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RURAL VILLAGE WATER RESOURCES MANAGEMENT PROJECT PHASE III

Irrigation Scheme and MUS Business Plan Impact Study

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1. Executive summary

Irrigation and MUS Business Plan impact study aims to provide information on whether irrigation schemes and MUS Business Plan implemented by the project have been helpful to change the living standard of local people. The study will guide the project and other readers whether the irrigation schemes and Business Plans developed and implemented by the RVWRMP have been effective in providing long-term impacts for the target beneficiaries.

The study is based on a questionnaire sent to one irrigation scheme in 9 working districts (Achham, Doti, Dadeldhura, Baitadi, Bajhang, Darchula, Bajura, Dailekh). Humla was excluded due to poor internet connection and difficult access during the winter when data collection took place. For the MUS Business Plan study, five schemes which have developed a Business Plans and five schemes without such development were selected for comparison. 5 individual respondents were interviewed and one focus group discussion was held to collect the data in each scheme for both the irrigation and MUS Business Plan aspects of the study.

Irrigation impact study found that the UC committees were well-organized. They had clear roles and responsibilities, management of operational and maintenance works, fund collection, and around half of them had water distribution rules. The beneficiaries were using the irrigation facilities for commercial farming of vegetable and cash crops. The average area of the irrigated land increased significantly after construction of the scheme as farmers' transformed non-irrigated land to systematically irrigated land. As a result of irrigation schemes, the species of crops per annum typically increased from 2 to 3, production and productivity increased around 50%, the farmers increased their incomes and their economic status improved, and the time used for managing the water distribution was reduced and used for other farming works. Furthermore, the environmental situation improved due to protection of the area around the spring including erosion protection, and an increased number of greeneries and vegetation close by irrigated areas.

MUS Business Plan impact study found that the development of MUS business plans increased the proportion of farmers involved in commercial farming activities compared to areas without a plan. They also earned more, and were more familiar with market trends thus they could produce market oriented commodities. Overall the farmers with irrigation schemes and implementing the MUS Business Plan are much more aware of both management aspects and the socio-economic aspects of agribusinesses.

In conclusion, projects working with the farmers at the grassroots level to develop farming infrastructure and build the capacity of locals, such as RVWRMP, are effective towards bringing change in the living standard and livelihoods of the target beneficiaries.

2. Introduction

Background: The RVWRMP is working in Sudurpaschim and Karnali provinces in water and sanitations with integrations of livelihood, social issues, cooperative development and advanced level of livelihoods like income generations, agribusinesses, microenterprises and value chain development. The project is working in multiple sectors which are directly or indirectly linked with the provision of water. Irrigation and MUS are crucial in the work of RVWRMP for changing the livelihoods of the target beneficiaries. Without irrigation facilities it would be difficult to change the livelihood of the communities. The provision of drinking water and irrigations implemented together is termed multi-use water system (MUS). Drinking water itself might bring a change in the health conditions of the communities but integration of irrigations along with drinking water, waste water management for productive works added more values for the health and livelihoods of the target communities. Tapping on to the opportunities of the MUS systems, the project also entered into the development of business plans as an advanced level for improving the livelihood in the target communities.

Although the project closely monitored and frequently evaluated the significance of implemented interventions it was essential to measure the factual results of the irrigation schemes and the MUS business plan at micro-level. To fulfil this objective, the project designed the research and impact study of irrigation and MUS business plan. The study focusses on the target beneficiaries' management practices for the sustainable uses and changes brought about by the irrigation and the MUS business plan schemes on their livelihoods, economic status, health and well-being. The concept applied by the study was to measure the before and after situation in terms of management and livelihoods. Likewise, the significance of the MUS business plan was to measure the significance of business plan by comparing the MUSes with business plan and the MUSes without business plan.

The research and study aimed to bring tangible information on the significance of both types of work. This report present the results of the study and will guide further implementation of these types of interventions for internal use of the RV projects and serve as an inspiration for external use for others working within the same area.

Objective of the study: The main objective of the research and study work is "to find out whether the implemented MUS business plan and the irrigation schemes are effective for achieving livelihood change in target communities or whether they are just burden for them". Other objectives of the study are as follows:

- To find out the management, operational and maintenance practices of the farmers for long run of the irrigation schemes.
- To find out the people who benefitted from the irrigation project and who are not benefitted and the reasons behind it.
- To measure the impacts of the irrigation scheme to livelihood of the beneficiaries and impact of it in the environment.
- To find out the degree of effectiveness of the MUS business plan in MUS constructed areas.

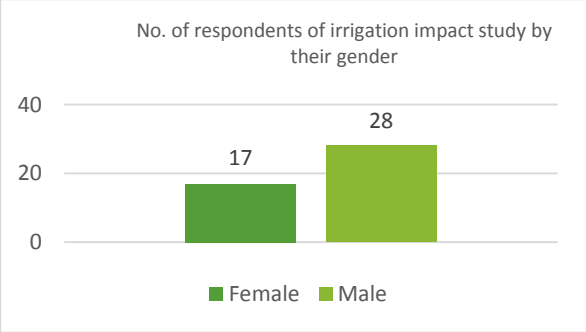
3. Methodology

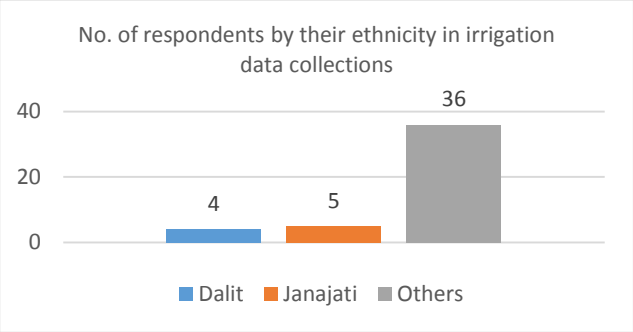
The mehodology applied for the irrigation and MUS impact study has followed various stages:

1. Preparatory stage: Before commencing the formal research and study work, senior management team (experts) designed the study including key questionas for study parameters, work assignments, and

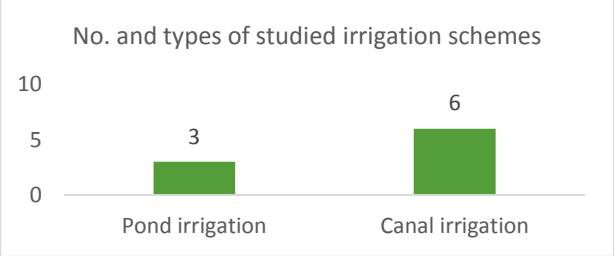
tentative time to carry on the work. In this stage, the skeleton of the irrigation and MUS business plan impact study was designed through in-depth discussions between all the PSU specialists.

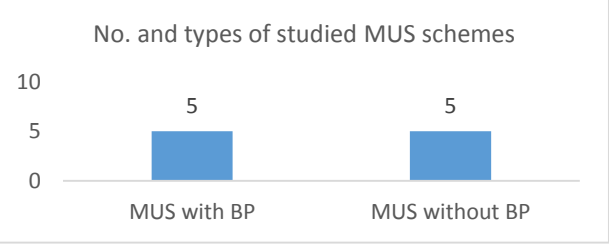
2. Questionannaires and checklist development stage: In this stage, as guided by the study framework, the questionnaires for individual respondents and the checklists for focus group discussion was prepared. Previous project reports on irrigation and MUS business plans were studied and used as a base for the questionnaires and checklists. Series of meetings were conducted with senior management teams and the concerned staff members to finalize the questionnaires.
3. Pre-test of survey questionnaires and the Checklist: A test survey was accomplished before the finalization of survey questionnaires and the checklist in Aalital RM of Dadeldhura district. To test the survey questionnaires and the checklists, one irrigation project area, one MUS with BP area and one MUS without BP areas were visited. The test survey proved valuable for refining the questionnaire and checklists.
4. Pre-data collection meetings with potential data collectors: A zoom meeting was organized with the data collectors i.e. livelihood officers and the livelihood facilitators before commencing the survey work. Through this meeting the selection of study areas was finalized and the data collectors guided to how to collect the data for the study.





5. Organization of data collection works: One irrigation scheme in each of the 10 districts were supposed to be selected for the irrigation impact study. Due to inaccessible internet access and lack of proper communications with the staffs of Humla only 9 districts were enrolled for the irrrigation impact study. In each irrigation scheme 5 repondents for individual data collection and one focus group discussion was held to collect the data. Likewise, five districts' five MUS with BP and five MUS without BP were selected for MUS-BP impact study. Even in each selected MUS schemes 5 respondents for individual data collections and one FGD in each MUS scemes. One MUS without BP was recently constructed. Assuming the no change occurance in a short period only one household is brought for impact study.
   As illustrated in the graphs, three pond irrigation systems and six canal irrigation systems were brought for impact study. Likewise, five MUS with business plans and five MUSes without business plan were studied for impact studies.



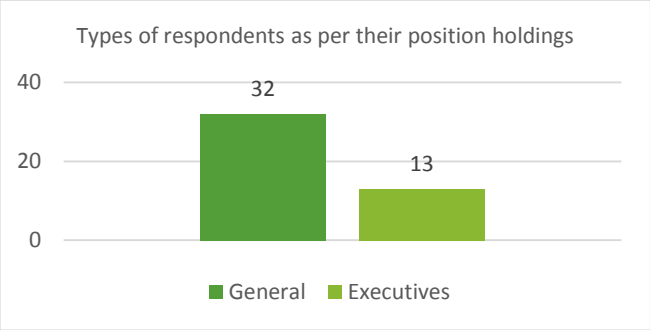


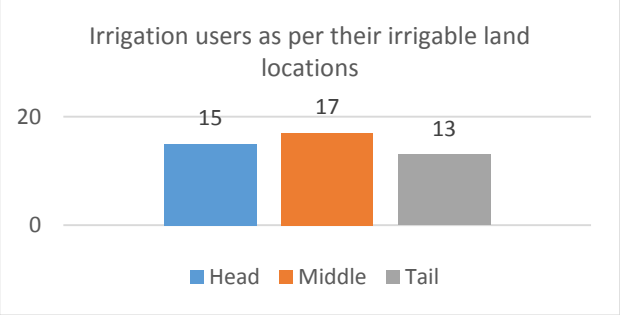
In irrigation impact study, there were 17 women and 28 men, 4 Dalits, 5 Janajatis and 36 Others interviewed for irrigation impact study survey. Likewise, in MUS Bsuiness plan impact study, there were 13 females and 12 males, 4 Dalits, 5 Janajatis and 36 Others in MUS with BP and 8 female, 13 male, 2 Dalits, 5 Janajatis and 14 Others in MUS without BP.

Disaggregated data of irrigation impact studied respondents					
No. of schemes	Gender		Ethnicity		
	Female	Male	Dalit	Janajatis	Others
9	17	28	4	5	36

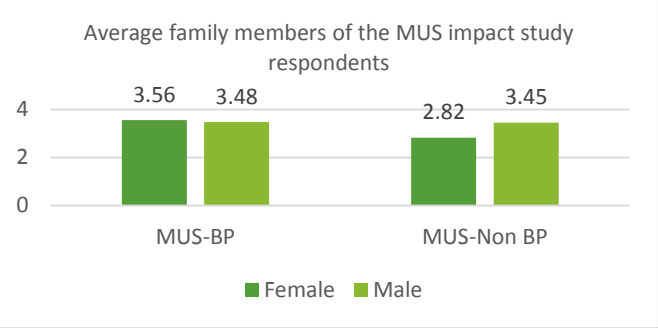
Disaggregated data of MUS-BP impact studied respondents					
MUS Types	Gender		Ethnicity		
	Female	Male	Dalit	Janajatis	Others
MUS with BP	13	12	4	5	16
MUS without BP	8	13	2	5	14

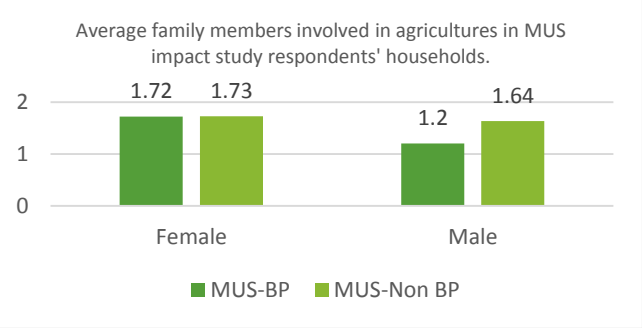
In order to collect data on irrigation impact study both executive members and the general users were interviewed. Almost 13 executive members and 32 general users were included for interview. Likewise, as per the irrigable land locations the first one third part of the canals or ponds owned by the users termed as head users, second one-third users termed as middle users and third or last one third users termed as tail users. The compositions of the respondents as per irrigable land locations were 15, 17 and 13 users from head, middle and tail parts.





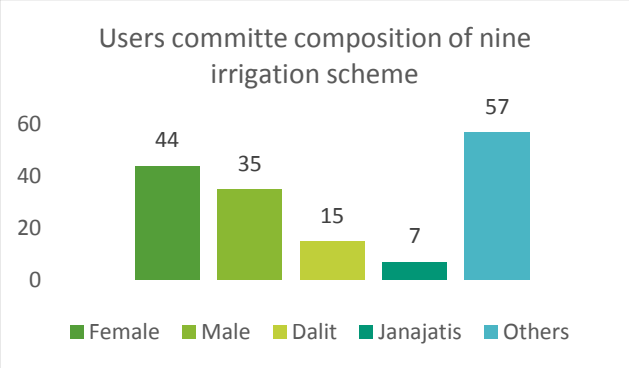
The average household members of the respondents found 3.56 female and 3.48 male in MUS with BP areas and 2.82 females and 3.45 males in MUS without BP areas. Likewise, the number of household members fully involved in agricultures of respondents found 1.72 female and 1.2 male of MUS with BP and 1.73 females and 1.64 male in MUS without BP areas.

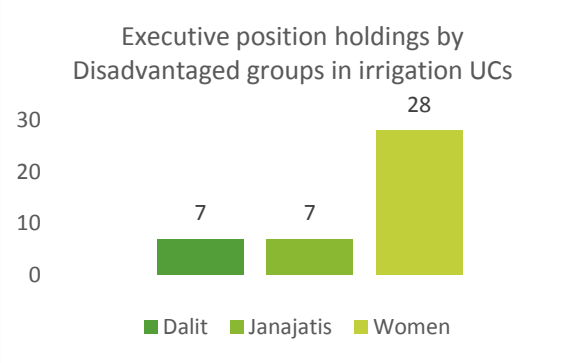




6. Data collections: Livelihood facilitators (LF) and the livelihood officers (LOs) have collected the data for both irrigation impact study and the MUS business plan impact study. The research leader self-mobilized to collect the data in Bajura, Achham and Dailekh, where there no longer was LOs. The data of individual farmers were collected through one-by-one interview. The questions were formulated in such a way that the interviewees easily could understand the questions and response freely. Likewise, the focus group

discussions were conducted with the participation of all levels of users like executives, general members, women, Dalits, Janajatis etc.
Likewise, the focus group discussions was conducted in participation of all levels of users like executives, general members, women, Dalits, Janajatis etc. From the FGD, it was found that users' committee composition is 44 women, 35 Male, 15 Dalit, 7 Janajatis and 57 others. The executive position holdings by the disadvantaged groups was 7 Dalits, 7 Janajatis and 28 women from the 9 irrigation schemes.





