Size of farmland                              | 13     | 1.33 | 1     |
| 15  | Size of grazing land                          | 14     | 1.00 | 2     |

A varimax orthogonal rotation method was used to select and include indicators that have higher factor loading (i.e., greater than 0.4) to the newly identified factors or latent variables [28]. Each factor was attributed a name according to the set of indicators it encompasses. Eigenvalue (>$1$) was used to determine the number of factors to extract. A scree plot was used to examine the
3.3.3. Farmers’ Willingness to Participate in the CBWM Program

Farmers’ willingness to participate in the CBWM program was determined by asking each farm household to rate (0 = Strongly disagree, 1 = Disagree, 2 = Agree, 3 = Strongly agree) to what extent they agree with the following seven items. The items were mainly obtained from the key informant interviews that preceded the household survey and were refined based on pilot household survey results.

- I found trainings given before starting campaign works useful and valuable.
- I have a firm belief that the CBWM program contributes to ecosystem restoration or livelihood improvement.
- I am in favor of the construction of SWC structures on my farmland and communal land that I am using.
- I have been enthusiastically contributing labor for campaign works.
- Since I have been in favor of the CBWM program, I have been using my own working tools during campaign works.
- I have been participating in the CBWM program by my own initiative; not because of external pressure or persuasion.
- I have been eagerly contributing to the maintenance and protection of micro-watersheds.

Cronbach alpha was used to assess reliability or internal consistency of the items. The Cronbach alpha value for these items was 0.7; values from 0.7 to 0.9 are considered a good indicator of the reliability of items in a composite measure [29]. Next, a willingness score was calculated for each household by summing responses to each item. One-way ANOVA was used to show the difference in willingness level across the studied Kebeles. Data obtained from the key informant interviews were used to substantiate the result of the household survey.

3.3.4. Relationship between Households’ Perceived Outcomes of the CBWM Program and Their Willingness to Participate in the Program

Spearman’s partial correlation coefficients ($r_s$) were used to determine the influence of farmers’ perceived outcomes of the CBWM program on their willingness to participate in the program. This test is more appropriate for ordinal or scale variables that do not satisfy the assumptions of linearity and bivariate normality [30]. More importantly, it enables the assessment of the net effect of an independent variable on the dependent variable, by controlling the effects of other variables (i.e., control variables). In this study, Spearman’s correlation coefficients ($p < 0.05$) were used to select four control variables out of variables that influence farmers’ willingness or motivation [31,32]. The control variables were (1) households’ perception of watershed degradation, (2) households’ distance from micro-watersheds, (3) social capital, and (4) performance of Kebele administrators. A rule of thumb suggested by Reference [33] was used to interpret the strength of the correlation coefficient ($0.80$ to $1.00$ ($-0.80$ to $-1.00$) very strong positive (negative) correlation; $0.60$ to $0.79$ ($-0.60$ to $-0.79$) strong positive (negative) correlation; $0.40$ to $0.59$ ($-0.40$ to $-0.59$) moderate positive (negative) correlation; $0.20$ to $0.39$ ($-0.20$ to $-0.39$) weak positive (negative) correlation; $0.00$ to $0.19$ ($0.00$ to $-0.19$) very weak positive (negative) correlation).

4. Results

This section is divided into three parts. The first part describes the outcomes of the CBWM program (between 2011/12 and 2015/16) focusing on the executed physical works as well as biophysical and socio-economic conditions. The second part presents farmers’ perceptions of these
outcomes of the program. The last part describes farmers’ willingness to participate in the program (in 2015/16).

4.1. Outcomes of the CBWM Program

4.1.1. Executed Physical Works

Data obtained through Google Earth Engine show that SWC structures were constructed on 192.17 ha within the studied micro-watersheds (153.61 ha communal land, 38.56 ha farmland) in the past five years. Of this total, 82.61 ha (54.17 ha in Ararso-Bero, 28.44 ha in Sara-Areda) was enclosed and handed over to associations who use, protect, or maintain the micro-watersheds. Tree seedlings were planted in the enclosed micro-watersheds every year.

