

Research Application Summary

**Integrated watershed intervention in improving livelihood and natural resource management
in Western Amhara Region, Ethiopia**

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Abstract

An integrated watershed management was implemented in the Amhara region of Ethiopia mainly to improve natural resource conservation and livelihoods in the region's watersheds. The study was specifically conducted in West Gojjam and South Gonder zones of Amhara region to determine the effectiveness of the interventions and lessons learnt. Multi-stage sampling was used to select representative respondents while purposive sampling was used to select watersheds based on their experiences in integrated watershed management. Then, random sampling was used to select farmers in the watershed. A household survey was conducted from 296 farmers from eight watersheds using a semi-structured questionnaire. Descriptive statistics were used to analyze and present research findings. Farmers perceived farm land, closure and forest areas as the most important natural resources. Crop production and livestock were major means of livelihoods for the community. Natural resource development, crop production and livestock production were the interventions made in the area. Others were physical soil and water conservation and tree planting. Improved crop varieties and inorganic fertilizer application were the major interventions for crop production improvement; while forage and rearing of improved poultry were the major livestock interventions. These lead to multi-dimensional improvements such as improving crop and livestock production, securing household demand, enhancing micro-climatic conditions, improving household living standards. It is recommended that these interventions be continued in addition to forming watershed based innovation platforms to enhance social and organizational cohesion at watershed level to improve and sustain this integrated watershed development.

Key words: Crop production, Ethiopia, integrated watershed, livestock production, soil and water conservation

Résumé

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Une gestion intégrée de bassin versant fut mise en œuvre dans la région d'Amhara en Éthiopie, principalement pour améliorer la conservation des ressources naturelles et les conditions de vie dans les bassins versants de la région. L'étude a été menée dans les zones Ouest de Gojjam et Sud Gonder de la région d'Amhara, afin de déterminer l'efficacité des interventions et les leçons. L'échantillonnage à plusieurs niveaux a été utilisé pour sélectionner des répondants représentatifs,

tandis que l'échantillonnage raisonné a été utilisé pour sélectionner les bassins versants en fonction des expériences en matière de gestion intégrée. Ensuite, un échantillonnage aléatoire a été fait pour sélectionner 256 agriculteurs avec qui une enquête fut menée dans huit bassins versants à l'aide d'un questionnaire semi-structuré. Des statistiques descriptives ont été utilisées pour analyser et présenter les résultats de la recherche. Les agriculteurs considéraient les terres agricoles, enclos et zones forestières comme les ressources naturelles les plus importantes. La production agricole et l'élevage étaient les principaux moyens de subsistance. Le développement des ressources naturelles, la production végétale et animale ont été les interventions faites dans la région. D'autres comprenaient la conservation physique des sols et de l'eau et la plantation d'arbres. L'amélioration des variétés de cultures et l'application d'engrais inorganiques étaient les principales interventions pour l'amélioration de la production agricole; tandis que le fourrage et l'élevage de volailles améliorées étaient les principales interventions d'élevage. Celles-ci conduisent à des améliorations multidimensionnelles telles que l'amélioration de la production agricole et animale, la garantie de la demande des ménages, l'amélioration des conditions microclimatiques, l'amélioration du niveau de vie des ménages. Il est recommandé que ces interventions se poursuivent, en plus de former des plates-formes d'innovation basées sur les bassins versants et améliorer la cohésion sociale et organisationnelle au niveau des bassins versants afin d'améliorer et de soutenir ce développement intégré des bassins versants.

Mots clés: Production végétale, Éthiopie, bassin versant intégré, production animale, conservation des sols et de l'eau

Introduction

Ethiopia is well known for its agricultural development challenges due to its large and rapid growing population; and limited and deteriorated land resource which resulted in extreme land shortages in the highland Ethiopia (OECD, 2010). Agricultural production has also faced serious ecological imbalances because of large scale soil erosion through improper farming practices, destructive forest exploitation, wild fire, planting of eucalyptus causing moisture stress and uncontrolled grazing practices (Waga and Jermias, 2013). More than 2 million ha of Ethiopia's highlands have been degraded beyond rehabilitation and an additional 14 million ha of land severely degraded (Yenealem *et al.*, 2013). Regarding soil erosion, the net amount of soil eroded is drastically increasing from year to years. For example, at national level, the net amount eroded soil increased from 130 million metric tons in 1995 to 182 million metric tons in 2005 and the nutrient loss from lost soil in terms of phosphorus and nitrogen was 1.1 and 1.3 million metric tons, respectively (EfD, 2010). This has resulted in a decline in agricultural production, water depletion, disturbed hydrological conditions, poverty and food insecurity (Daniel, 2002; Waga and Jermias, 2013; Yenealem *et al.*, 2013).