7. Data entry, tabulations and analysis: The collected data were entered in excel sheet prepared on the basis of the questionnaires. Separate data entry sheets were prepared to enter the data of irrigation schemes (both individuals and the focus group discussions) and MUS business plans (both MUS with business plan and MUS without business plan). The responses of individual interviewees and the data collected from focus group discussions considered separately. Data were tabulated where main sheet (both individual and focus group discussions) of the data are linked with the tables. Data was analysed and various types of graphs and charts were used to illustrate the results informatively.
8. Analytical write up of report: The research report follows the analysis of the findings. In chapter 4 Results (Key findings), is organized in accordance with the questions-. The draft report has been shared with the project specialists and incorporates the suggestions and corrections as appropriate.

4. Results (Key Findings)

Basically, the results are split into the two major themes of the study. First the section explore the findings of the impact of irrigation scheme in which management and operational practices of the irrigation scheme and livelihood change status of the target beneficiaries before and after construction of the scheme. The impact of irrigation schemes on the environmental situation is also covered. Second part covers the findings of the implication of the development of a MUS business plan in the MUS scheme. The study explored the differences in livelihood, market, information, major practices of farmers in the MUS with business plan and farmers without a business plan but with a MUS scheme. The elaborative findings are as follows:

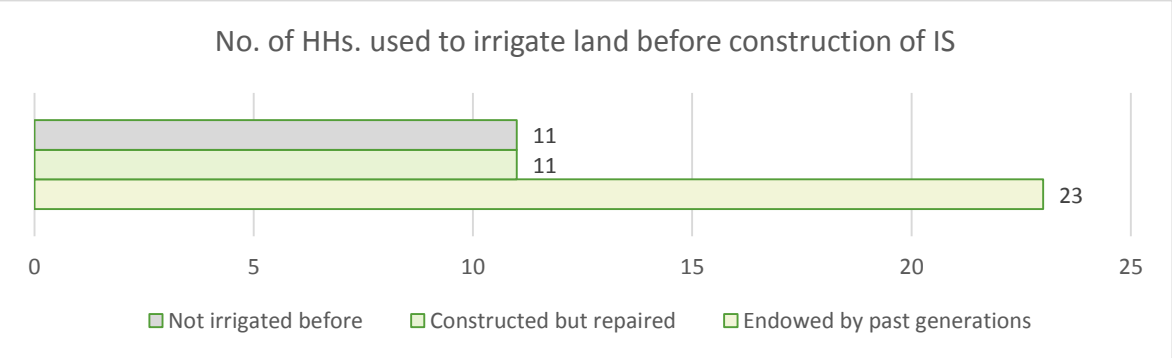
4.1. Impacts of irrigation schemes

4.1.1 Management, operational and maintenance status:

How do/did the farmers support to manage the irrigation scheme? And how did they irrigate land before construction of the scheme?

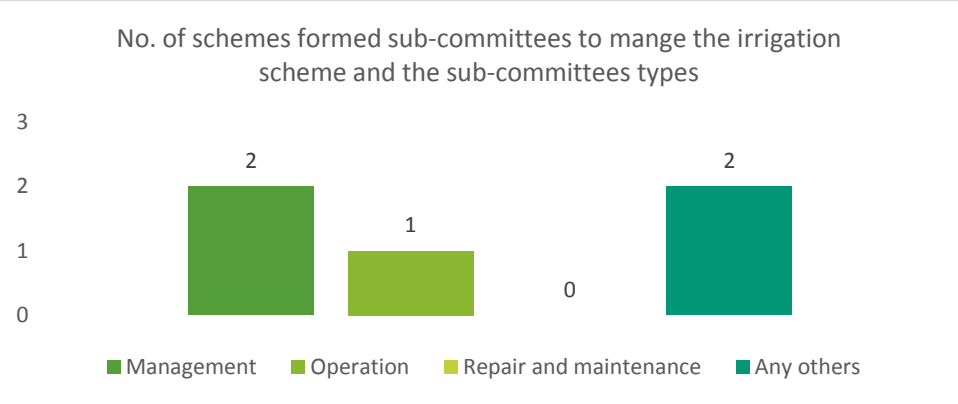
Almost all the respondents responded that they have contributed to construct, operate and maintain the irrigation scheme with both cash and kind. All 45 respondents from the surveyed households (representing different schemes) responded that they had contributed cash, collection of local materials and the labor to construct the scheme and likewise to operate and maintain the irrigation scheme for long term sustainability and adequately taking benefits of the scheme.

Depending on the irrigation scheme, some are repaired and some are newly constructed. It has been found that 23 farming households were irrigating their lands endowed from past generations, 11 farming households used to irrigate their lands from previously constructed (RV repaired) schemes and 11 farming households didn't irrigate their land. After construction of the irrigation scheme, all the households within the area are irrigating their lands. Color scheme – to be changed



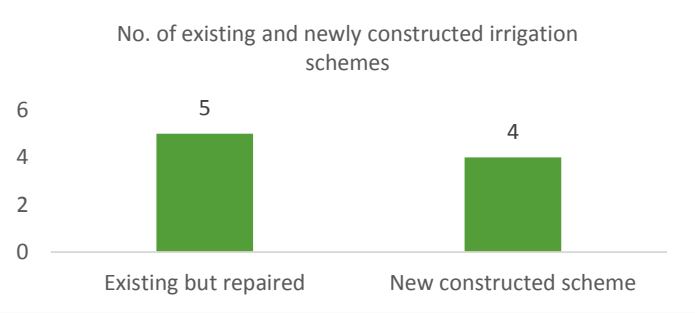
Are there any sub-committees formed for management, operations, repair and maintenance etc.? If yes, please mention the name of sub-committees.

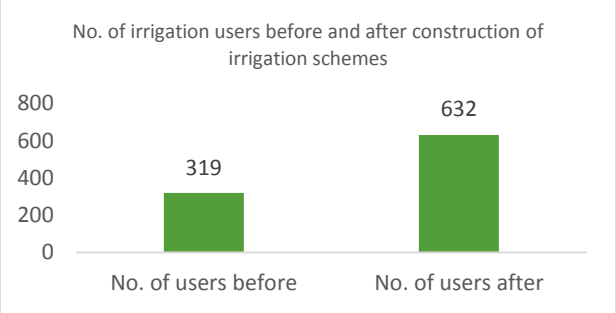
There are functional sub-committees formed to ease the different works of the irrigation schemes. There are 2 management sub-committees, 1 operation sub-committee and other types of sub-committees like monitoring/agriculture sub committees are formed in nine irrigation schemes. These sub-committees independently work for proper management and operation of the irrigation schemes.



Is there previously existing irrigations or newly constructed? If previously existed no. of users before and after, if newly constructed no. of users.

Among the studied irrigations 5 schemes were existing but repaired and 4 schemes are newly constructed. Likewise there were 319 users who previously irrigating their lands but the users reached 632 after construction of the schemes.





Are the users committees regularly meet to plan and execute for mutual benefits? If yes, what sorts of plan do they make and execute.

The users committees of 6 irrigation schemes regularly meet while the users committees of 3 irrigation schemes occasionally (as per need) meets. During the meeting the users committees generally talks about the operations and maintenance needs, farming practices, water distributions, crop planning and marketing of the products. This shows that the irrigation schemes are more institutionalized after construction of the irrigation schemes.

Table 1: Meeting regularity status of the users committees.

Is the users committee regularly meet, if yes major decisions do during the meeting		
Meets regularly	Meets occasionally	Major decisions done during the meeting
6	3	O&M, farming practices, water distribution, crop planning, market

Is there any provision of No. of VMWs? If yes, are there any female VMWs? What is the payment system and the source?

Among the studied irrigation schemes 7 UCs are provisioning the 8 VMWs. The payment rate of the VMWs mostly is mostly provided in daily wages 300 to 700 NRs. per day and one scheme providing 3000 NRs. per month. In all the studied schemes there are no any women VMWs. The source of payment for VMWs is in general from the O&M funds, water milling as incentives and some provides no payment to them.

Table 2: VMW provisioning status of the irrigation schemes

No. of schemes provisioning VMWs.	No. of VMWs	No. of female VMWs	Payment rate	Payment sources
7	8	0	Daily wages from 300 to 700 NRs. 3000/month in one scheme.	O&M funds, water mills as incentives, no any practices

Is the water enough for all the users to irrigate their land? If not, how do they manage the irrigation without any conflicts in the group?

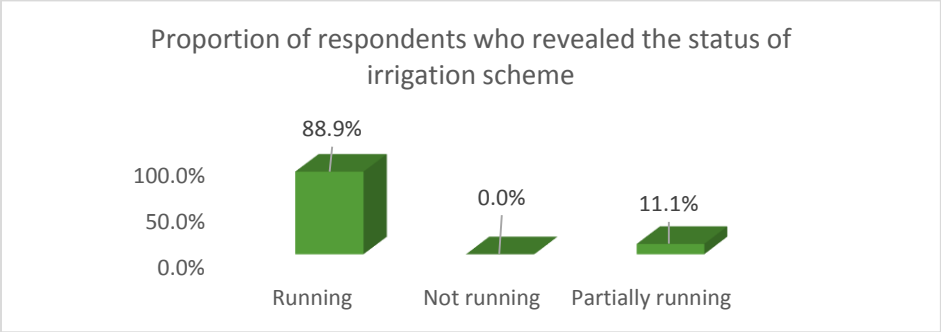
Among 9 irrigation schemes 7 irrigation schemes have sufficient water to irrigate the land whereas 2 schemes has insufficient water to irrigate. In case of insufficiency the users committee made equal distribution rules to provide the facilities to all the users. This practice shows the irrigation schemes are following democratic rules as institutionalized ways.

Table 3: Water sufficiency status of the irrigation schemes

Water sufficiency status		
No. of IS with Sufficient	No of IS (Insufficient)	Management practice if not sufficient
7	2	Equal distribution if case insufficient

Is the irrigation scheme in running condition? If yes, how long and if no how long.

Among the surveyed HHs. 88.9% respondents revealed that the irrigation scheme was functional from 2074 to 2077 (2019-2022) and 11.1% respondents revealed that their scheme was partially functioning. The main reason for partial functionality involved damage in canal structure or distribution pipeline. All surveyed schemes were at least partially running, no closed down schemes were found. None of the respondents informed that the schemes were damaged at the time of survey. This shows that due to management and operational skill of the beneficiaries the irrigation schemes have been functioning from the date of their construction. The users committees of partially running schemes are coordinating with local government for reconstructions and full functioning of those schemes.



Is there any privileges to the users while using the water?

There is only one users committee provides privilege to the some specific users like VMW, users near the springs or head users. Other 8 users' committee don't have any system of providing privilege. The types of privilege are priority to provide irrigation facilities.

Table 4: Water use privileges status to the users of the irrigation schemes.

Water use privilege status		
IS provides privilege	IS not providing privilege	Types of privileges
1	8	VMW and source near users get first priority

What position do the respondents hold and what roles and responsibilities do they perform to manage, operate and maintenance of the irrigation scheme?

In most of the irrigation scheme the key position holders within the UC possess roles and responsibilities for the management of the irrigation scheme. Among the surveyed households, an average of 2 respondents are responsible to manage the irrigation scheme. The management role includes checking operational status, organizing meetings regarding major decisions, labor costs accumulations, monitoring of the scheme, coordination, communication, etc. With exception of Thulo Kulo irrigation scheme, all mentioned their roles and responsibilities in relation to the management of the irrigation scheme.

Table 5: Roles and responsibilities distribution status to manage the irrigation schemes.

Roles and responsibilities for irrigation scheme management			
Name of irrigation scheme	**No. of respondents**	**Major position holdings**	**Major roles and responsibilities**
Sapra Canal Irrigation	2	Chairperson, Member	Checking of operational status of irrigation, meetings, labour costs collection, etc.
Sinyadi Irrigation	3	Treasurer, member	Monitoring, decision making and fund collections
Raichu Nun Chya Irrigation	1	Member	O&M fund contribution, labour contribution
Ranamul Irrigation	3	Secretory, members	O&M works, Discussion to manage, sustainability assurance
Sahade Irrigation	2	Chairperson, Member	Labour and coordination, labour saving
Tallekhali Irrigation	1	Secretory	Community mobilization
Jhulkekhola Irrigation	5	Chairperson, Members	Meeting, labour accumulation, patrolling, works as per decision
Nauli Pond Irrigation	1	Chairperson	Management of the project
Thulo Kulo Irrigation	0	NA	NA

In almost all the scheme at least one respondent mentioned their own roles and responsibilities for the management of the irrigation scheme. In addition, almost all perform different roles for operating the irrigation scheme such as operational support, monitoring, work assignment, fund collection and community mobilization.

Table 6: Roles and responsibilities distribution status to operate the irrigation schemes

Roles and responsibilities for irrigation scheme operation			
Group name	**No. of respondents**	**Major position holdings**	**Major roles and responsibilities**
Sapra Canal Irrigation	1	Member	Operation support
Sinyadi Irrigation	3	Treasurer, member	Monitoring and work assignment decision
Raichu Nun Chya Irrigation	1	Member	Monitoring
Ranamul Irrigation	2	Secretory, members	Monitoring
Sahade Irrigation	2	Chairperson, Member	Fund collections, support to O&M worker
Tallekhali Irrigation	1	Secretory	Community mobilization
Jhulkekhola Irrigation	1	Chairperson	Ensure the scheme is operating
Nauli Pond Irrigation	1	Chairperson	Operation support, fund collection
Thulo Kulo Irrigation	0	NA	NA

Almost 64.44% of the respondents contribute to repair and maintenance of the irrigation scheme through facilitation, store management, fund collections, monitoring, labor contribution, labor mobilization, major decision making, VMW mobilization, etc.

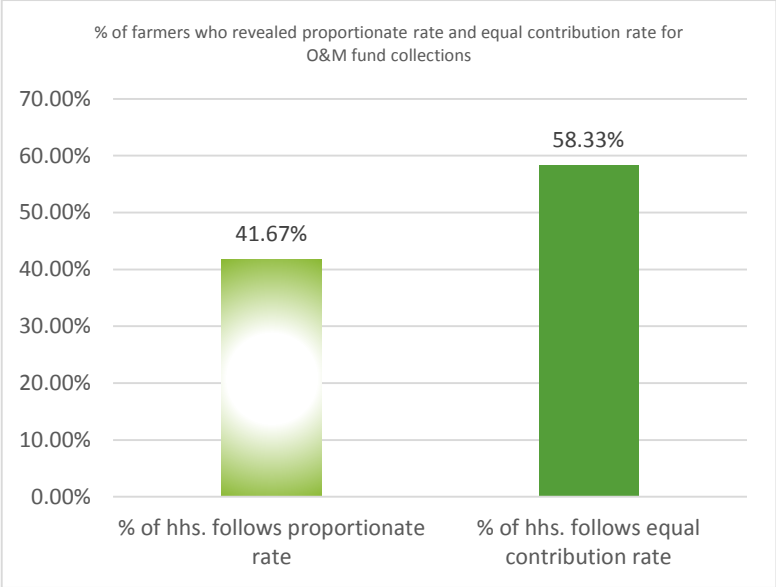
Table 6: Roles and responsibilities distribution status to repair and maintain the irrigation schemes.