**SWC structures:** During the year preceding this study, stone bunds were constructed in Ararso-Bero and Sara-Areda, mainly on communal land, and soil bunds were constructed in Qachachule-Guja on farmlands. Analysis of Google Earth images taken in April 2016 indicates that some 29.86 km of SWC structures were found on the micro-watersheds that were developed in the past five years, as shown in Table 2. However, experts in the district, the supervisor, and extension workers stated that the construction of SWC structures has been below technical standards in almost all localities in the study *Kebeles*. Extension workers particularly stated that the main focus of the program was to mobilize as many farmers as possible to construct a large quantity of SWC structures in a short period of time at the expense of quality. They stated that quality has not been given due attention in reporting achievement and evaluating outcomes since the inception of the program.

| *Kebeles*          | Year Constructed | Total     |
|--------------------|------------------|-----------|
|                    | 2011/12 | 2012/13 | 2013/14 | 2014/15 | 2015/16 |
| Ararso-Bero        | 2.46    | 1.73    | 1.85    | 3.04    | 2.29    | 11.37   |
| Sara-Areda         | 1.38    | 0.50    | 2.26    | 0.39    | 1.21    | 5.74    |
| Qachachule-Guja    | 1.45    | 2.15    | 1.61    | 1.75    | 5.79    | 12.75   |
| Total              | 5.29    | 4.38    | 5.72    | 5.18    | 9.29    | 29.86   |

*Tree seedlings:* In order to assess the number of seedlings that were planted in 2015/16, the sample households were asked to estimate the number of seedlings they had planted. Numbers obtained from the sample households were multiplied by the total household population in each *Kebele* and then divided by sample households. Accordingly, it was estimated that a total of 67,841 (31,333 in Ararso-Bero, 35,327 in Sara-Areda, and 1181 in Qachachule-Guja) tree seedlings were planted in the three *Kebeles*. But extension workers, *Kebele* administrators, and leaders of development teams stated that tree seedlings that have been planted since the inception of the program hardly survived. According to the extension workers, this was attributed to incompatibility of the seedlings to the agro-ecological conditions of the *Kebeles*, poor handling of the seedlings during plantation, and absence of proper care after planting the seedlings.

4.1.2. Change in Biophysical Conditions

The program generated some **short-term** (e.g., runoff control and moisture retention) and **medium-term** (e.g., vegetation cover and soil fertility improvement) biophysical outcomes.

- Short-term outcomes

According to leaders of development teams and village elders in Ararso-Bero, stone bunds have reduced runoff on communal lands and adjacent farmlands. They also stated that this indeed has contributed to moisture retention, particularly on farmlands. However, the informants were concerned about frequent runoff from upstream neighboring *Kebeles*. Similarly, for leaders of development
teams, extension workers, and village elders in Sara-Areda, the program has substantially contributed to runoff control and moisture retention in and around the micro-watersheds on communal land. In Qachachule-Guja, however, extension workers and leaders of development teams indicated that the contribution of the program to runoff control on communal land has been quite limited because of the complete destruction of the SWC structures and planted tree seedlings. They related this to severe runoff water coming down from neighboring Kebeles, and yet absence of maintenance and conservation practices.

- **Medium-term outcomes**

An improvement of vegetation cover was one of the medium-term outcomes revealed by the key informants. In Ararso-Bero and Sara-Areda, leaders of development teams and village elders noted that the barren land has changed into green vegetation in micro-watersheds that were successfully enclosed. They related this change to the regeneration of natural species. The informants also stated that vegetation cover improved weather conditions and precipitation around the micro-watersheds, attracted wild animals, and enhanced the availability of grasses and woods. Data obtained through Google Earth Engine indicates that the coverage of grassland was reduced while the coverage of forestland was increased in Ararso-Bero. This was opposite in Sara-Areda, as shown in Figure 2. In Qachachule-Guja, all key informants stated that the program has had very limited contribution to the improvement of vegetation cover. Particularly, extension workers stated that the program has exacerbated land degradation because of the increased competition among farmers to use and/or fence off a portion of the micro-watersheds. But as seen in Figure 2, the coverage of forestland increased, most probably because farmers who fenced off portions of the micro-watersheds were better conserving the land.

![Figure 2. Percentage change in vegetation cover: (a) grassland; (b) forestland.](image)

The other important medium-term outcome revealed by the key informants was soil fertility improvement. In Ararso-Bero, the extension workers, leaders of development teams, and village elders highlighted an improvement of soil fertility on farmlands that are adjacent to the communal lands. They cited an improvement of crop productivity (e.g., sorghum) on plots where the bunds constructed effectively controlled runoff. Some village elders particularly stated that the productivity of such plots is comparable to those treated by fertilizers. Similarly, village elders and leaders of development teams in Sara-Areda reported a visible difference between farmlands with and without SWC structures in terms of crop productivity. They noted that bunds enhance crop productivity by keeping seeds and fertilizers from being washed away by runoff water. In Qachachule-Guja, all informants saw limited contribution of the program to soil fertility improvement since most SWC structures and planted tree seedlings were destroyed.
4.1.3. Change in Socio-Economic Conditions

The key informants identified some immediate positive and negative socio-economic outcomes of the CBWM program.