In Ethiopian highlands, particularly in Amhara region, integrated watershed management has been implemented to fight land degradation, conserve water, raise agricultural productivity and improve farmers' livelihoods. It includes the integration of technologies within the natural boundary of a drainage area to optimum development of land, water, vegetation and livestock resources to meet the basic needs of dwellers in a sustainable manner. To do this, different government and non-government organizations have invested substantial resources in integrated watershed management to promote soil and water conservation practices to improve environmental conditions and increase agricultural production (Yenealem *et al.*, 2013). By mobilizing the community, both physical and biological measures were made to retain runoff, reduce soil erosion, land degradation and improve soil fertility, recharging ground water and volume of surface waters. In addition, different livelihood improving measures have also been done to reduce the dependence of the community on natural resources like

firewood, free grazing, extensive crop cultivation etc. However, adequate research has not been done to determine the effectiveness of these integrated interventions and lessons learnt.

Objectives of the study

Therefore, this study was carried out with the following objectives: (i) to identify the most effective integrated interventions in addressing natural resource conservation and livelihood improvement; and (ii) to analyse the impacts of integrated watershed interventions in the study watersheds

Research methods and methodology

Description of the study area. The study was conducted in watersheds in North Western Ethiopia, namely South Gonder and West Gojjam zones. South Gonder zone is found North East of Bahir Dar, the capital city of Amhara region (11°39'59.99"N and 38°00'00.00" E). The total population of this zone is estimated to be 3,500,000 with an area of 14,095.19 km². square kilometers. It has a population density of 145.56. The studied watersheds in this zone were Gomit and Alekit Woniz. Most of the studied area in West Gojjam zone is found southern of Bahir Dar (11°09'60.00"N and 37°14'60.00" E). The total population of this zone is estimated to be 3,800,000 with an area of 13,311.94 km² and population density of 158.25. The studied watersheds in West Gojjam were Abagerima, Debre mawi, Debre Yakob, Goshi, Chentale and Brakat.

Sampling design. Multi-stage sampling technique was used to select representative respondents. From west Amhara region, South Gonder and West Gojjam were selected purposively based on their integrated watershed interventions. From South Gonder, three WatershedS and from West Gojjam, five watersheds were selected. From each watershed, 37 farmers were selected randomly to provide baseline information. Finally, a total of 296 farmers were interviewed.

Data collection and analysis. A semi-structured questionnaire was developed and pre-tested to improve validity. Field work was embarked on to collect data from each watershed. The collected data were organized and managed using SPSS (Version 16) software. Descriptive analysis was used to analyze and present findings of the study.

Results and discussion

Framers' perception on the predominant natural resource in the watershed. In the watershed development perspective, there are different types of natural resources in a given watershed. Communities give different weights for these natural resources. Table 1 shows the most important natural resources based on the belief of the watershed dwellers in Western Amhara region. According to the perception of respondents, farm land (89.5%), closure area (69.3%) and forest area (68.2%) were the major natural resources. Grazing land (59.1%) and river (59.1%) were also the other important natural resources for the community, whereas streams (27.36%) were considered as less important natural resources. This finding is somehow supported by the finding of Tschopp *et al.* (2010) in Gurage and Woldia where farmers needed to prioritize cropland and grazing land to feed their growing families and animals, respectively.

Table 1. Important natural resource types in the watershed

Type of natural resources	Zones				Total	
	South Gonder		West Gojjam		N	Percentage
	N	Percentage	N	Percentage		
Grazing land	48	42.1%	127	69.8%	175	59.1%
Forest	65	57.0%	137	75.3%	202	68.2%
Closure area	66	57.9%	139	76.4%	205	69.3%
River	77	67.5%	98	53.8%	175	59.1%
Stream	26	22.8%	55	30.2%	81	27.3%
Farm land	106	93.0%	159	87.4%	265	89.5%
Ground water	13	11.4%	6	3.3%	19	6.4%
Total	114	38.5%	182	61.5%	296	100%