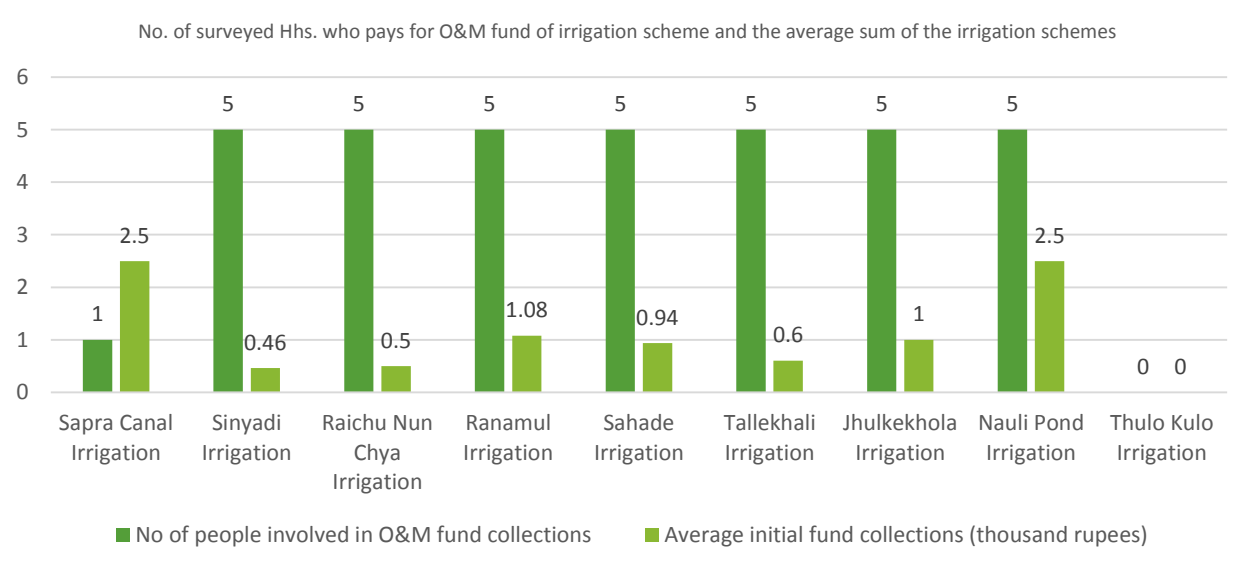
Roles and responsibilities for repair and maintenance of the irrigation scheme			
Name of irrigation scheme	**No. of respondents**	**Major position holdings**	**Major roles and responsibilities**
Sapra Canal Irrigation	2	Chairperson, Member	Repair facilitation

Sinyadi Irrigation	3	Treasurer, member	Store keeping, assigning work and fund collections
Raichu Nun Chya Irrigation	3	Member and users	Repair/funds collections, Monitoring, Labour contribution
Ranamul Irrigation	2	Secretory, members	Contribute for O&M, Fund collections
Sahade Irrigation	5	Chairperson, Member, user	O&M, fund collection support
Tallekhali Irrigation	4	Secretory, users	Labour contribution and labour mobilizations
Jhulkekhola Irrigation	1	Chairperson	Lead O&M activities
Nauli Pond Irrigation	4	Chairperson and users	Communication, VMW mobilization, Fund contribution, Labour contribution
Thulo Kulo Irrigation	5	Users	Labour/cash contribution

Is there any system of O&M fund collections, if yes in average how much do they contribute so far?

Among 45 HH respondents, 36 HHs paid O&M fund which is managed by the Users Committees either in initial stage or also in later stage. The graph below shows that among 9 irrigation scheme all the respondents of 7 irrigation schemes mentioned they have practice of collection of funds for operation and maintenance, 1 respondents of Sapra irrigation scheme mentioned they have operation and maintenance fund collection practices. But 1 scheme, Thulo Kulo irrigation scheme, missed the data. Scheme-wise fund collection in the initial stages ranges from 460 to 2500 NPR. 41.67% follows proportionate rate and 58.33% follows an equal contribution for the O&M fund collections. Collection for later stage operational maintenance is rarely practiced but as per informal interaction with the members of the UCs, they practice collection of O&M funds as per need and requirement. Data was not available for Thulo Kulo Irrigation.





Are there any rules of water distribution in the irrigation scheme? Who gets the first turn and why? Please also mention how to cover the uncovered households of the scheme area.

It has been found that 4 irrigation schemes have rules for how water is distributed. Other 5 irrigation schemes don't have such types of rules but use the water as per need of the farmers.

The table below shows the priority order of the use of water. In general the order follow HEAD-MIDDLE-TAIL i.e. in view of the canal alignment and the distribution line of the pond. The first in line gets first irrigation water, subsequently the others in accordance with their location to the canals. In some irrigation scheme the water is used as per need of the farmers in others the commercial farmers get priority. No notable conflicts are noted concerning the distribution after construction of the irrigation scheme and thus no need for water distribution rules. They have developed common understanding that as per need, whoever can use the water.

To cover the uncovered households most find that there is a need for extension of the canal, extension of the distribution line, construction of additional ponds and distribution channels through coordination with wards and the rural municipality. Nauli irrigation scheme would like to lift the water from lower sources and provide the facilities to the uncovered households. In the focus group discussions, most of the irrigation scheme beneficiaries are going to propose their plan of irrigation to cover the uncovered households in upcoming RM councils.

Table 7: Water distribution priority orders and ideas to cover uncovered households of the schemes.

Name of irrigation scheme	**Priority orders**	**Ideas to cover uncovered HHs.**
Sapra Canal Irrigation	Head-middle-tail	Extension of canal alignment through coordinating with RM
Sinyadi Irrigation	As per need	All HHs. are covered
Raichu Nun Chya Irrigation	As per need	All HHs. are covered
Ranamul Irrigation	Head-middle-tail	Extension of distribution line through coordination with RM
Sahade Irrigation	Need identification and distribution by group decision	Construction of additional ponds and distribution line through coordinating with RM
Tallekhali Irrigation	As per need	Extension through coordinating with RMs
Jhulkekhola Irrigation	As per need	All HHs. are covered
Nauli Pond Irrigation	Commercial farmers get additional water	Water lifting to cover the additional HHs.
Thulo Kulo Irrigation	As per need	All HHs. are covered

4.1.2 Major Benefits/Drawbacks before and after construction of the irrigation scheme.

What are the major uses of the irrigation scheme after construction of the scheme?

Table 8 summarizes the major uses of the water in irrigation schemes. It is found that, all farmers within the irrigation schemes cultivate cereals combined with vegetables either in whole patches or partially with cereals and fruits.

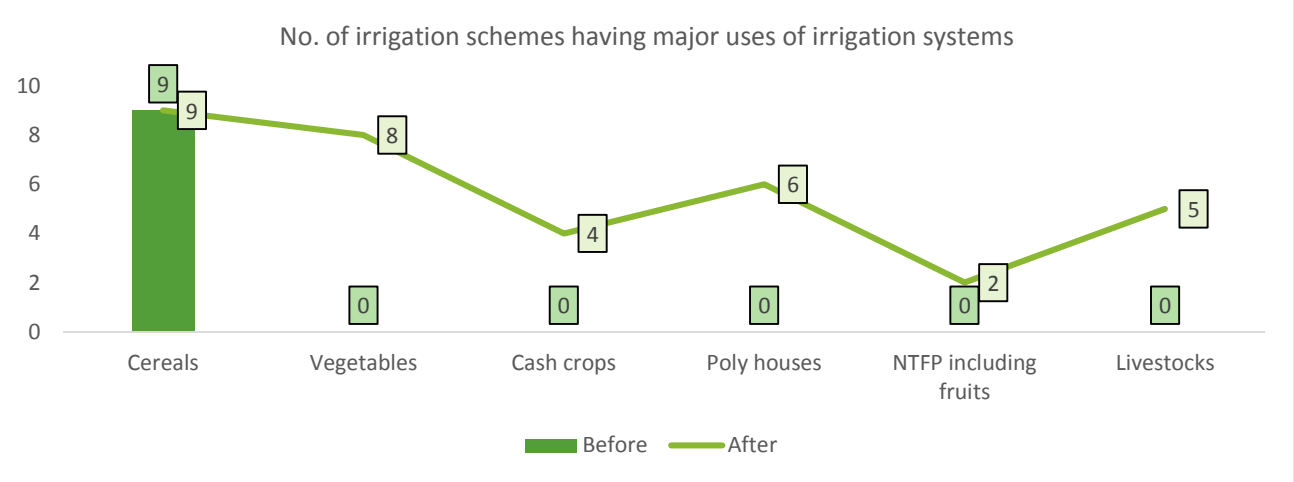
Table 8: Summarized major proposes of irrigation schemes through scheme constructions.

Major purposes of irrigation of irrigation schemes	
Name of irrigation scheme	**Major purposes**
Sapra Canal Irrigation	Cereals, Vegetable, Watermill, Bathing
Sinyadi Irrigation	Cereals crops, water mills

Raichu Nun Chya Irrigation	Cereals, vegetable, fruits, Livestock
Ranamul Irrigation	Cereals, vegetable, Livestock
Sahade Irrigation	Cereals, vegetable, cash crops
Tallekhali Irrigation	Cereals, vegetable, fruits, Livestock
Jhulkekhola Irrigation	Vegetable, cereals
Nauli Pond Irrigation	Vegetable, poly-house farming
Thulo Kulo Irrigation	Vegetable, cereals

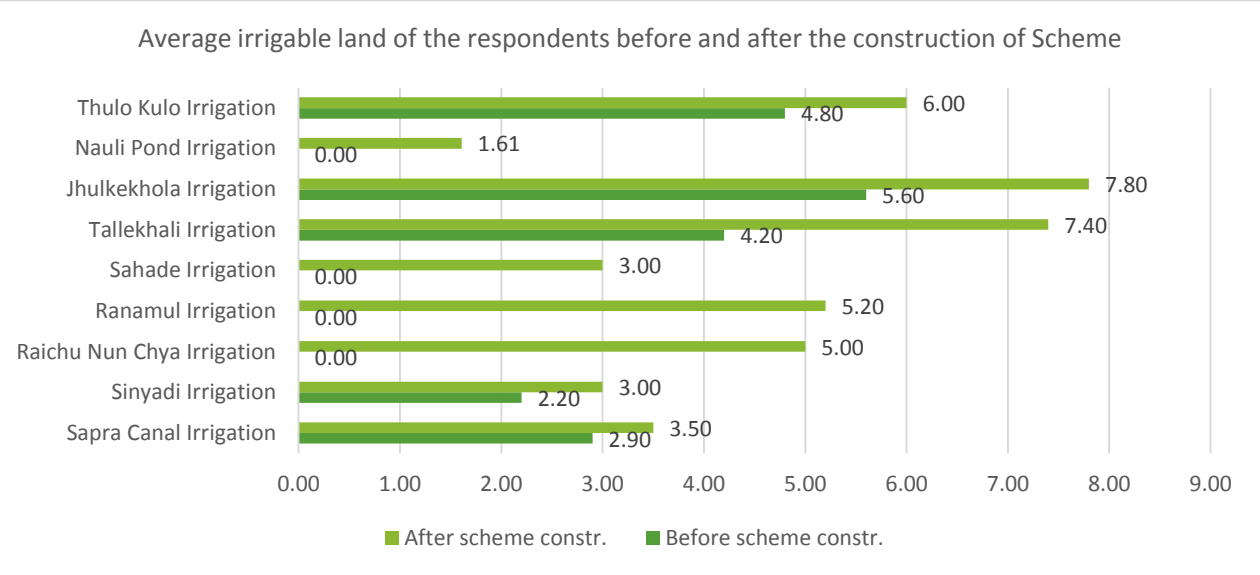
What are the major uses of the irrigation system? (Cereal/cash crops, vegetable, fruits, livestock etc.)

Farmers of almost all 9 irrigation systems used water to cultivate the cereal crops before construction of the Schemes. But, after constructions of the schemes farmers of all 9 studied irrigation schemes partially use the water for cereal crops, 8 users groups also use water for vegetable farming, 4 groups also use water for cash crops, 6 groups use water for poly-houses, 2 groups use for NTFP and 5 groups use water for livestock rearing. Indeed, the farmers of the irrigation schemes are using water for different purposes that help them to bring positive change in their living standards after construction of the irrigation schemes.



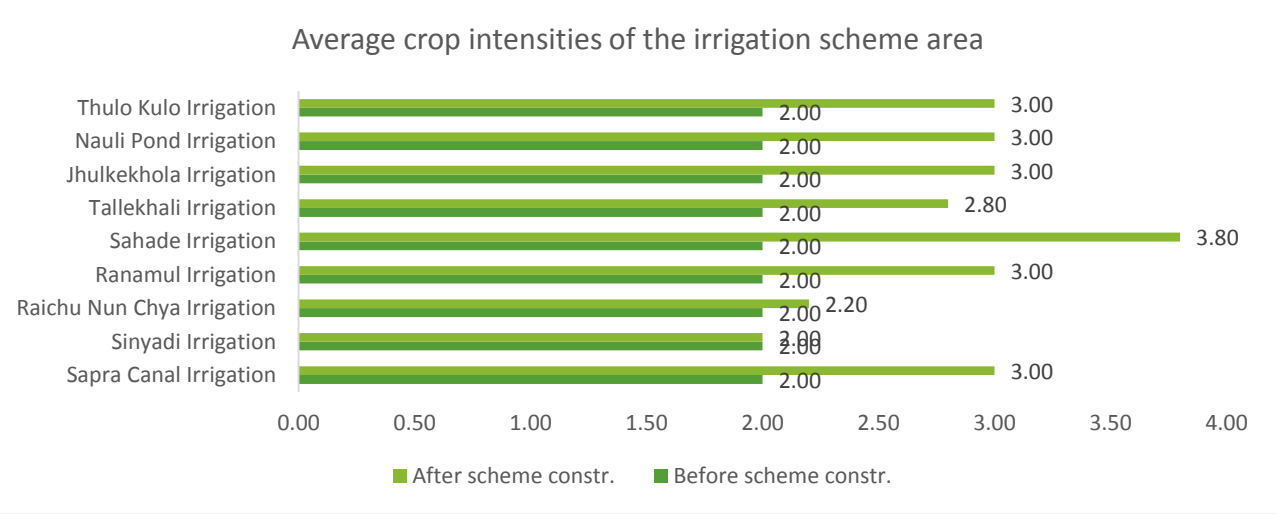
What is the average area of the irrigable land before and after construction of the scheme?

The average area of the irrigable land increased after construction of the scheme. Sahade irrigation scheme has zero area of irrigable land before irrigation scheme construction. Others had been irrigating either previously constructed schemes or self-managing the water resources as irrigation supplement. The irrigable land before construction of the scheme ranges from 0 to 5.60 Ropanis per households. The average irrigable land after construction of the irrigation scheme ranges from 1.61 to 7.80 Ropanis. The result shows that in average of 2.53 Ropanis irrigable land of the individual farmer is increased from the constructed irrigation schemes.



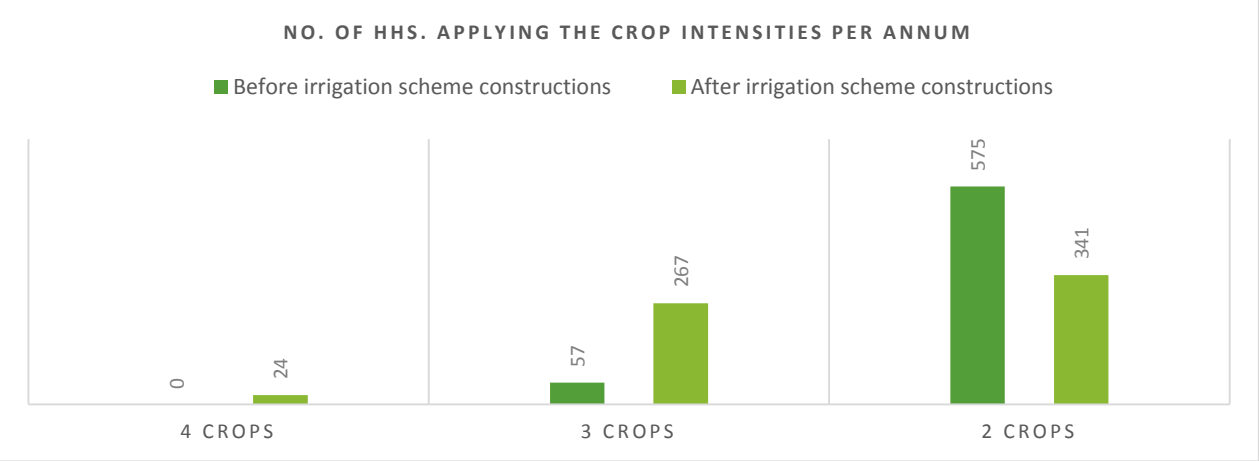
What are the crop intensities (number of the crops per annum) and cropping pattern of the farmers in irrigation scheme constructed areas before and after construction of the scheme?