**Conflicts among farmers:** Conflicts between farmers who live in the vicinity of the micro-watersheds and micro-watershed associations were frequently mentioned as an undesirable outcome of the program. For instance, extension workers and leaders of development teams stated that farmers’ protests against area closure in the Qawa-Qeransa micro-watershed led to the destruction of SWC structures in Ararso-Bero. In Sara-Areda, in 2014/15, violent conflicts between a youth association and a micro-watershed association for ownership of a micro-watershed led to the destruction of growing tree seedlings by the former. In Qachachule-Guja, protest by farmers living in the vicinity of micro-watersheds was the main factor for the absence of area closure and micro-watershed associations.

**Access to communal land and income earnings:** Farmers in the vicinity of micro-watersheds oppose area closure mainly because they perceived this will dwindle their access to open grazing on communal land. However, in Ararso-Bero and Sara-Areda, village elders and extension workers stated that access to communal land increased for members of micro-watershed associations, who usually get some animal forage/grass or cash income from sale of grasses. This was completely lacking in Qachachule-Guja. Even though an attempt for area closure completely failed in Qachachule-Guja, access to communal land reduced for some farmers and increased for others since some farmers fenced off portions of the micro-watersheds for their private use.

**Knowledge and skills:** Most key informants in the three Kebeles mentioned the substantial contribution of the program to the knowledge and skill development of the farmers. Leaders of development teams particularly stated that most farmers came to know how to construct SWC structures only after the introduction of the program. As a result, according to extension workers, some farmers have already started constructing SWC structures on their own farmlands.

4.2. Farmers’ Perceptions of Outcomes of the CBWM Program

In order to assess farmers’ perception of outcomes of the CBWM program, factor analysis was used to identify 11 factors, out of the original 15 factors considered. The other four factors were discarded due to either their low value of factor loadings (<0.4) or cross-loading, as shown in Table 3. The factor analysis extracted three latent variables or factors which we labeled **physical effects**, **effects on personal capacities**, and **economic effects**. These factors together explained 74.05% of the total variance in the data set. The first factor—physical effects—encompasses farmers’ perceptions of quality of SWC structures and planted tree seedlings, and their biophysical outcomes. It accounts for the highest variance in the data set (48.90%). The second factor—effects on personal capacities—involves farmers’ perceived effects of the program on their skills and acceptance of SWC structures. The third factor—economic effects—involves farmers’ perceived access to communal land and income obtained from the program.

**Table 3.** Rotated component matrix of outcome indicators for the three Kebeles (n = 275).
The factor analysis was followed by calculating scores that represent each extracted latent variable or factor (physical effects score, effects on personal capacities score, economic effects score) and the overall farmers’ perceived outcomes of the CBWM program (households’ perceived outcome score). On the scale that ranges between 0 and 2, the average farmers’ perceived outcome score was 0.73, as shown in Table 4. This score indicates that farmers’ appreciation of the outcomes of the program was quite low. Across the study Kebeles, the score was highest in Sara-Areda and lowest in Qachachule-Guja.

Table 4. Mean scores of households’ perceived outcomes of the CBWM program (0 = lowest, 2 = highest).

| Factors                  | Ararso-Bero (n = 105) | Sara-Areda (n = 110) | Qachachule-Guja (n = 61) | All Kebeles (n = 276) | F Value |
|--------------------------|-----------------------|----------------------|--------------------------|-----------------------|---------|
| Physical effects         | 1.15                  | 1.63                 | 0.43                     | 1.16                  | 390.61 *** |
| Effects on personal capacities | 0.47                  | 0.72                 | 0.67                     | 0.62                  | 13.44 *** |
| Economic effects         | 0.58                  | 0.14                 | 0.47                     | 0.40                  | 62.92 *** |
| Mean                     | 0.74                  | 0.84                 | 0.52                     | 0.73                  | 65.76 *** |

*** p < 0.01.

Farmers’ perceptions of the physical effects of the program was relatively higher. Farmers particularly held positive opinions of the contribution of the program to the improvement of biophysical conditions of their farmland and communal land they accessed, as shown in Table 1. This was highest in Sara-Areda and lowest in Qachachule-Guja. As indicated under Section 4.1.2, the exposure of micro-watersheds both in Ararso-Bero and Qachachule-Guja to runoff water from neighboring Kebeles negatively influenced farmers’ perceived physical effects of the program. This was particularly important in Qachachule-Guja, where collective maintenance and conservation practices were completely lacking.