In South Gonder zone's watersheds, farmland (93.0%) was considered the most important natural resource. The other important natural resources were river (67.5%), closure areas (57.9%), forest (57.0%) and grazing land (42.1%). Streams (22.8%) and ground water (11.4%) were also mentioned as less important natural resources. Unlike South Gonder zone, in West Gojjam zone, farmland (87.4%), closure area (76.4%), forest (75.3%) and grazing land (69.8%) were almost equally important resources. Rivers (53.8%) and streams (30.2%) were regarded less important. Only 3.3% of the respondents mentioned ground water as important resources. This finding clearly shows that dwellers in the watersheds did not give equal weight for all natural resource types.

Livelihood strategies. Means of livelihood strategies of the community in the study watersheds are illustrated in Table 2. Crop (99.3%) and livestock (96.6%) farming were the major livelihood activities for the community in Western Amhara's watersheds. Only few individuals (17.6%) used off-farm activities as a means of living. Dwellers that engaged in non-farm (6.1%) and employed (3.1%) were very rare in the study watersheds.

Table 2. Means of livelihoods in the watershed

Means of livelihood	Zone				Total	
	South Gonder		West Gojjam		N	Percentage
	N	Percentage	N	Percentage		
Crop production	112	99.1%	181	99.5%	293	99.3%
Livestock keeping	108	95.6%	177	97.3%	285	96.6%
Off-farm activities	31	27.4%	21	11.5%	52	17.6%
Nonfarm activities	7	6.2%	11	6.0%	18	6.1%
Employed	4	3.5%	5	2.7%	9	3.1%
Total	113	38.3%	182	61.7%	295	100.0%

Only few individuals (17.6%) used off-farm activities as a means of living. Dwellers that engaged in non-farm (6.1%) and employed (3.1%) were very rare in the study watersheds. This finding concurs with Kebede *et al.* (2014) in Northern Ethiopia. Their reports stated that the dominant livelihood strategy in the watersheds of Eastern and Central zones of Tigray region is mixed livestock-crop

farming type (98%). In South Gonder, the major livelihoods of the dwellers were crop production (99.5%) and livestock keeping (95.6%). About 27.4% of the respondents also reported engaging in off-farm activities as a means of a livelihood. Only 6.2% and 3.5% of the respondents used non-farm activities and employment by others as a means of living. The percentage of respondents who engaged in crop production, livestock keeping, off-farm activities, nonfarm activities and employed were 99.5%, 97.3%, 11.5%, 6.0% and 2.7%, respectively. This figure implies that farmers in West Amhara Region's watersheds mainly rely on crop production and livestock keeping.

Integrated watershed interventions

Natural resource development. As indicated in Table 3, various interventions were made by different organizations to improve the status of natural resources in the study watersheds in Western Amhara region. The major interventions included physical soil and water conservation (90.9%), tree planting (63.5%), area closure (59.8%), grass stripe along the physical structures (51.0%) and protecting free grazing (45.3%). Improved forage on grazing land (30.1%), alley cropping (21.3%) and improving grazing land with organic or inorganic fertilizer (18.9%) were the other interventions used for improving natural resources in the study watershed. Results of this study are similar to those of Mahdi *et al.* (2000), in which is most of interventions made in the highland of Ethiopia were physical structures, like benches, water diversions, waterways, check dams; and biological measures like afforestation and reforestation.

In South Gonder, interventions for improving natural resources included construction of physical structure for soil and water conservation (81.6%), area closure (66.7%), tree planting (66.7%) and protecting free grazing (50.9). Improved forage development on grazing land (43.9%), grass strip along physical structures (35.1%) were also considerably important interventions. Like South Gonder, in West Gojjam, physical structures (96.7%) were the most important intervention to conserve soil and water in the watershed. Tree planting (61.5%) and grass strip (61.0%) were also the second most important interventions. Area closure (55.5%), protecting free grazing (41.8%) and alley cropping were made to manage the available natural resources in the watershed. Improving grazing land using improved forage types (21.4%) and organic/inorganic fertilizer (20.3%) were the least important natural resource development interventions.

Crop production interventions. In the study watershed, there were also interventions on crop production improvements (Table 4). In the study area, the predominant intervention made in improving crop production and productively was the introduction of improved crop varieties (97.6%), inorganic fertilizer application (61.8%) and improved crop protection practices (50.3%). The other interventions made in improving crop production were improved ploughing technologies (47.6%), organic fertilizer application (45.3%) and crop post harvesting and handling techniques (31.8%).