Crop intensities of the irrigation scheme area is increased significantly after construction of the Scheme. 8 irrigation scheme areas increased their crop intensity (no. of crops per annum after construction of irrigation scheme). In general, the no. of crops was 2 crops per annum before construction of the scheme but after construction of the scheme it has been ranged 2 to 3.8 crops per annum. In conclusion, it can be said that the farmers within the scheme area on an average increased their productions and earning by utilizing multiple seasons after construction of the scheme. On the other hand, increased number of crops may cause faster soil depletion from nutrients.



There were negligible numbers of farmers who maintain one cropping sesons before and after construction of irrigation schemes. There were large numbers about 575 households of the beneficiaries used to apply 2 no. of crops, 57 households maintain 3 crops per annum before construction of irrigation

schemes. But after construction of the irrigation scheme the large numbers of the households about 267 farmers maintaining 3 crops, 24 farmers are maintaining 4 crops and 341 farmers are maintaining 2 crops per annum after construction of the irrigation schemes. This shows that, the farmers who are having irrigation facilities best utilizing the water in their farms. In spite of 2 crops they are maintaining 3 or 4 crops. Likewise, the farmer who are maintaining 2 crops per annum also earning by vegetable farming.



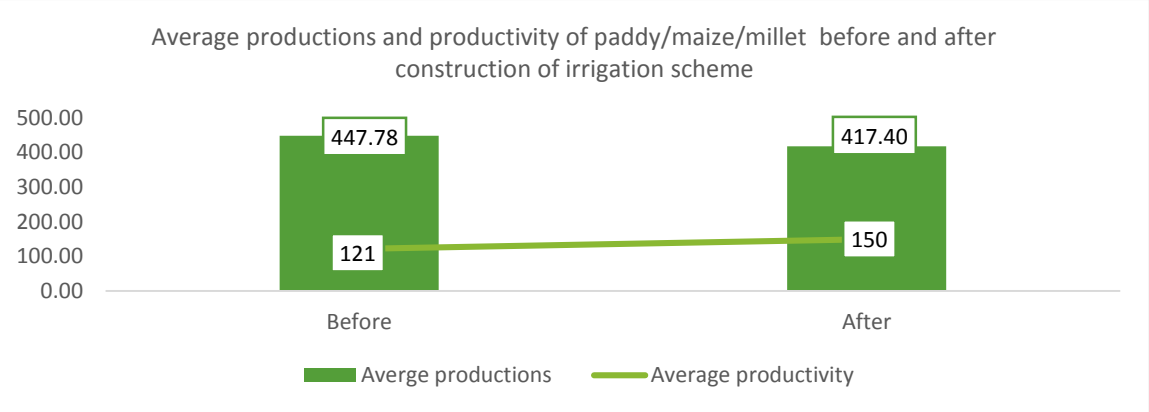
As illustrated in the table below many of the farmers of scheme areas had cereal crops in both winter and summer seasons before construction of the scheme. But, due to availability of irrigation facilities and technical facilitation of the project, most of the farmers also started to cultivate vegetables, cash crops and the fruits.

Dominant cropping patterns in the irrigation scheme area		
Name of irrigation scheme	**Before scheme constr.**	**After scheme constr.**
Sapra Canal Irrigation	Paddy-Wheat	Paddy-Wheat-Vegetable
Sinyadi Irrigation	Paddy/Maize-Wheat	Paddy/Maize-Wheat
Raichu Nun Chya Irrigation	Maize-Wheat	Paddy-Wheat-Vegetable
Ranamul Irrigation	Paddy/Maize/Millet-Wheat/Barley	Paddy/Maize-Potato/Coriander/Onion-Potato
Sahade Irrigation	Maize-Wheat	Paddy/Maize-Vegetable-Wheat-Vegetable
Tallekhali Irrigation	Maize/Millet/Paddy-Wheat/Barley	Maize/Millet/Paddy-Wheat/Barley-Vegetable
Jhulkekhola Irrigation	Paddy/Maize-Wheat	Paddy-Wheat-Vegetable
Nauli Pond Irrigation	Maize-Wheat	Tomato-Cucumber-Potato/cauli-flower/cabbage
Thulo Kulo Irrigation	Paddy-Wheat	Paddy-Wheat-Vegetable

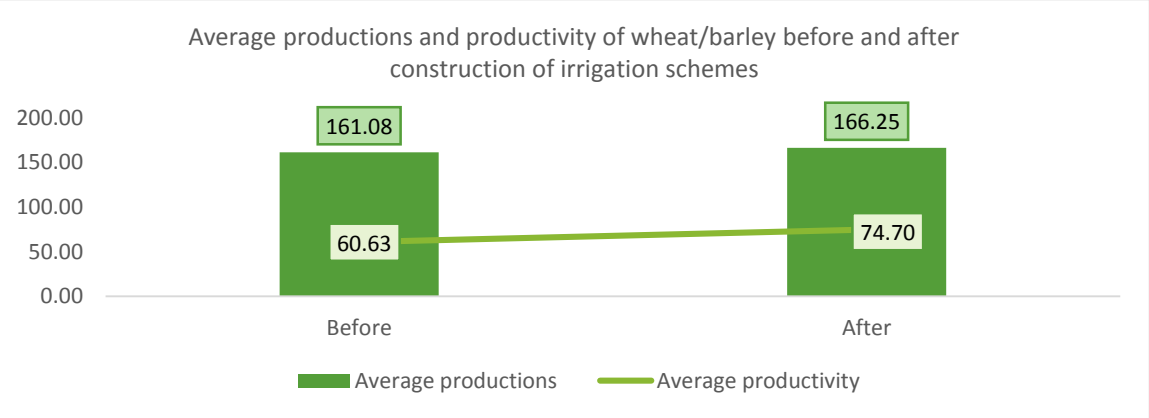
Please provide the productions and productivity of crops before and after the construction of irrigation scheme.

The production and productivity of each of the commodities changed with the construction of the irrigation schemes. When looking at the production of paddy/maize /millet, the production before construction of the scheme was an average of 447.78 kilograms but the productivity of the same was 121 kilograms per ropani. The production of paddy/maize/millet after construction of the irrigation scheme reached 417.40 kilogram whereas

productivity increased to 150 kilograms per ropanis. The average production of paddy/maize and millet decreased overall due to substitution of these crops by vegetable and the cash crops.

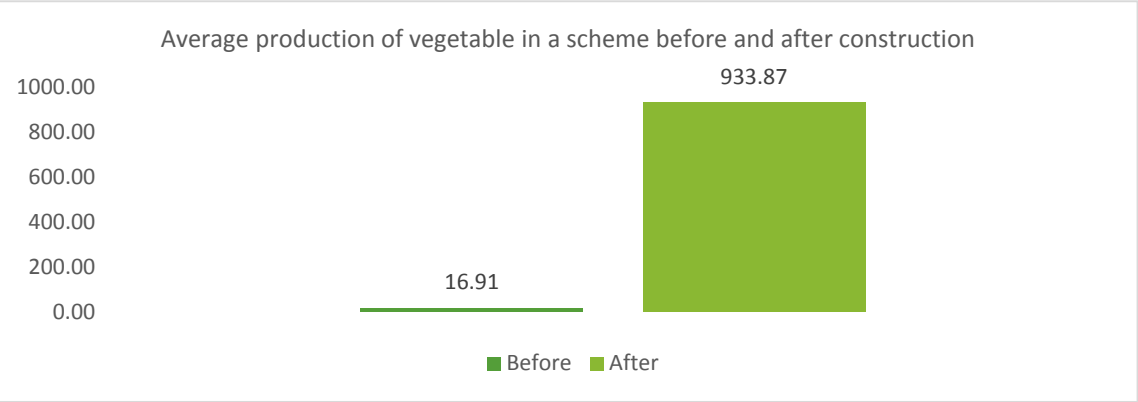


The production of the wheat/barley before and after construction of irrigation schemes are as 161.08 kilogram and 166.25 kilogram respectively. The production trend is not so different, this is due to the substitution of wheat/barley by the vegetable crops. On the another hand the productivity of wheat and barley increased from 60.63 kilogram per ropani to 75.70 kilogram per ropani due to the irrigation facility.



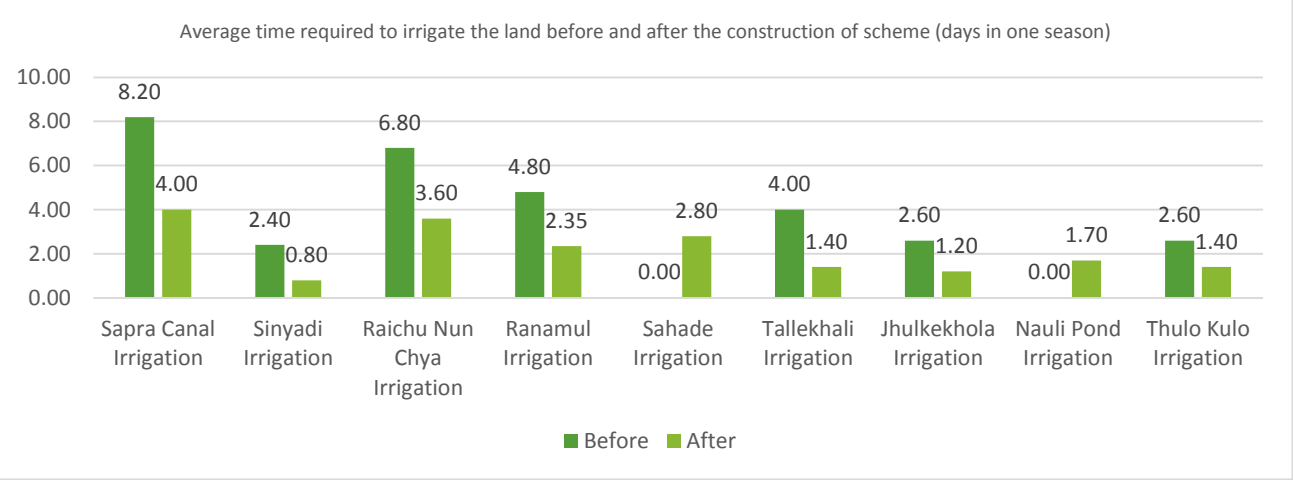
As per objectives of the irrigation scheme constructions, the beneficiaries are fully devoting themselves to vegetable and cash crop productions. Before construction of the irrigation scheme, the farmers rarely cultivated vegetables and cash crops but after construction of the scheme the farmers started to grow vegetables and cash crops commercially. The production of the vegetable in all studied irrigation scheme areas before construction of the scheme was on average 16.91 kilograms per scheme. After construction of the schemes, the average

production of vegetable reached to 933.87 kilograms per scheme.



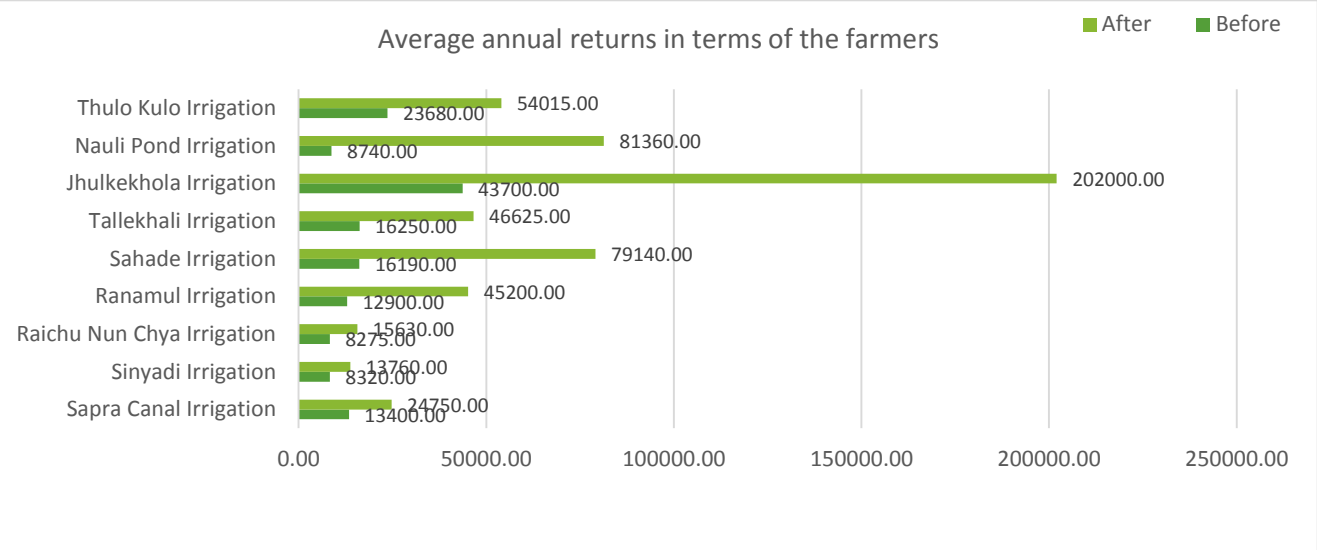
What time do the farmers spent on irrigating the land before and after construction of the irrigation scheme?

Before construction of the irrigation schemes, the farmers spend a lot of time irrigating their land, but after the scheme construction, the time is reduced. The practices introduced by RVWRMP is rarely found in traditional irrigations schemes or before the intervention. Before the intervention, the farmers often used their time for unproductive works and gossiping, whereas afterwards they spend more time for productive farming. As shown in the figure below, the farmers of Sapra irrigation scheme used to spend 8.20 days/season to irrigate their lands but after construction this was reduced to 4.00 days/season. The farmers of Nauli Pond Irrigation and Shade Irrigation did not spend time on irrigation before constructions as they did not have access to any. Principally, the saved time of the farmers spent to other productive works.



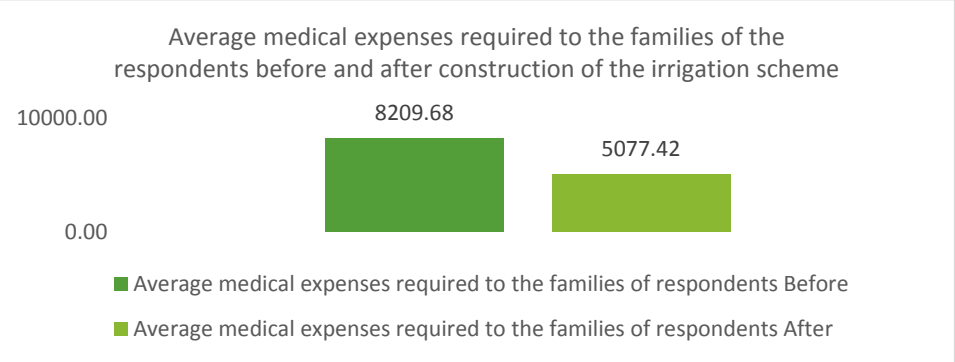
What are the average annual returns (monetary value of the production) of the farmers before and after construction of irrigation scheme?