Farmers also perceived that the program has somewhat improved their personal capacities through the development of their skills on how to construct SWC structures and enhancing their capabilities to implement the structures on their land on their own. Across the studied Kebeles, this perception was relatively higher in Sara-Areda and lowest in Ararso-Bero. The relatively lower score in Ararso-Bero and Qachachule-Guja may be related to the inability of some farmers to implement the skills they learned on their land since they were busy with off-farm and non-farm activities, respectively.

Furthermore, farmers indicated that the economic effects of the program in terms of improving access to communal land and income earnings was quite limited. This was particularly low in Sara-Areda. The reason could be lower income earned by members of the micro-watersheds in Sara-Areda as compared to Ararso-Bero. Though micro-watershed associations were absent in Qachachule-Guja, access to communal land has improved for some farmers because of the failure of area closure initiatives and thus open access to the micro-watersheds.

4.3. Farmers’ Willingness to Participate in the CBWM Program

In order to assess the willingness of farmers to participate in the CBWM program, seven items each measured on a scale from 0 to 3 were used to calculate total households’ willingness scores. On the scale that ranges between 0 and 21, the mean households’ willingness score was 15.74.

As indicated in Table 5, the most important items that revealed farmers’ willingness to participate in the CBWM program were their perceptions of the usefulness of training given before campaign works, belief that the CBWM program could contribute to ecosystem restoration or livelihood improvement, and approval of the construction of SWC structures on their farmland and communal land they use. These three items indicate that farmers were more motivated to undertake training to improve their knowledge and skills on activities that were implemented during campaign works and support the construction of SWC structures on their farmland and the communal land they use because they believed that these will benefit them.
Table 5. Mean households’ willingness score to participate in the CBWM program.

| No. | Indicators                                             | Ararso-Bero | Sara-Areda | Qachachule-Guja | Mean | F Value   |
|-----|--------------------------------------------------------|-------------|------------|-----------------|------|-----------|
| 1   | Usefulness of trainings given before campaign works    | 2.39        | 2.61       | 2.51            | 2.50 | 5.94 ***  |
| 2   | Belief that the CBWM program contributes to ecosystem  | 2.45        | 2.48       | 2.46            | 2.46 | 0.09      |
|     | restoration or livelihood improvement                   |             |            |                 |      |           |
| 3   | In favor of the construction of SWC structures         | 2.45        | 2.17       | 2.02            | 2.24 | 17.91 *** |
| 4   | Willingness to contribute labor for campaign works     | 2.07        | 2.41       | 2.09            | 2.19 | 18.73 *** |
| 5   | Willingness to use own working tools                   | 1.97        | 2.35       | 2.12            | 2.14 | 23.42 *** |
| 6   | Own initiative to participate in the CBWM program      | 2.14        | 2.14       | 2.15            | 2.14 | 0.01      |
| 7   | Willingness to maintain and protect the micro-watersheds| 2.02        | 2.39       | 1.43            | 1.99 | 75.59 *** |
|     | Total (0 = lowest, 21 = highest)                       | 15.50       | 16.57      | 14.91           | 15.74| 14.28 *** |

*** p < 0.01.

However, the mean scores for farmers’ own initiative to participate in the CBWM program, contribute labor to campaign works, use own working tools during campaign works, and maintain and protect the micro-watersheds was relatively lower. These four items show that farmers were less motivated to contribute labor and materials without pressure from local government actors. Hence, it is important to understand conditions that motivate farmers to participate in the program. Leaders of development teams and village elders suggested some specific conditions that could motivate farmers to participate in the program: (1) proper recognition for farmers’ labor contribution during campaign works (e.g., certificates, awards, financial incentives), (2) compensation for farmers’ working tools when broken in the field during campaign works, and (3) minimizing bias in the selection of members while establishing new micro-watershed associations.

Across the studied Kebeles, the total mean score was highest in Sara-Areda and lowest in Qachachule-Guja. Table 5 shows also that the score for all items was higher in Sara-Areda, except for “in favor of the construction of SWC structures”. Another observation is that the lowest score (1.43) in Table 5 refers to “farmers’ willingness to maintain and protect the micro-watersheds” in Qachachule-Guja, which is due to the failure of the area closure initiative in this Kebele. However, there was no difference between the three Kebeles with regard to farmers’ belief about the possible contribution of the program to ecosystem restoration or livelihood improvement and own initiative to participate in the program.