In South Gonder zone's watershed, the major interventions to improve crop production were improved crop varieties (99.1%), improved crop protection practices (77.2%), inorganic fertilizer application (57.0%) and improved ploughing techniques (45.6%). For 32.5% and 21.9% of respondents, organic fertilizer and crop post-harvest handling were introduced, respectively. In West Gojjam zone, improved crop varieties (96.7%), inorganic (64.8%) and organic (53.3%) fertilizer applications were the major interventions made to improve crop production in the study watersheds. Improved plowing techniques (48.9%), crop post-harvest handling (37.9%) and crop protection practice (33.5%) were also introduced for the same purpose.

Table 3. Intervention made to improve status of natural resources

Type of intervention	Zone				Total	
	South Gonder		West Gojjam		N	Percentage
	N	Percentage	N	Percentage		
Physical structures	93	81.6%	176	96.7%	269	90.9%
Grass strip	40	35.1%	111	61.0%	151	51.0%
Alley cropping	12	10.5%	51	28.0%	63	21.3%
Area closure	76	66.7%	101	55.5%	177	59.8%
Protecting free grazing	58	50.9%	76	41.8%	134	45.3%
Improving grazing land with improved forage development	50	43.9%	39	21.4%	89	30.1%
Improving grazing land with org/ inorganic fertilizer	19	16.7%	37	20.3%	56	18.9%
Tree planting	76	66.7%	112	61.5%	188	63.5%
Total	114	38.5%	182	61.5%	296	100.0%

Source: Own survey

Table 4. Intervention types in relation to crop production

Types of intervention	Zone				Total	
	South Gonder		West Gojjam		Frequency	Percentage
	Frequency	Percentage	Frequency	Percentage		
Improved crop varieties	113	99.1%	176	96.7%	289	97.6%
Improve crop protection practices	88	77.2%	61	33.5%	149	50.3%
Improved plowing techniques	52	45.6%	89	48.9%	141	47.6%
Inorganic fertilizer	65	57.0%	118	64.8%	183	61.8%
Organic fertilizer	37	32.5%	97	53.3%	134	45.3%
Crop post-harvest handling	25	21.9%	69	37.9%	94	31.8%
Total	114	38.5%	182	61.5%	296	100.0%

Livestock intervention. As illustrated in Table 5, different types of livestock technologies were introduced in the study watersheds. The major interventions were introduction of improved backyard forage development, physical structure and farmland (59.6%), improved poultry (55.8%) and improved animal husbandry practices (52.7%). Considerably, improved apiculture (40.4%), cattle fattening (40.4%) and shoat fattening (26.7%) were also introduced to diversify livelihood options of the watershed dwellers. To enhance livestock production and productively in the watersheds, improved animal breeds like crossbred dairy cows (21.6%) and shoats (17.5%), were introduced.

In South Gonder zone, introducing improved animal husbandry practices (63.2%), improved poultry breed (59.6%), and forage development (57.9%) and beekeeping (57.0%) were the top interventions to improve livestock production and productivity so as to improve natural resource management in the study watersheds. Improved shoat breed (33.3%) and crossbred dairy cows (21.1%) were also

introduced for production improvement. Cattle (23.7%) and shoat (10.5%) fattening were also a considerable intervention in the watersheds.

In West Gojjam watersheds, the priority interventions were backyard forage development, physical structures and farmland (60.7%), improved poultry rearing (53.4%) and cattle fattening (51.1%) and animal husbandry practices (46.1%). The other interventions made to improve livestock production were improved apiculture (29.8%) and dairy production (21.9%). Improved shoat breed (7.3%) was the least intervention in the study watersheds.