The return of the agricultural products of the farmers have significantly increased after construction of the scheme. The farmers of Jhulkekhola irrigation scheme have increased their returns from 43,700.00 NRs. to 202,000.00 NRs. The lowest return calculation is found in Sinyadi irrigation scheme, where the average annual return of individual farmers only increased from 8320 to 13760 NRP. The irrigation scheme where vegetable and cash crop cultivations are produced have significant return increase compared to the scheme areas where they have no significant cultivation of vegetable and cash crops.



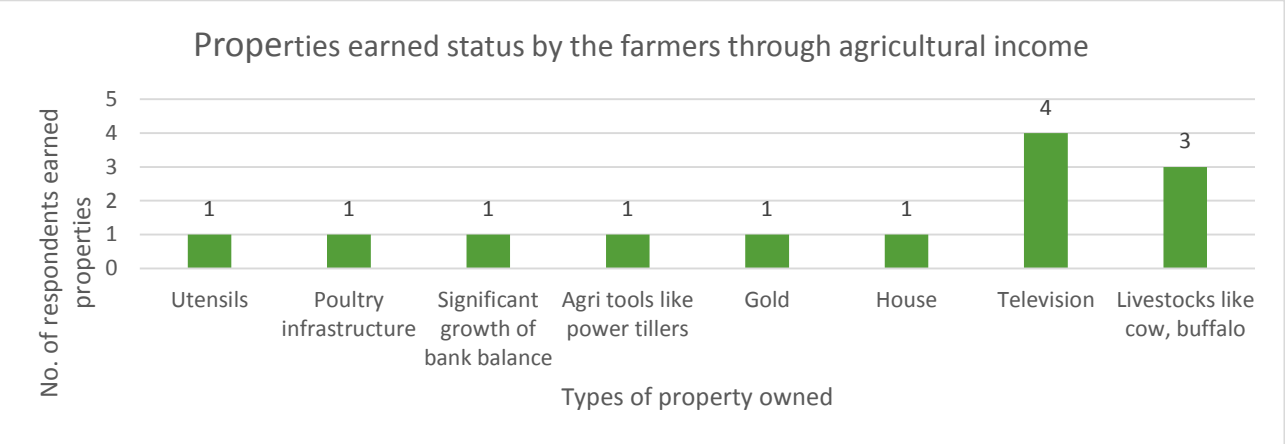
What are/ were the average medical expenses before and after construction of the irrigation scheme?

The medical expenses decreased after construction of the irrigation scheme thus health improved. It can be assumed that the farmers who started to cultivate and consume fresh vegetables together with improved tidiness and cleaner environment the rate of illness decreased. The average medical expenses of the respondents decreased from 8209 NRs. per annum to 5077.42 NRs. per annum i.e. 38%. It reflects that the farmers have changed their meal habits i.e. they have started to consume vegetable and other nutritious things purchasing through the agriculture income and then they has less chances of disease attacks.



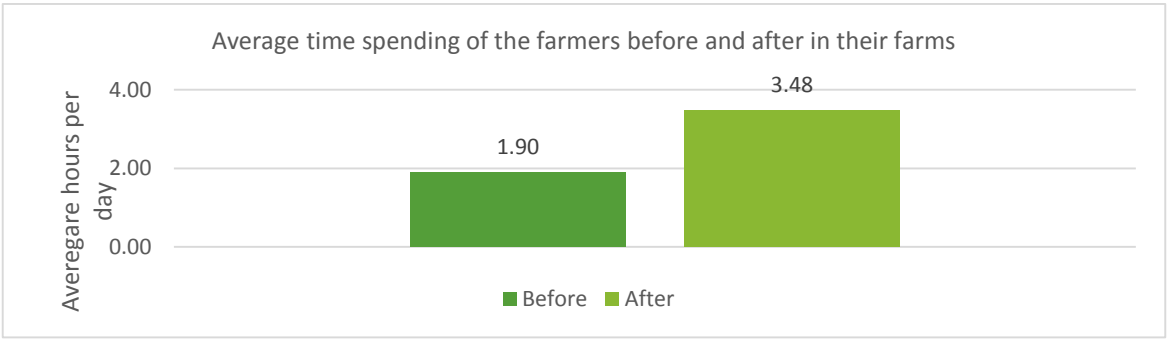
Do the farmers of the scheme areas own any properties by selling their agricultural productions?

Of the 45 respondents of the study only 13 responded owned properties. Some of them purchased the properties from the agricultural income. One respondent purchased utensils, one built poultry infrastructures, one has significant growth of his/her bank balance, one purchased agri-tools like power-tiller, one purchased gold, one constructed a house, four purchased television and three respondents purchased livestock like cows and buffaloes.



How much time do the individual farmer spend in his/her farms before and after construction of the irrigation scheme?

The farmers of the scheme area spend less time in their farms before the construction of the schemes and thus got less returns from agricultural productions. After construction they spend more time farming and thus earn more from the farming. Before construction the farmers used to spend an average of 1.90 hours per day while after construction they spend 3.48 hours per day. This shows that, they are more likely to be employed in agricultural works, as vegetable and cash crops requires more time rather than other crops but also provide greater earnings from agricultural returns. It can be also said that before construction of the irrigation scheme the farmers spend their more time in unproductive works like playing cards, carom boards, political gossiping because they didn't had much more opportunities to engage themselves in productive works. After construction of the irrigation scheme they are getting new opportunity to engage themselves for their earnings.



What was/is your main daily menu (rice, vegetables, fruits, meat etc.)?

With regard to the farmers diet it consisted mostly of Rice/Bread+Dal (Pulses) before construction of the irrigation scheme. After the construction the farmers have included vegetables and pickles in their daily menu. In general, the farmers grow vegetables both for consumption as nutritious supplement but also for selling..

Majority of the people's daily menu before and after construction of irrigation scheme		
Name of irrigation scheme	**Before**	**After**
Sapra Canal Irrigation	Rice/Bread+Dal	Rice/Bread+Dal+vegetable
Sinyadi Irrigation	Rice/Bread+Dal	Rice/Bread+Dal
Raichu Nun Chya Irrigation	Rice/Bread+Dal	Rice/Bread+Dal+vegetable
Ranamul Irrigation	Rice/Bread+Dal	Rice/Bread+Dal+vegetable+pickle
Sahade Irrigation	Rice/Bread+Dal	Rice/Bread+Dal+vegetable+pickle+milk

Tallekhali Irrigation	Rice/Bread+Dal	Rice/Bread+Dal+vegetable
Jhulkekhola Irrigation	Rice/Bread+Dal	Rice/Bread+Dal+vegetable
Nauli Pond Irrigation	Rice/Bread+Dal	Rice/Bread+Dal+vegetable
Thulo Kulo Irrigation	Rice/Bread+Dal	Rice/Bread+Dal+vegetable

Was/are there any malnutrition cases before and after construction of the irrigation scheme?

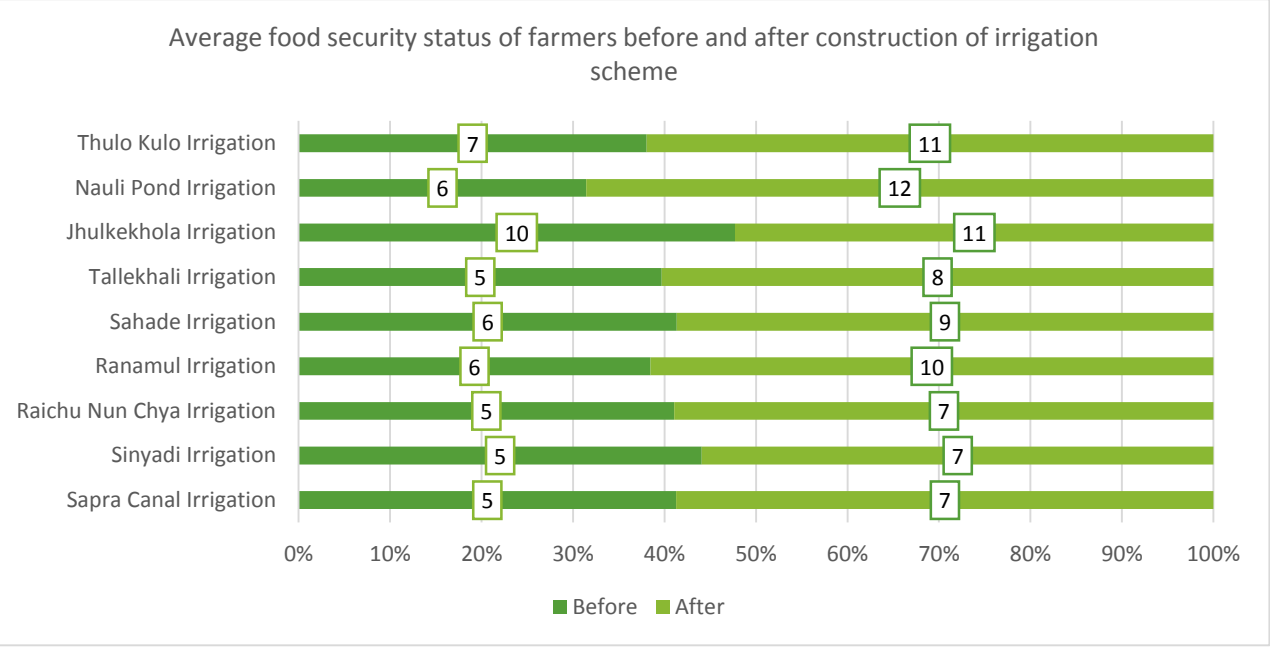
Before construction of the scheme four cases malnutrition had been registered but, no cases after the construction and change in diet. The concerned families responded that before the irrigation scheme, they didn't have vegetable in their dishes, but after irrigation scheme, they started to cultivate and consume vegetable, which reduced the malnutrition cases in their families.

Total number of Malnutrition cases before and after the construction of irrigation scheme

Before	After
4.00	0.00

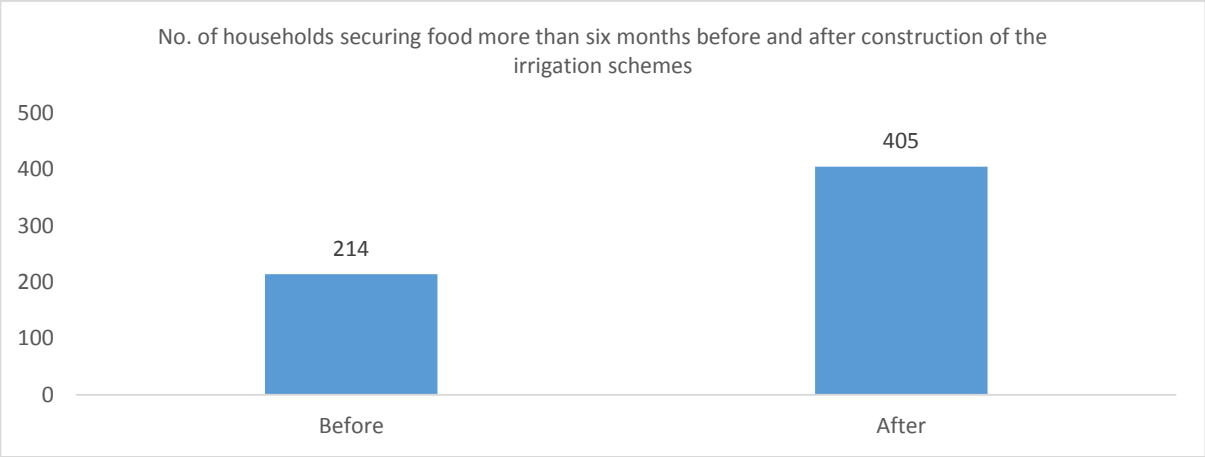
How many months did/ do the respondents have their food security? What foods did/ do they buy or exchange?

The realized irrigation facilities and consequent agricultural production contribute to providing food security of the respondents. The average f food security before construction of the irrigation scheme was between 5 to 10 months but after construction it ranges 7 to 12 months. The farmers of Sinyadi irrigation scheme increased their food security from 5 months to 7 months. Likewise, the farmers of the Nauli irrigation scheme increased their food security from 6 months to 12 months.



As illustrated in the graph, 214 households had food security more than six months before construction of the irrigation schemes. But after construction of the scheme the no. of households reached to 405. Increment of productions and productivity, productions of economically benefiting

crops, marketing and cash earning opportunities from irrigation facilities made them to increase their food security.



Many of the respondents used to buy rice, wheat, maize before construction of irrigation scheme. But after construction they sell their vegetable and cash crop and purchase food like rice, wheat, etc.

Types of the food buy or exchange in majority		
Name of irrigation scheme	**Before**	**After**
Sapra Canal Irrigation	Rice, wheat, vegetable	Rice, Wheat
Sinyadi Irrigation	Rice, Maize, Wheat	Rice, Wheat
Raichu Nun Chya Irrigation	Rice and Wheat	Rice
Ranamul Irrigation	Rice, Wheat, Maize	Rice
Sahade Irrigation	Rice	Rice and wheat
Tallekhali Irrigation	Rice, wheat	Rice, Wheat
Jhulkekhola Irrigation	Rice	Rice to vegetable
Nauli Pond Irrigation	Rice	Rice after selling vegetable
Thulo Kulo Irrigation	Rice	None

Do/did farmers have any conflict/ discriminations over use of water? If yes why, if no why not?

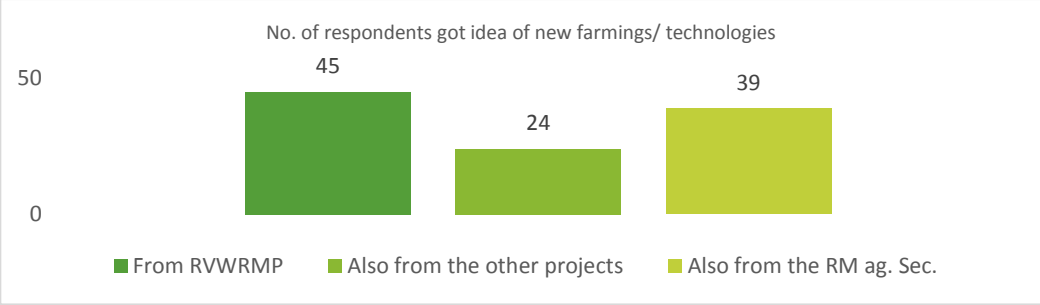
Nearly 49% farmers revealed they used to have confrontations/discriminations over use of water before the construction of irrigation scheme. But, after construction of the scheme, no one revealed those types of problems in their localities. Before construction of irrigation schemes, the farmers usually confront each other for the irrigation turn, as less water was available but after construction of the scheme they are getting more water and thus reduced the problems. Likewise, before construction of irrigation scheme, no one looked after repair and maintenance which reduced the water flow, but after the construction of the irrigation scheme, users committees were established who appointed a Village Maintenance Worker, and collect the funds for O&M works improving the sustainability of the system and providing water to all. Indeed the well management factors of the UCs and the adequate water supply, rules and regulations of the UCs like water distribution rules, have reduced conflicts and problems in irrigation scheme areas.

No of respondents revealed the conflicts/discriminations over user of water before and after constructions			
Name of irrigation scheme	**No. of people before**	**No. of people after**	**Reason behind**
Sapra Canal Irrigation	3.00	0.00	Turn to irrigate
Sinyadi Irrigation	4.00	0.00	Repair and maintenance
Raichu Nun Chya Irrigation	3.00	0.00	Conflict for turn

No of respondents revealed the conflicts/discriminations over user of water before and after constructions			
Ranamul Irrigation	5.00	0.00	Turn to irrigate
Sahade Irrigation	0.00	0.00	NA
Tallekhali Irrigation	5.00	0.00	Turn to irrigate
Jhulkekhola Irrigation	0.00	0.00	NA
Nauli Pond Irrigation	2.00	0.00	Turn for water
Thulo Kulo Irrigation	0.00	0.00	NA

Where did the farmers get the idea for new farming crops/techniques/habits?