5. Discussion

The main objective of this study was to assess farmers’ perception of the outcomes of the Campaign-Based Watershed Management (CBWM) program in Ethiopia, and how this influences their willingness to participate in the program in Boset District, Ethiopia. To this end, Spearman’s partial correlation coefficient ($r_p$) was used between the scores that represent farmers’ perceived outcomes of the program and their respective willingness score. The result shows that there was a statistically significant positive (but very weak) relationship between total households’ perceived outcome score and willingness score. This indicates that prior outcomes of the CBWM program hardly motivated farmers to participate in the program. But this relationship was not found for each study Kebele separately, as shown in Table 6.
Table 6. Spearman’s partial correlation coefficients ($r_s$) of households’ perceived outcome scores and willingness score.

| Outcome Scores                  | Farmers’ Willingness Score |
|--------------------------------|---------------------------|
|                                | Ararso-Bero | Sara-Areda | Qachachule-Guja | All Kebeles |
| Physical effects               | −0.059      | 0.142      | −0.056          | −0.109      |
| Effects on personal capacities | 0.260 ***   | −0.044     | −0.079          | 0.292 ***   |
| Economic effects               | 0.056       | 0.037      | 0.110           | 0.078       |
| Total outcomes                 | 0.103       | 0.066      | 0.065           | 0.171 ***   |

*** $p < 0.01$.

Of the studied latent variables or factors, no correlation was found between farmers’ perceived physical effects score and willingness score for all Kebeles together and each separately, as shown in Table 6. The absence of influence of physical effects on the willingness of farmers could be attributed to the limited direct biophysical benefits of the program to most individual households since the intervention has been mainly confined to selected micro-watersheds on communal lands both in Ararso-Bero and Sara-Areda. This is consistent with other studies in Ethiopia that indicate that farmers are less motivated to participate in an initiative [34] or adopt conservation technologies [35,36] that will not generate short-term benefits at a farm household level. In addition, in some micro-watersheds, SWC structures and planted tree seedlings were being destroyed by flood water coming down from upstream neighboring Kebeles, particularly in Ararso-Bero and Qachachule-Guja. Furthermore, micro-watersheds were generally exposed to human and animal disturbances in all Kebeles, which exacerbates erosion problems [35] and creates a sense of apathy among farmers [37]. This was particularly important in Qachachule-Guja, where farmers were demotivated by the total absence of area closure and thus maintenance and protection of the micro-watersheds on communal land since the inception of the program.

However, a relatively strong relationship was found between farmers’ perceived effects on their personal capacities score and willingness score in all Kebeles together and in Ararso-Bero, as shown in Table 6. This shows skills that farmers obtained on how to construct SWC structures and implementation of the structures have motivated them to participate in the program. This could be because some farmers in Ararso-Bero cultivate steep slopes compared to other Kebeles. On steeper slopes, soil erosion problems are generally more severe than on relatively gentle ones. These erosion problems possibly improved farmers’ flood perception and stimulated them to learn skills on how to construct SWC structures [38] and start constructing the structures on their own farmlands [35,39,40]. Such farmers are generally more dynamic and intrinsically motivated to participate in other collective action initiatives, including the CBWM program. Though farmers in Qachachule-Guja experienced erosion problems and had higher flood perception, they were not motivated by the effect of the program on their personal capacities (see Section 4.1.2). One possible reason for this is failure of previous micro-watershed (communal lands) management, which discouraged farmers in participating in the program. The other reason may be that farmers who live both in Bofa town and rural neighborhoods are generally less motivated to participate in the program, since they focus on their non-farm activities in the town [41]. Similarly, although farmers obtained skills and started constructing SWC structures on their farmlands in Sara-Areda, these did not motivate them to participate in the program because they generally cultivate relatively flat plots that are less exposed to erosion problems.

Finally, farmers’ perceived economic effects score was not correlated with willingness score for all Kebeles together and each one separately, as shown in Table 6. One possible reason for this was the absence or weakness of micro-watershed associations to manage treated micro-watersheds. According to Reference [41], micro-watersheds have been handed over to associations that were not real target groups in Ararso-Bero and Sara-Areda. This explicitly excludes non-members from any short-term economic benefits, demotivates these non-members to participate in the program, and contributes to unequal access to resources. Even so, the associations rarely ensure maintenance and
conservation of the micro-watersheds, which might have driven members to question the plausibility of the associations, sustainability of the micro-watersheds, and continuity of some economic benefits they were receiving. Unlike other Kebeles, which at least handed over the micro-watersheds to associations, a clear benefit-sharing mechanism was lacking in Qachachule-Guja. This not only discouraged farmers to participate in the program, but also served as a potential source of conflict, as indicated by Reference [42]. The other reason could be conflicts among farmers over access to communal land, since area closures and the handing over of the micro-watersheds to associations reduces access to communal land for some farmers, while it increases access for others. For instance, in Qachachule-Guja, not a single micro-watershed was handed over to associations due to farmers’ protest against area closure. Conflicts among farmers abate social cohesion, mutual trust, social networks, and weaken their motivation to participate in the CBWM program and other similar collective action initiatives.