Table 5. Types of livestock intervention

Interventions	Zone				Total	
	South Gonder		West Gojjam		Frequency	Percentage
	Frequency	Percentage	Frequency	Percentage		
Crossbred dairy	24	21.1%	39	21.9%	63	21.6%
Improve shoat breeds	38	33.3%	13	7.3%	51	17.5%
Forage development (Backyard, physical structure and farmland)	66	57.9%	108	60.7%	174	59.6%
Shoat fattening	12	10.5%	66	37.1%	78	26.7%
Cattle fattening	27	23.7%	91	51.1%	118	40.4%
Improve poultry breed	68	59.6%	95	53.4%	163	55.8%
Apiculture	65	57.0%	53	29.8%	118	40.4%
Improved animal husbandry practices	72	63.2%	82	46.1%	154	52.7%
Total	114	39.0%	178	61.0%	292	100.0%

Effects of integrated watershed interventions

Effects of Natural Resource Interventions. As indicated in Table 6, natural resource interventions have brought significant improvement in the studied watershed. The most significant improvements observed were increased crop production (60.47%), micro-climate and drought improvement (53.37%), livestock production improvement (49.32%). In turn, household income increased (44.26%). The second important improvements shown in the study areas were improved access to animal feeds (39.19%) and improved soil fertility (38.85%).

In South Gonder zone, major improvements were recorded as improved micro climate and drought problems (50.88%), reduced animal feed shortage (47.37%) and enhanced soil fertility (39.47%). In turn, these resulted in improvement in crop (35.96%) and livestock (29.82%) production, household income (28.07%) and biodiversity (28.95%). On the other hand, improvement in land degradation and sustaining physical structure (9.64%) and forest density (10.53%) were very minimal yet these were the main aims of implementing these integrated natural management interventions. Only 0.88% of the respondents mentioned increase in volume of stream as a result of natural resource management interventions.

In West Gojjam zone's watersheds, improvements in crop (75.82%) and livestock (61.54%) production, micro climate and drought problems (54.95%) and household income (54.40%) were the major achievements due to natural resource management interventions. These interventions have also played a great role in enhancing soil fertility (38.46%), availability of animal feed (34.07%) and degraded land recovery and sustain physical structure (31.32%). They also brought resulted into some impact on biodiversity improvement (7.14%), improvement of stream volume (6.59%) and increase in honey production (2.20%).

Table 6. Impacts as a result of natural resource interventions

Impacts of natural resource intervention	Zones				Total	
	South Gonder		Wet Gojjam		Frequency	Percentage
	Frequency	Percentage	Frequency	Percentage		
Degraded land recover & sustain physical structure	11	9.64%	57	31.32%	68	22.97%
Soil fertility improved	45	39.47%	70	38.46%	115	38.85%
Animal feed problem solved	54	47.37%	62	34.07%	116	39.19%
Livestock production improved	34	29.82%	112	61.54%	146	49.32%
Hone production improved	0	0.00%	4	2.20%	4	1.35%
Crop production improved	41	35.96%	138	75.82%	179	60.47%
Biodiversity improved	33	28.95%	13	7.14%	46	15.54%
Micro climate & drought improvement	58	50.88%	100	54.95%	158	53.38%
Forest density increased	12	10.53%	20	10.99%	32	10.81%
Send children to school	0	0.00%	6	3.30%	6	2.03%
HH income increases	32	28.07%	99	54.40%	131	44.26%
Volume of streams increased	1	0.88%	12	6.59%	13	4.39%
Total	114	35.51%	182	61.49%	296	100%

Impacts of crop improvement interventions. Like natural resource improvement interventions, crop development interventions also had a significant impact on the livelihoods of the study area inhabitants. As indicated in Table 7, improvements in crop yield (65.1%), household income (63.4%) and household food security (55.5%) were the major impacts resulting from crop development interventions. Improvement of living standards (33.2%) and reduction in water runoff (11.3%) were the other benefits of crop development interventions. In south Gonder, 62.50% of the respondents reported improvement in food security due to crop improvement interventions. About 50.89% and 50.00% of the respondents' household income and crop yield were also reported to have increased, respectively. Overall, living standards improved by only 26.79%. Animal feed problems were only solved for 0.89% of the respondents. The contribution of the crop improvement interventions in enabling to send children to school (0.89%) was so minimal. In West Gojjam Zone, crop yield (74.44%) and household income (71.11%) improvement were the major impacts reported. Achieving household food security (51.11%) and improving household living standards (37.22%) were also the other improvements achieved in the study watersheds. Less improvements were recorded in the reduction of water runoff (7.78%), sending children to school (2.78%) and availability of animal feed (0.56%).