It has been found that, almost all the respondents found new ideas about farming and technologies from the RVWRMP, 24 of them also got idea from other projects and 39 of them also got idea from the RM agriculture sections.



Are there any benefits/ drawbacks for whole community including those who don't have access to the facility?

Regarding to major benefits and the drawbacks occurred in the communities who don't have irrigation facilities 26 respondents indicated the benefits as learning sharing, improved water mills, new agricultural technologies, exchange of knowledge and productions, clustering of vegetable farms. None of the respondents revealed the drawback statements to the communities who don't have direct access of the interventions.

Benefits/drawbacks to the communities which is not includes direct beneficiaries of the project			
Name of Irrigation scheme	No. of responses	Major benefits statements	Major drawback statements
Sapra Canal Irrigation	5	Learning sharing	NA
Sinyadi Irrigation	0	NA	NA
Raichu Nun Chya Irrigation	5	Sanitation habit, improved water mills, new agriculture technologies	NA
Ranamul Irrigation	4	Exchange of knowledge, productions	NA
Sahade Irrigation	3	Cash outflow for vegetable blocked	NA
Tallekhali Irrigation	4	Knowledge sharing, production sharing, clustering of vegetable farm	NA
Jhulkekhola Irrigation	0	NA	NA
Nauli Pond Irrigation	0	NA	NA
Thulo Kulo Irrigation	5	Learning sharing	NA

What are the environmental impacts of the construction of irrigation system?

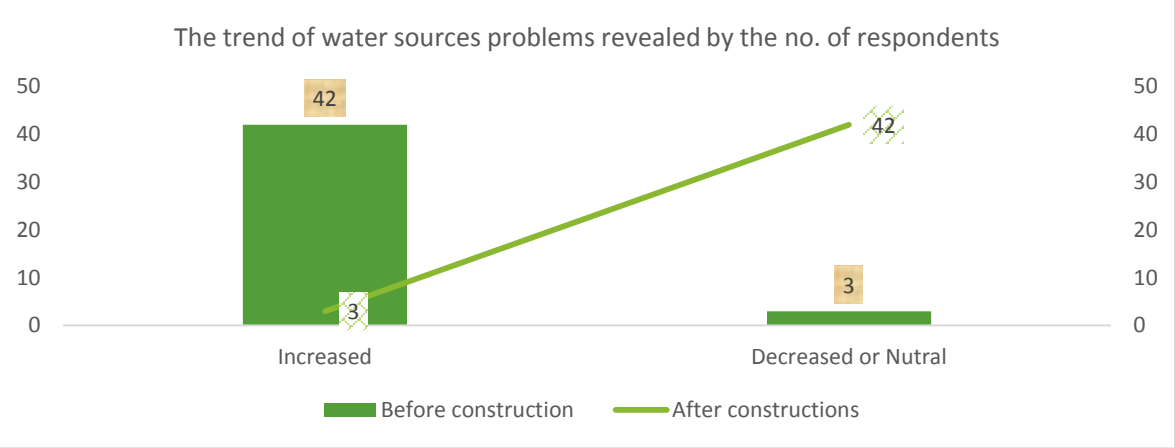
Regarding to environment impact of the constructed irrigation scheme, almost 30 respondents revealed their thoughts. Before construction of the irrigation scheme there were some environmental indicators like due to irrigation problem open cattle used to destroy the crops, frequent landslides seen in canal alignments, drying of springs, dirt around, dried drinking water ponds, dry lands, etc. But after construction of irrigation scheme some visible improvement occurred. The environment before construction of the irrigation schemes were dirty and dusts, which now cleaned due to water availability. Land that was barren and used for pasture have been transformed to cultivated land and the cattle have been moved further away from the irrigated areas, landslides

close by canal alignments reduced due to construction of concrete instead of earthen canals, springs are recharged, the is more greenery around due to more water available for plants and soil, negligible dirt, pond recharged, etc. increased number of crops may cause faster soil depletion from nutrients

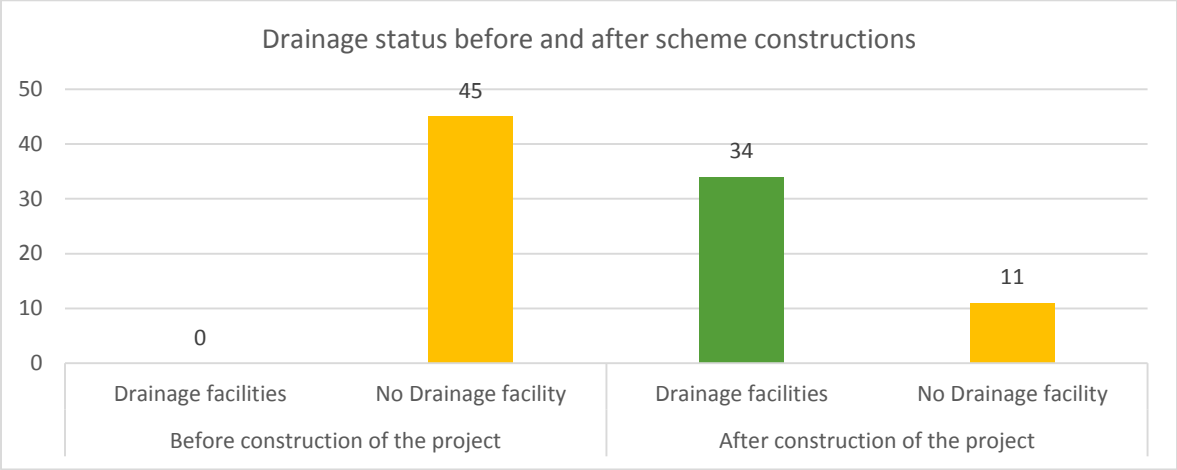
Environmental status before and after the construction of irrigation schemes			
Name of Irrigation scheme	No. of responses	Status before	Status after
Sapra Canal Irrigation	1	Open cattle destroy crops	No such evidences
Sinyadi Irrigation	5	Landslides in canal area	Minimized landslides
Raichu Nun Chya Irrigation	2	Partially barren land and open cattle harmed to land and crops	No such evidences
Ranamul Irrigation	4	Drying spring, dry around, open cattle	Spring recharged, greenery, etc.
Sahade Irrigation	3	Dry land and dirt	Greenery and no dirt
Tallekhali Irrigation	5	Dry land, drying springs, dirt	Greenery, water recharge and no dirt
Jhulkekhola Irrigation	1	Dry in winter season	Greenery throughout the year
Nauli Pond Irrigation	4	Dried ponds, dry land	Pond recharge, greenery
Thulo Kulo Irrigation	5	Dry land	Greenery

Mention water sources issues/benefits due to the construction of the irrigation scheme and also mention the drainage status before and after construction of the scheme.

It has been found that 42 respondents revealed the water sources problem was increased and 3 respondents revealed decreased or neutral before construction of irrigation scheme. Likewise, after the construction of the irrigation scheme the reciprocal is happened.



Regarding to the drainage status available in the community of around the canal alignment, almost all the respondents mentioned there were no any drainage facilities, so seepage of water obstruct the footpath. After construction of irrigation scheme, 34 respondents mentioned no seepage or well drainage and 11 respondents revealed reciprocal. The results found after interviewing of respondents are the irrigation schemes contributed to reduce drainage problem in the community.



What are the trends of social benefits after construction of the irrigation schemes?

The constructed irrigation systems not only provided the economic benefits to the communities but also provided social benefits. After construction of the scheme the social harmony is increased, confrontations/issues of irrigations are decreased, copying of cropping systems are increased, dignity of Dalits and women are increased, leadership development among the users are increased. The well planned and executed system of constructing the irrigation schemes provided social and economic advantages to the working communities. These are the some of the examples for which the constructed irrigation system contributed to bring the change in the communities.

The trends of social factors found after construction of the irrigation schemes				
Social harmony	Confrontations/issues of irrigations	Copying of cropping systems	Dignity of Dalits and women	Leadership development
Increasing	Decreasing	Increasing	Increasing	Increasing

What notable changes found among the farmers who uses the irrigation system and who don't uses the irrigation system?

The notable changes found between the users and the non-users of the irrigations are living standards, utilization of time for productive works, health and sanitations, nutrition, income status, food habits, family happiness, homestead surroundings. The living standards of the irrigation users found different due to increased income, the irrigation users pay more time to productive works while non-users rarely do, the health and sanitation status of the users found better rather than non-users.

What do the respondents think whether the constructed irrigation schemes are beneficial to them or not? If these are beneficial, how? What are the next cropping plan of the respondents?

The majority of the respondents mentioned the irrigation schemes are beneficial to them because now they are able to get better productions, generate incomes, cropping even in winter season (that rarely occurred before), improved livelihoods and living standards, commercialization, etc.

The majority of the respondents revealed that they have next cropping plan as vegetable farming, spices farming, fruit farming, large cardamom farming, and expansion of vegetable farm. This status mentioned by the respondents shows the irrigation schemes are boon to them for their livelihoods.

Farmers perceptions on constructed irrigation scheme and their next cropping plan		
Scheme Name	**Farmers perception**	**Major cropping plan for next season**
Sapra Canal Irrigation	Beneficial: irrigations, productions, etc.	Cash crops, vegetable and fruits

Sinyadi Irrigation	Beneficial: income generation	Vegetable, spices and fruits
Raichu Nun Chya Irrigation	Beneficial: winter season cropping, cattle rearing, water milling etc.	Vegetable, fruits and large cardamom
Ranamul Irrigation	Beneficial: improved livelihoods	Expansion of vegetable farm
Sahade Irrigation	Beneficial: income generation	Expansion of vegetable farm
Tallekhali Irrigation	Beneficial: commercialization	Vegetable and fruits
Jhulkekhola Irrigation	Beneficial: income generation	Expansion of vegetable farm
Nauli Pond Irrigation	Beneficial: commercialization	Expansion of vegetable farm
Thulo Kulo Irrigation	Beneficial: income generation	Expansion of vegetable farm

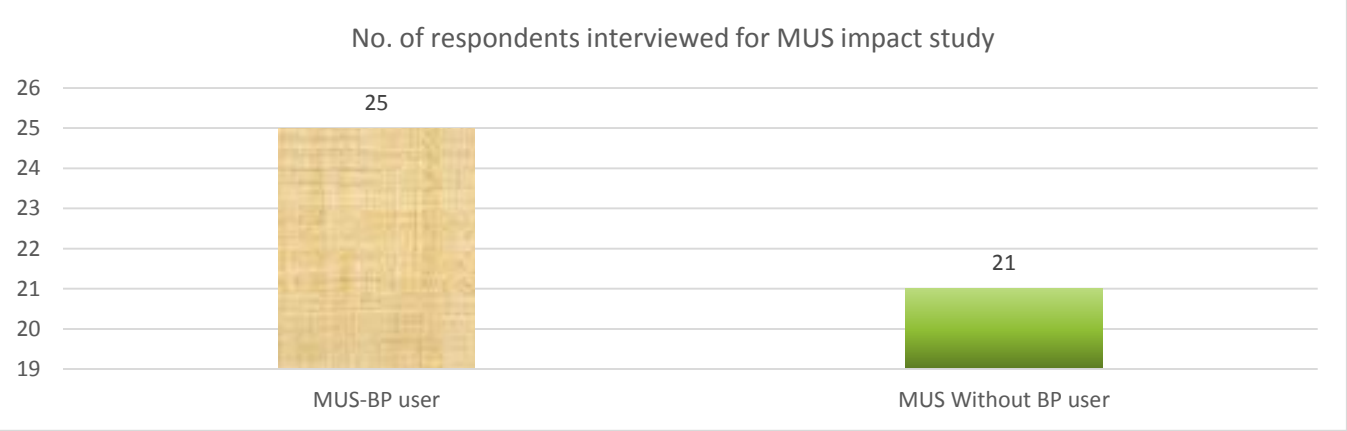
4.2. Impact study of the MUS Business Plan:

The core idea of the impact study of MUS business plan is to compare the different aspects of livelihoods between the MUS scheme with business plan and the MUS scheme without business plan. The comparative study was carried out through different questionnaires to the users or beneficiaries of the scheme and the focus group discussions. The responses or findings for a particular study group are outlined as key findings of the study.

The development of Business Plans has been supported by the project in some of the established MUS schemes through training and providing assistance for the development of the Plan to the MUS users. The impact study aims to see whether such development has an impact.

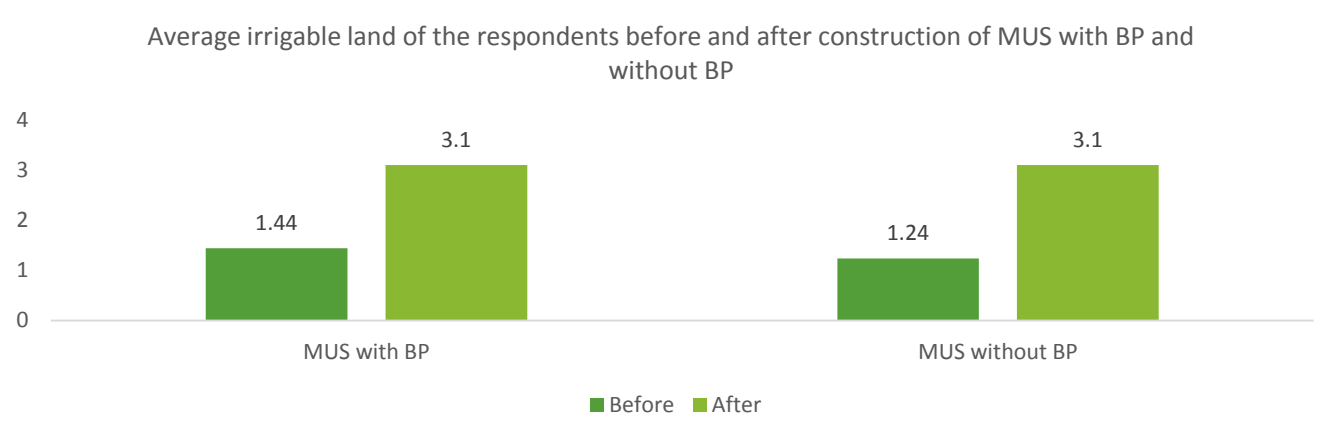
How many sampled HHs. carried on for the impact study of MUS?

Five MUS with business plan and five MUS without business plan were selected for the study. Total of 25 MUS-BP users and 21 MUS-noBP users were interviewed representing different schemes and separate households. The lower number of MUS-noBP users is explained by recent completion of one of the schemes, which allowed the project to interview only one user in that scheme.