6. Conclusions

The main objective of this study was to assess farmers’ perception of the outcomes of the Campaign-Based Watershed Management (CBWM) program in Ethiopia and how this influences their willingness to participate in the program. Data obtained from key informants and Google Earth Engine show that the construction of SWC structures, planting tree seedlings, and area closures have improved biophysical and socio-economic conditions in the study area. However, farmers’ perceived outcomes of the program hardly motivated them to participate in the program. Particularly, physical effects of the program as perceived by the farmers demotivated them to continue participating in the program. This was especially due to the limited direct biophysical benefits of the program to farm households, and the destruction of previously developed micro-watersheds by frequent runoff from neighboring Kebeles and human and animal disturbances. Similarly, farmers were not motivated by the economic effects of the program, because of the limitations/absence of benefit-sharing mechanisms and resultant conflicts among farmers. Where micro-watersheds were handed over to associations, their appropriateness was debatable. Where they were absent, questions remained as to how the future accrued benefits will be shared among farmers. The only motivating outcome of the program concerned its effect on personal capacities, which was particularly appreciated in localities that were vulnerable to erosion. This means farmers who obtained skills on how to construct SWC structures and those who started constructing SWC structures on their own farmlands were more motivated to participate in the program.

Hence, in order to enhance the willingness of farmers to genuinely participate in the CBWM program, three recommendations are drawn from the above results: (1) better integrate actions at watershed level to come to effective water runoff control and collaboration between neighboring villages in watersheds, (2) enhance the participation of all local actors to come to more effective area closure initiatives with transparent benefit-sharing mechanisms for equitable distribution of the outcomes of the program, and (3) give much more emphasis to capacity building as a cross-cutting component in the program since this ensures short-term biophysical benefits to individual farm households as well as motivates them to participate in the program. These recommendations suggest that the program should use a more participatory and integrated approach to motivate farmers and enhance their genuine participation. In this regard, future research should focus on exploring a more sustainable collective watershed management strategy through discussions, negotiations, and learning among local actors.