Impact of livestock interventions. Table 8 shows impacts livestock interventions in the study area. Improvement in household income (90.0%), increased animal production (78.3%) and improved standards of families (58.3%) were the major improvements observed the study watersheds. Due to these integrated livestock interventions, in family feeding habits changed (26.55%), animal feed problems were solved (26.21%) and household food security was achieved (24.14). The other achievements recorded though minimal were improvement in animal health (13.4%), sending children to school (4.5%) and maintaining physical structure (3.8%).

Table 7. Impacts of crop improvement interventions

Impact type	Zones				Total	
	South Gonder		West Gojjam		Frequency	Percentage
	Frequency	Percentage	Frequency	Percentage		
Animal feed solved	1	0.89%	1	0.56%	2	0.68%
Able to send children to school	1	0.89%	5	2.78%	6	2.05%
Crop yield improved	56	50.00%	134	74.44%	190	65.07%
HH income increased	57	50.89%	128	71.11%	185	63.36%
Save labour	0	0.00%	10	5.55%	10	3.42%
HH food security	70	62.50%	92	51.11%	162	55.48%
Living standard	30	26.79%	67	37.22%	97	33.22%
Reduce water runoff	19	16.96%	14	7.78%	33	11.30%
Reduce post-harvest lost	0	0.00%	1	0.56%	1	0.34%
Total	112	36.36	180	61.64%	292	100%

In South Gonder zone, household income (92%) and animal production increments (90.2) were the major impacts that resulted from those integrated livestock interventions. In addition, the interventions improved living standards of families (71.4%), improved household food security (43.8%), and food habits (37.50%). There were also improvements in access to animal feed (27.68%) and animal health (25%). Some few respondents also reported that they were able to send their children to school (3.57%) and maintained physical structures as a result of livestock interventions in the study watersheds.

In West Gojjam, improvements were recorded for household income (88.8%), animal production (70.8%) and living standards. The other positive impacts in the study watershed were improved access to animal feed (25.3%) and changing family food habits (20%). Other improvements were shown in animal health (6.18%), maintenance of physical structures (5.62%) and capacity to send children to school (5.06%).

Conclusions and recommendations

Integrated watershed management interventions were made in Western Amhara region to improve the sustainability of natural resource management in general and soil and water conservation activities in particular to enhance human livelihoods. From a livelihood perspective, both crop production and livestock keeping have been the major means of living for the community in the study watersheds.

As a result, farmers have considered farmlands, closure areas and forest as the most important natural resources in the watershed.

Table 8. Types of livestock intervention impacts

Impacts of livestock intervention	Zones				Total	
	South Gonder		West Gojjam		Frequency	Percentage
	Frequency	Percentage	Frequency	Percentage		
Increased income	103	91.96%	158	88.76%	261	90.00%
Animal production increment	101	90.18%	126	70.79%	227	78.28%
Animal feed problem solved	31	27.68%	45	25.28%	76	26.21%
Animal health problem solved	28	25.00%	11	6.18%	39	13.45%
HH food secured	49	43.75%	21	11.80%	70	24.14%
Family food habit changed	42	37.50%	35	19.66%	77	26.55%
Living standard improved	80	71.43%	89	50.00%	169	58.28%
Maintain physical structure	1	0.89%	10	5.62%	11	3.79%
Able to send children to school	4	3.57%	9	5.06%	13	4.48%
Total	112	38.62%	178	61.37%	290	100%

Integrated watershed management interventions constituted natural resource management options, crop production and livestock rearing. For natural resource management, construction of different physical soil and water conservation structures, planting trees and promoting area closure areas were the dominant interventions. The major intervention in crop production included introducing improved crop varieties, inorganic fertilizer and crop protection practices while those for livestock were improved forage development, improved poultry breeds and animal husbandry practices.

Through these integrated interventions, significant improvements were achieved in the study watersheds. Some of these were increased crop and livestock production, improved micro-climate and drought problems, promotion of closure areas and tree planting; and improved household income. Finally, as a result, farmers were able to secure household food security and an improvement in living standards.

However, the contribution of these integrated interventions in recovering degraded land, sustaining physical structure, improving biodiversity and increasing volume of streams was minimal in study watersheds. Therefore, to be more visible and meet overall targets of these integrated interventions, the current momentum in implementing integrated watershed management interventions should continue. Watershed based innovation platforms should be developed to give equal opportunity to all in improving and sustaining this integrated watershed development and to improve synergy among watershed actors. Efforts should also be made to scale up some of the successes to similar watersheds.

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