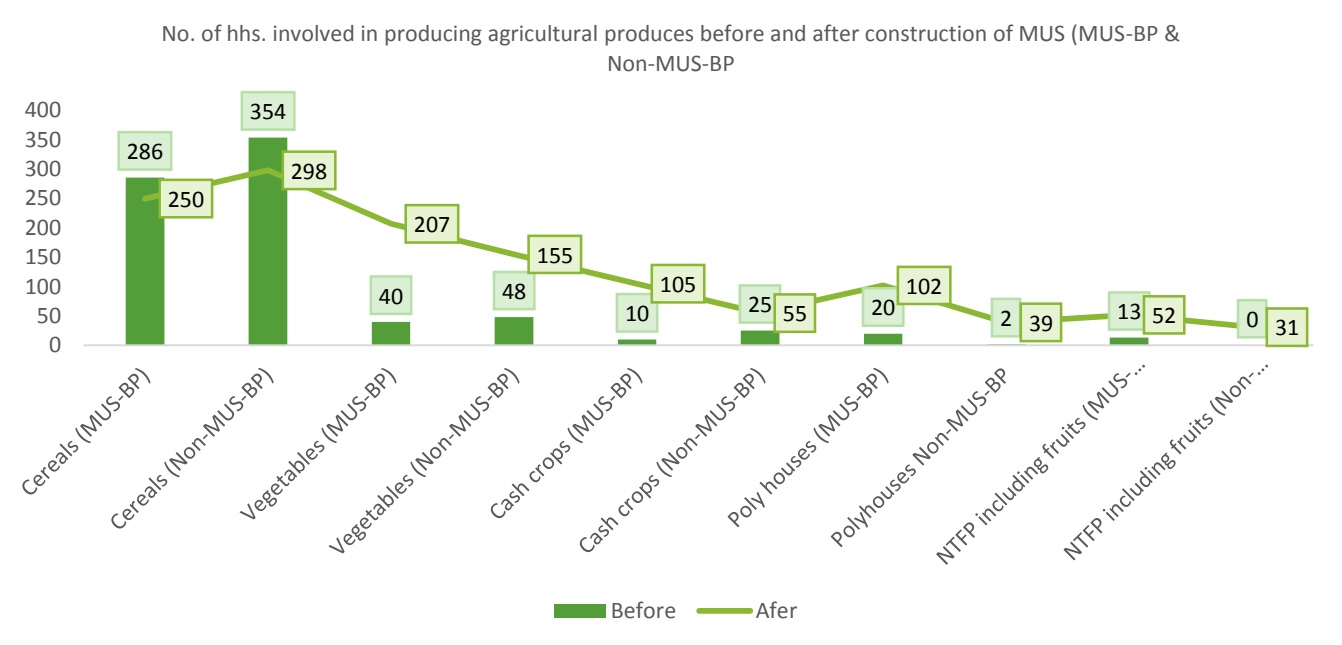
What was the average area of irrigable land before and after construction of MUS scheme?

The average irrigable land before and after construction of MUS scheme is compared to show the differences of irrigable lands. The average area of irrigable land before construction of MUS scheme with business plan and without business plan as 1.44 Rop. and 1.24 Rop respectively. after construction of MUS scheme for both with BP and without BP the result is 3.1 Ropani.



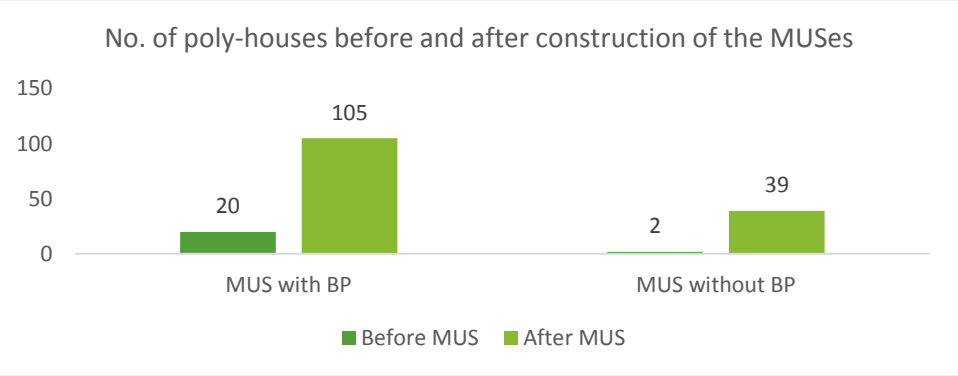
What are the major uses of the MUS scheme in both MUS-BP and Non-MUS-BP areas? (cereals, cash crops, vegetable, fruits/enterprises, livestock rearing)

The major crops cultivated by the farmers before and after construction of the MUS scheme in MUS-BP area and the Non-MUS-BP areas is different. In general both the types of studied MUSes, the no. of farmers cultivating the cereal crops decreased after construction of the scheme. The farmers who produces the vegetables are significantly increased after MUS construction in MUS-BP areas (40 to 207), whereas the no. of farmers in Non-MUS-BP areas are also increased but the variation is not so different (48 to 155). In this way the farmers cultivating the cash crops in MUS-BP areas reached 105 from 10 and it reached 55 from 25 in Non-MUS-BP areas. The farmers farming in poly-houses reached 102 from 20 in MUS-BP areas whereas it reached 39 from 2 in Non-MUS-BP areas. The farmers producing NTFPs including fruits reached 52 from 13 in MUS-BP areas whereas it reached 31 from 0 in MUS without BP areas. The overall results shows that the farmers of the MUS-BP areas are more commercialized and producing the agricultural products for marketing purpose but the farmers of MUS without BP areas also producing but no significant commercialization found among them.



Please tell us the number of poly-houses/poly-tunnels of your farmer groups under this MUS scheme?

It has been found that the no. of poly-houses in MUS with business plan areas significantly increased from 20 to 105 and it also increased in the MUS without business plan areas but slightly lesser i.e. 2 to 39 poly-houses. The result shows that the farmers of the MUS-BP areas have commercial mind-sets and hence the number of poly-houses increased significantly.

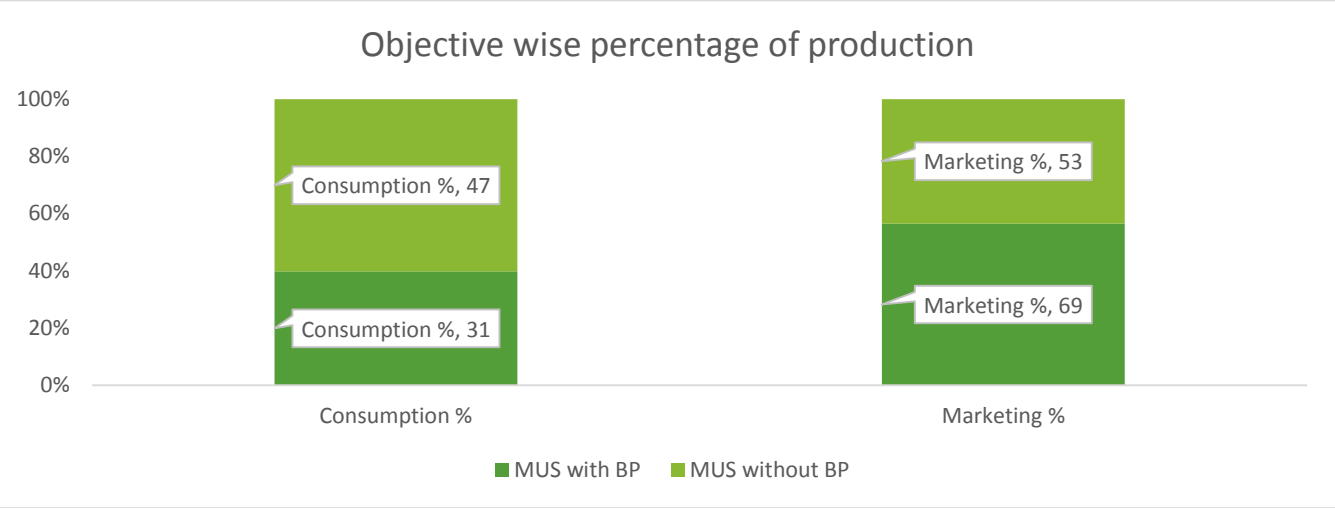


Are the surveyed HHs. producing vegetable and cash crops by using MUS? If yes, for which purpose do they produce those agricultural commodities?

The proportion of producing vegetable and cash crops in MUS scheme areas with BP and without BP is different all the sampled HHs. are involved in vegetable and cash crop farming.

Sampled HHs. Producing vegetable and cash crops					
MUS Name with BP	Producing	Not producing	MUS Name with No BP	Producing	Not producing
Sankhet MUS	5	0	Ramakhola-Selgadi-Simwan MUS	5	0
Silka MUS	5	0	Basain MUS	5	0
Ghattekhola MUS	5	0	Sattar Irrigation MUS	5	0
Bagjewala MUS	5	0	Khalla Kafal MUS	5	0
Gharelu Lamjile MUS	5	0	Khaluwa-Dipalmare MUS	1	0

The purpose of vegetable and cash crop production varies according to status of Business Plan preparation. The production of vegetable and cash crop in MUS with BP are 31% for consumption and 69% for marketing, while in MUS without BP 47% are for consumption and 53% for marketing. The result indicates that the preparation of the business plan for the MUS help the users to better understand and direct the vegetable and cash crop production.



Which crops are highly substituted due to the construction of MUS scheme?

Due to the development of new opportunities to the farmers, they have changed their practices concerning crop cultivation. Almost all the respondents told that they used to cultivate cereal crops before MUS but after construction of the MUS scheme, the majority started to cultivate vegetables and cash crops. Only the Gharelu-Lamjile MUS with BP and Khaluwa-Dipalmare MUS without BP had practices of vegetable and cash crop farming even before the construction of MUS scheme, so no new substitution occurred in those areas.

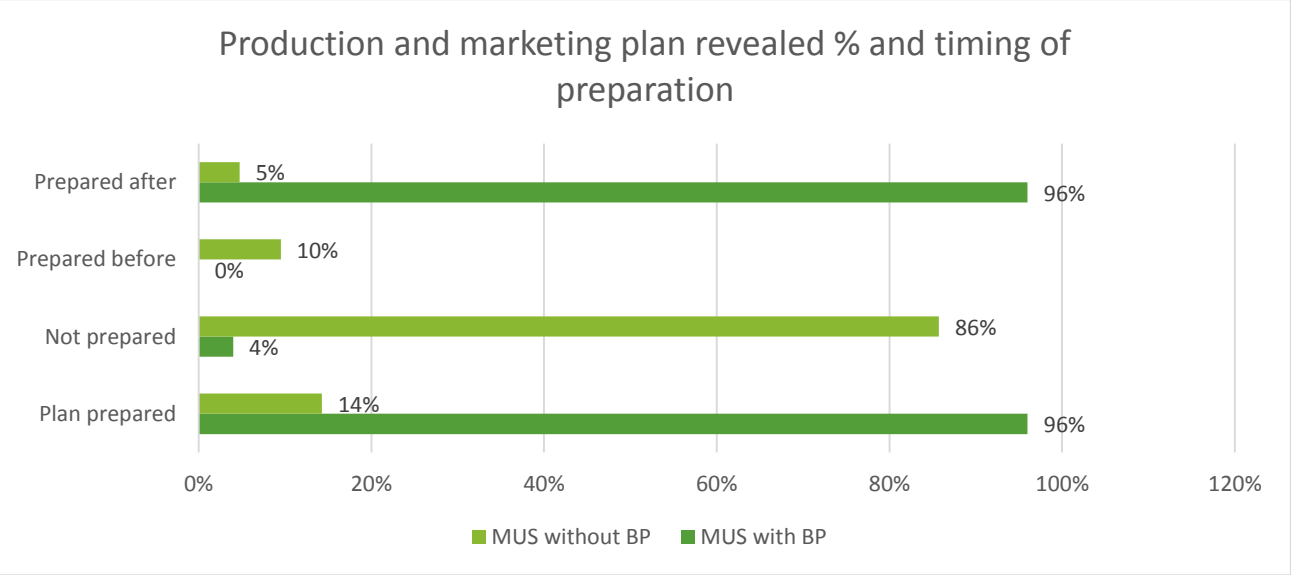
Crop substitution status after MUS construction

MUS Name with BP	Old Crops	Substituted by	MUS Name with No BP	Old crops	Substituted by
Sankhet MUS	Wheat, Maize, Paddy, Mustard, Millet	Tomato, cauli, bean, brinjal, potato, cabbage, ginger	Ramakhola-Selgadi-Simwan MUS	Wheat, Mustard, Maize	Cabbage, cauli, garlic, onion, tomato, etc.
Silka MUS	Maize, millet, barley	Tomato, cauli, bean, brinjal, potato, cabbage, ginger	Basain MUS	Millet, barley	Apple, Kiwi, Walnut, Tomato, Onion, Cabbage, Cauli, Mustard, Radish, Potato, Jukeni, Bean (Black)
Ghattekhola MUS	Paddy, maize, millet, wheat	Tomato, cauli, bean, brinjal, potato, cabbage, ginger, mustard	Sattar Irrigation MUS	Paddy, wheat	Tomato, Garlic, Onion, Cauli, Cabbage, Bean, large cardamom
Bagjewala MUS	Maize, wheat, Barley, soyabean	Cabbage, cauli, onion, cucumber, tomato, mustard, radish	Khalla Kafal MUS	Wheat	Radish, Mustard, Tomato
Gharelu Lamjile MUS	Cabbage, cauli, onion,	No change	Khaluwa-Dipalmare MUS	Tomato, cabbage, bean, cauli,	No change

	cucumber, tomato, mustard, radish			radish, cucumber, etc.	

Do the farmers prepare their production and marketing plan? If 'yes', were those prepared before MUS scheme construction or after MUS scheme construction.

96% respondents from MUS who have prepared a business plan follow a production and marketing plan, while only 14% from MUS without a business plan prepared follow a production and marketing plan. It has also found that, 0% respondents from MUS with BP and 10% respondents from MUS without business plan, prepared their production and marketing plan before MUS Scheme construction, while 96% respondents from MUS with BP and 5% respondents from MUS without BP prepared their production and marketing plan after the MUS construction.



What were the cropping patterns of irrigable land before and after construction of MUS?

The dominant cropping patterns of the studied MUS scheme area is different before and after construction of MUS scheme. Cropping pattern refers to the types of crops cultivated in the area over the year. Apart from Gharelu-lamjile MUS, all the MUS areas with BP had two no. of crops per annum as cereals-cereals. Two MUS scheme areas had two number of crops per annum (one with cereals-cereals/vegetable and one with vegetable-vegetable) cropping patterns in MUS with BP. Three MUS with BP have four no. of crops per annum in MUSes with BP areas. Apart from Khaluwa-Dipalmare MUS, all the MUSes had two crops with cropping patterns of Cereals-Cereals before construction of MUS in MUSes without BP areas. Likewise, four MUSes without BP had three major no. of crops in one annum. Likewise one MUS without BP have two crops. The cropping patterns can be seen in the table below.

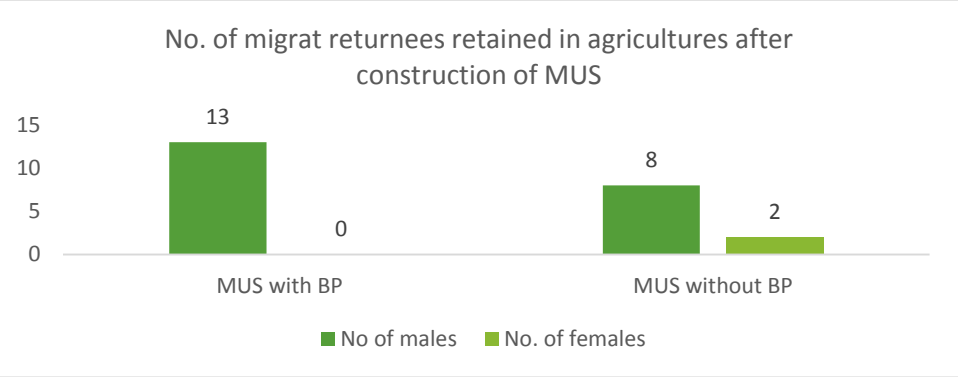
Dominance cropping patterns status

MUS with BP	Before	After	MUS without BP	Before	After
Sankhet MUS	Paddy/Maize-Wheat	Paddy/Maize-What/Vegetable/Potatoes	Ramakhola-Selgadi-Simwan MUS	Paddy-Wheat	Vegetable/Paddy-Vegetable-Wheat/vegetables

MUS with BP	Before	After	MUS without BP	Before	After
Silka MUS	Maize/Millet-Wheat/Barley	Wheat/vegetable-Vegetable-Vegetable-Vegetable	Basain MUS	Millet/Potatoes-Barley	Veg-Veg-Veg
Ghattekhola MUS	Paddy/Maize/Millet-wheat	Paddy/Maize/veg-Vegetable-Wheat-vegetable	Sattar Irrigation MUS	Paddy-Wheat	Vegetable/Paddy-Vegetable-Wheat/vegetables
Bagjewala MUS	Maize/Soyabean/Millet-Wheat/Barley	Cereal/veg-veg-cereal-veg	Khalla Kafal MUS	Wheat/Barley-Soyabean	Potato/Vegetable/Wheat-Maize/Chilli
Gharelu Lamjile MUS	Vegetable-Vegetable	Vegetable-Vegetable	Khaluwa-Dipalmare MUS	Cereal-vegetable-vegetable	Cereal-vegetable-vegetable

Are there migrant returnees retained in agricultural works for his/her livelihood after implementation of MUS business plan? If yes, please mention the numbers.