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References
1. Darghouth, S.; Ward, C.; Gambarelli, G.; Styger, E.; Roux, J. Watershed management approaches, policies, and operations: Lessons for scaling up. Water Sect. Board Discuss. Pap. 2008, 11, 164.
2. Erdogan, R. Stakeholder Involvement in Sustainable Watershed Management. Adv. Landsc. Archit. 2013. [CrossRef]
3. Desta, L.; CarUCCi, V.; Wendem-Ageliehu, A.; Abebe, Y. Community Based Participatory Watershed Development: A Guideline; Ministry of Agriculture and Rural Development: Addis Ababa, Ethiopia, 2005; ISBN 2511514389.
4. Tongul, H.; Hobson, M. Scaling up an integrated watershed management approach through social protection programmes in Ethiopia: The MERET and PSNP schemes. Hunger Nutr. Clim. Justice 2013, 4.
5. Wood, A.; Stahl, M. Ethiopia: National Conservation Strategy: Phase 1 Report; IUCN Publication: Gland, Switzerland, 1990; p. 164.
6. Zeleke, G. Integrated management of watershed experiences in Eastern and Central Africa: Lessons from Ethiopia. In Integrated Management of Watersheds for Agricultural Diversification and Sustainable Livelihoods in Eastern and Central Africa: Lessons and Experiences from Semi-arid South Asia. Proceedings of the International Workshop Held at ICRISAT, Nairobi, Kenya, December 2004; Shiferaw, B., Rao, K., Eds.; International Crops Research Institute for the Semi-Arid Tropics and Soil and Water Management Network: Nairobi, Kenya, 2006; pp. 73–89.
7. AgWater Solutions. Watershed management in Ethiopia. Agric. Water Manag. Learn. Discuss. Brief 2012, 2.
8. Mazengia, W.; Mowo, J. Role of collective actions in integrated soil and water conservation: The Case of Gununo Watershed. Afr. J. Water. Cons. Sustain. 2013, 1, 81–93. [CrossRef]
9. Adimassu, Z.; Kessler, A.; Stroosnijder, L. Co-investments in land management: Lessons from the Galessa watershed in Ethiopia. Int. J. Sustain. Dev. World Ecol. 2013, 20, 532–541. [CrossRef]
10. Meinzen-Dick, R.; Mendoza, M.; Sadoulet, L.; Abiad-Shields, G.; Subramanian, A. Sustainable Water User Associations: Lessons From a Literature Review. In User Organizations for Sustainable Water Services; Subramanian, A., Jagannathan, N.V., Meinzen-Dick, R., Eds.; World Bank: Washington, DC, USA, 1997; pp. 9–94, ISBN 0821338552.
11. Agrawal, A. Common property institutions and sustainable governance of resources. World Dev. 2001, 29, 1649–1672. [CrossRef]
12. Fujie, M.; Hayami, Y.; Kikuchi, M. The conditions of collective action for local commons management: The case of irrigation in the Philippines. Agric. Econ. 2005, 33, 179–189. [CrossRef]
13. Miyashita, A. Killing the Snake of Poverty: Local Perceptions of Poverty and Well-being and People’s Capabilities to Improve Their Lives in the Southern Andes of Peru. Ph.D. Thesis, University of Amsterdam, Amsterdam, The Netherlands, 2009.
14. Snyder, K.; Ludi, E.; Cullen, B.; Tucker, J.; Zeleke, A.; Duncan, A. Participation and performance: Decentralized planning and implementation in Ethiopia. Public Admin. Dev. 2014, 34, 83–95. [CrossRef]
15. Kessler, C.A.; van Duivenbooden, N.; Nsabimana, F.; van Beek, C.L. Bringing ISFM to scale through an integrated farm planning approach: A case study from Burundi. Nutr. Cycl. Agroecosyst. 2016, 105, 249–261. [CrossRef]
16. Swallow, B.; Johnson, N.; Meinzen-Dick, R.; Knox, A. The challenges of inclusive cross-scale collective action in watersheds. Water Int. 2006, 31, 361–375. [CrossRef]
17. Shiferaw, B.; Kebede, T.A.; Reddy, V.R. Community watershed management in Semi-arid India: The state of collective action and its effects on natural resources and rural livelihoods. Collect. Action Prop. Rights 2008, 85, 1–38.
18. Nyssen, J.; Clymans, W.; Descheemaeker, K.; Poesen, J.; Vandecasteele, I.; Vanmaercke, M.; Zenebe, A.; Van Camp, M.; Haile, M.; Haregeweyn, N.; et al. Impact of soil and water conservation measures on catchment hydrological response—A case in north Ethiopia. Hydrol. Process 2010, 24, 1880–1895. [CrossRef]
19. Taye, G.; Poesen, J.; van Wesemael, B.; Vanmaercke, M.; Teka, D.; Deckers, J.; Goosse, T.; Maetens, W.; Nyssen, J.; Hallet, V.; et al. Effects of land use, slope gradient and soil and water conservation techniques, on runoff and soil loss in a semi-arid Northern Ethiopia. *Phys. Geogr.* **2013**, *34*, 236–259. [CrossRef]

20. Taye, G.; Poesen, J.; Vanmaercke, M.; van Wesemael, B.; Martens, L.; Teka, D.; Nyssen, J.; Deckers, J.; Vanacker, V.; Haregeweyn, N.; et al. Evolution of the effectiveness of stone bunds and trenches in reducing runoff and soil loss in the semi-arid Ethiopian highlands. *Z. Geomorphol.* **2015**, *59*, 477–493. [CrossRef]

21. Nyssen, J.; Poesen, J.; Gebremichael, D.; Vancampenhout, K.; D’aes, M.; Yihdego, G.; Govers, G.; Leirs, H.; Moeyersons, J.; Naudts, J.; et al. Interdisciplinary on-site evaluation of stone bunds to control soil erosion on cropland in Northern Ethiopia. *Soil Tillage Res.* **2007**, *94*, 151–163. [CrossRef]

22. Kassie, M.; Köhlin, G.; Bluffstone, R.; Holden, S. Are soil conservation technologies “win-win?” A case study in the north-western Ethiopian highlands. *Nat. Resour. Forum* **2011**, *35*, 89–99. [CrossRef]

23. Adgo, E.; Teshome, A.; Mati, B. Impacts of long-term soil and water conservation on agricultural productivity: The case of Anjenie watershed, Ethiopia. *Agric. Water Manag.* **2013**, *117*, 55–61. [CrossRef]

24. Meshesha, D.T.; Tsunekawa, A.; Tsubo, M. Dynamics and hotspots of soil erosion and management scenarios of the Central Rift Valley of Ethiopia. *Int. J. Sediment Res.* **2012**, *27*, 84–99. [CrossRef]

25. Meshesha, D.T.; Tsunekawa, A.; Tsubo, M.; Haregeweyn, N.; Adgo, E. Drop size distribution and kinetic energy load of rainfall events in the highlands of the Central Rift Valley, Ethiopia. *Hydrol. Sci. J.* **2014**, *59*, 2203–2215. [CrossRef]

26. BDAO. *The Performance of Kebeles by Their Natural Resource Conservation*; Boset District Agriculture Office: Boset District, Ethiopia; 2015; p. 26.

27. Tucker, L.; MacCallum, R. *Exploratory Factor Analysis*; University of Illinois: Chicago, IL, USA; Ohio State University: Columbus, OH, USA; 1997; p. 457. Available online: https://www.unc.edu/~rcm/book/factor.pdf (accessed on 16 August 2018).

28. Field, A. *Discovering Statistics Using SPSS*, 3rd ed.; SAGE Publications: London, UK, 2009; p. 816, ISBN 9781847879066.

29. Bland, M.J.; Altman, D.G. Statistics notes: Cronbach’s alpha. *Br. Med. J.* **1977**, *1**, 572. [CrossRef]

30. Corder, G.; Foreman, D. *Nonparametric Statistics for Non-statisticians: A Step-by-Step Approach*; John Wiley & Sons: Hoboken, NJ, USA, 2009; p. 247, ISBN 9789004310087.

31. Kessler, C.A. Decisive key-factors influencing farm households’ soil and water conservation investments. *Appl. Geogr.* **2006**, *26*, 40–60. [CrossRef]

32. Vandersypen, K.; Bastiaens, L.; Traore, A.; Diakon, B.; Raes, D.; Jamin, Y. Farmers’ motivation for collective action in irrigation: A statistical approach applied to the office du Niger in Mali. *Irrig. Drain.* **2008**, *57*, 139–150. [CrossRef]

33. Evans, J. *Straightforward Statistics for the Behavioral Sciences*; Cole Publishing: Pacific Grove, CA, USA, 1996; p. 600, ISBN 0534231004.

34. Agidew, A.A.; Singh, K.N. Factors affecting farmers’ participation in watershed management programs in the Northeastern highlands of Ethiopia: A case study in the Teleyayen sub-watershed. *Ecol. Process* **2018**, *7*, 1–15. [CrossRef]

35. Amsalu, A.; de Graaff, J. Farmers’ views of soil erosion problems and their conservation knowledge at Beressa watershed, central highlands of Ethiopia. *Agric. Hum. Values* **2006**, *23*, 99–108. [CrossRef]

36. Zeweld, W.; van Huylenbroeck, G.; Tesfay, G.; Azadi, H.; Speelman, S. Impacts of Socio-Psychological Factors on Actual Adoption of Sustainable Land Management Practices in Dryland and Water Stressed Areas. *Sustainability* **2018**, *10*, 2963. [CrossRef]

37. Bagherian, R.; Bahaman, A.S.; Asnarulkhadi, A.S.; Shamsuddin, A. Factors Influencing Local People’s Participation in Watershed Management Programs in Iran. *Environ. Sci.* **2009**, *6*, 532–538.

38. Teshome, A.; de Graaff, J.; Kassie, M. Household-Level Determinants of Soil and Water Conservation Adoption Phases: Evidence from North-Western Ethiopian Highlands. *Environ. Manag.* **2016**, *57*, 620–636. [CrossRef] [PubMed]

39. Kessler, C.A. Motivating farmers for soil and water conservation: A promising strategy from the Bolivian mountain valleys. *Land Use Policy* **2007**, *24*, 118–128. [CrossRef]

40. Abi, M.; Kessler, A.; Oosterveer, P.; Tolossa, D. Understanding the Spontaneous Spreading of Stone Bunds in Ethiopia: Implications for Sustainable Land Management. *Sustainability* **2018**, *10*, 2666. [CrossRef]
41. Assefa, S.; Kessler, A.; Fleskens, L. Factors affecting farmers’ decisions to participate in campaign-based watershed management program in Boset District, Ethiopia. *Environ. Dev. Sustain.* 2018, under review.

42. Nigussie, Z.; Tsunekawa, A.; Haregeweyn, N.; Adgo, E.; Cochrane, L.; Floquet, A.; Abele, S. Applying Ostrom’s institutional analysis and development framework to soil and water conservation activities in north-western Ethiopia. *Land Use Policy* 2018, 71, 1–10. [CrossRef]