In case of MUS with BP, almost 13 male returnee migrants retained in agricultures, whereas in case of MUS without BP, 8 male and 2 females retained in agricultures. The result shows that the migrant returnees learnt the improved techniques of agricultures and raised own hope to income from it. Hence they are devoting themselves in agricultural works.



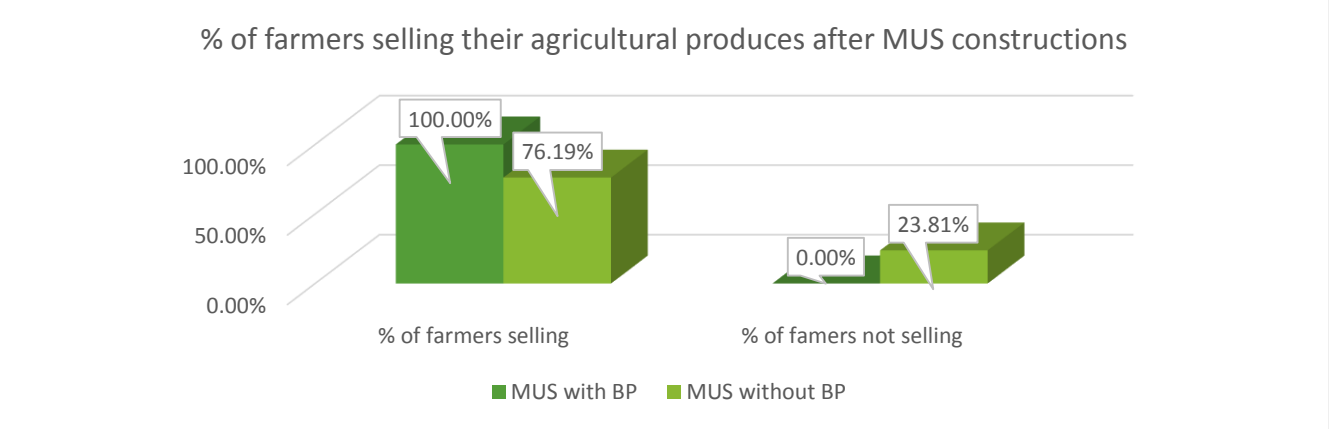
What are the major opportunities and challenges the farmers of the group facing after execution of MUS?

Regarding to the opportunities and challenges faced by the farmers mostly the farmers of MUS-BP areas realized the income generation, educations, nutrition, farm expansion, etc. opportunities after construction of the MUS whereas farmers of the MUS without BP areas realized cultivation whole years, fruit promotions, farm expansions, time saving and irrigation facilities after construction of the MUS. The main challenges faced by the farmers are transportations, diseases, market, production volumes, etc. in MUS-BP areas. Fund management for O&M works, lack of investment for poly-houses farming, wild pigs and diseases by the farmers of the MUS without BP areas.

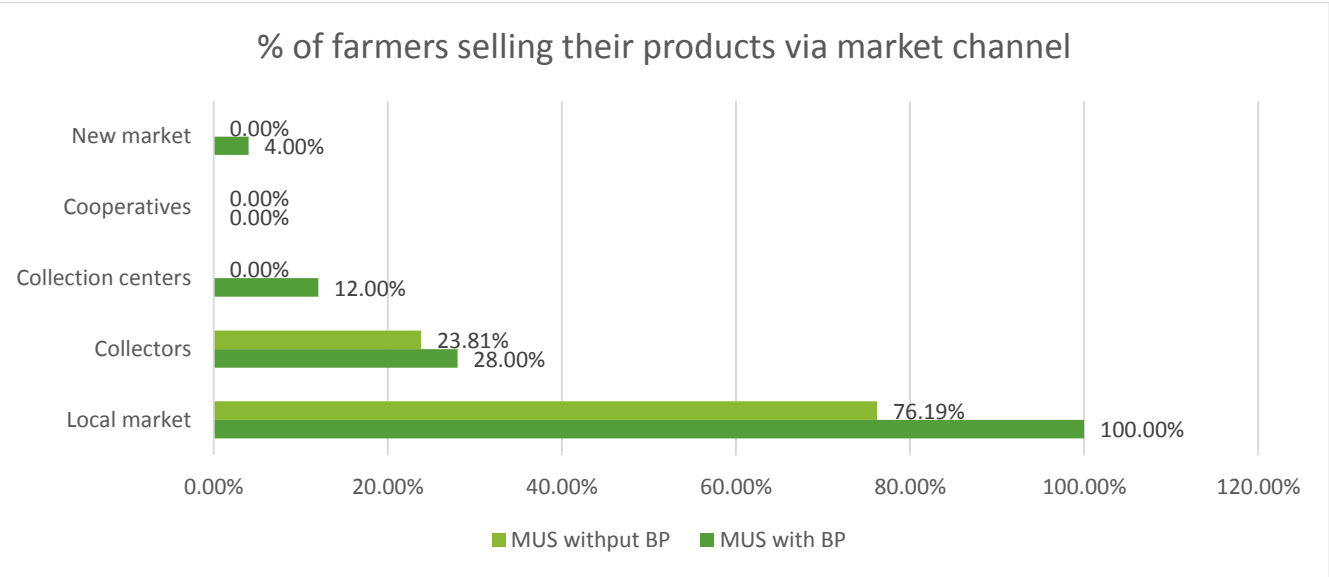
Major opportunities and challenges faced by the farmer groups of MUS Scheme					
MUS-BP	Opportunities	Challenges	MUS without BP	Opportunities	Challenges
Silka MUS	Income generation, Education, Nutrition	Transportation, disease, market	Basain MUS	Whole year cultivation, fruit promotion	Fund management for O&M activity
Ghattekhola MUS	Expansion of large cardamom	Volume of production	Sattar IS MUS	Expansion of veg. farm, cleaning, saving of time	No any
Bagjewala MUS	Income generation, Eduction, Nutrition	Transportation, disease, market	Khalla Kafal MUS	Vegetable production	Lack of investment for playhouse farming
Gharelu Lamjile	Road access, income generation	Transportation, disease, market	Khaluwa-Dipalmare	Irrigation facility	Wild pigs, diseases

Do the farmers sell their agriculture products? If yes, where do they sell? Are these new or old markets for them?

After construction of MUS scheme almost 100% farmers from the MUS area with BP sell their agricultural produces. Only 76.19% farmers sell their agricultural products from the MUS area without BP. This indicates that the farmers of the MUS with BP area are more commercialized than the farmers in MUS without BP. Though the farmers of MUS without BP areas also produces the agricultural productions for self-consumptions.

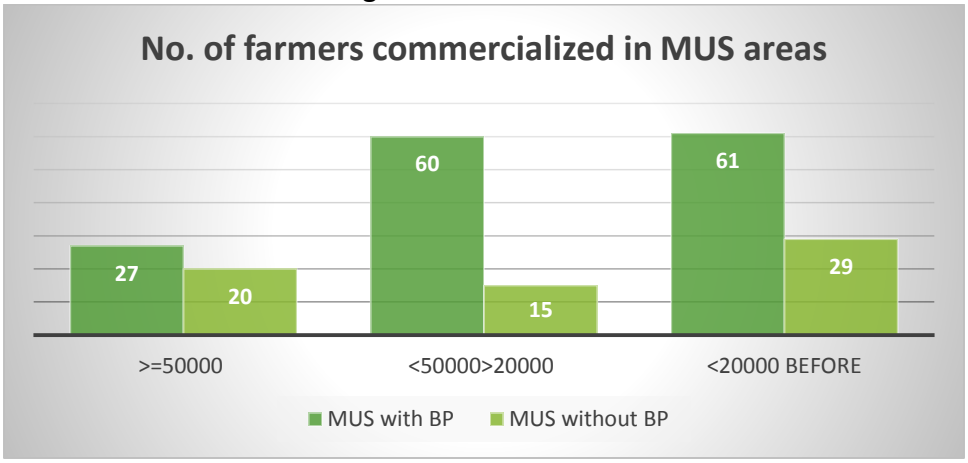


Almost 100% of farmers of MUS with BP, and 76.19% farmers of MUS without BP are selling their agricultural products are mainly sold in the local market. Furthermore, 28.00% farmers with MUS-BP and 23.81% farmers without MUS-BP sell their product through collectors. 12.00% of farmers with MUS-BP also sell their products through collection centers. None of the farmers sell their products through cooperatives. Around 4.00% farmers with MUS-BP found new market areas at local, district and regional zones.



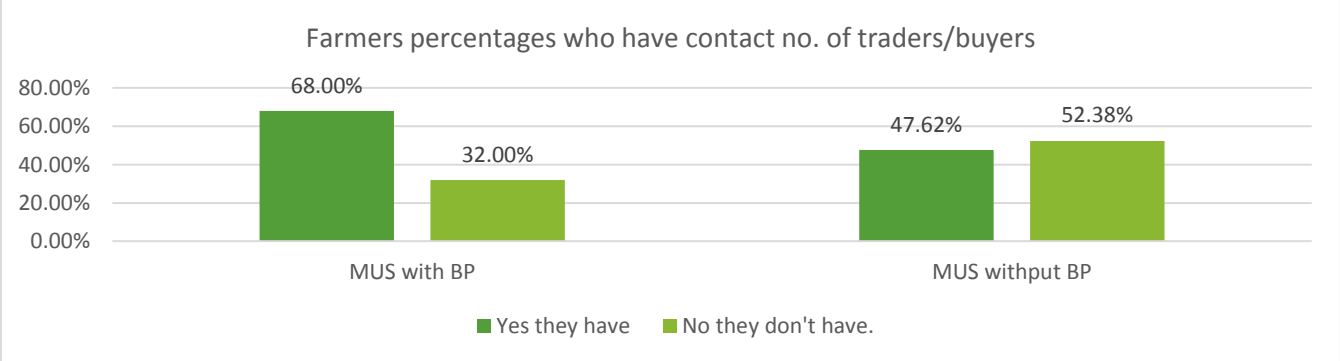
How many farmers are selling their agricultural products after implementation of MUS? What is the range of their income from the agricultural products?

Almost 27 farmers from MUS with BP areas sell their produces worth of >50000 per annum after construction of the MUS schemes whereas only 20 farmers from MUS without BP areas sell their produces worth >50000 NRs. 60 farmers from MUS-BP areas and 15 farmers from MUS without BP areas sell their products worth <50000>20000 NRs. per annum. 61 farmers of the MUS-BP areas and 29 farmers from MUS without BP areas sell their produces worth <20000 NRs. This shows that the farmers of MUS-BP areas are earning more than the farmers of the Non-MUS-BP areas.

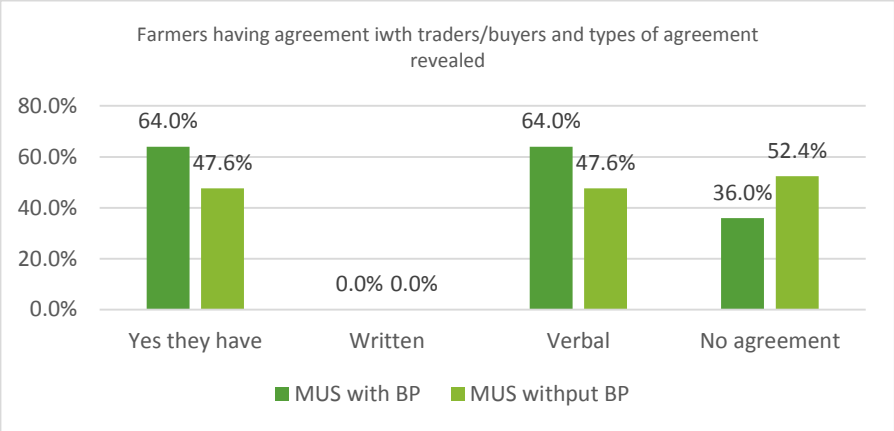


Do the farmers have any contact to the person/firm to whom they are selling their produces? If yes, did they make any agreement to sell their products?

68.00% farmers with BP have contact numbers to traders/buyers and 32% have not in case of MUS with BP. In MUS without BP 47.62% farmers have contacts to traders/buyers while 52.38% don't have the contacts. This indicates that, the farmers with BP are more organized for the commercialization of their products than the farmers without MUS-BP.



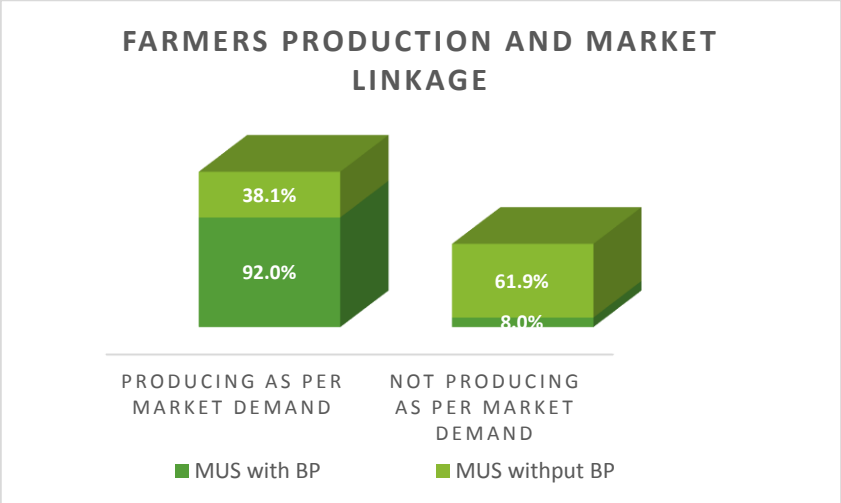
In line with the above finding, 64.0% of farmers with MUS-BP and 47.6% of farmers without MUS-BP have agreement with traders/buyers. No farmers have written agreements but almost all the farmers who have agreements with traders/buyers have a verbal agreement with them. It indicates that the farmers trust the words of the traders and the potential buyers.



Are the farmers producing the agricultural productions as per market demand? If yes, how do they know the market is demanding any particular products?

92.0% farmers from MUS-BP and 38.1% farmers from non MUS-BP produces their agricultural products as per market demand. The figure illustrates that the farmers from MUS-BP are more aware of market oriented productions.

The farmers are aware of market oriented productions through viewing the market trends, market assessment, recent selling trends, last years' selling pattern and information from the traders/buyers.



How did the farmers improve the quality of their saleable agricultural products (grading, sorting, storage, packaging etc.)

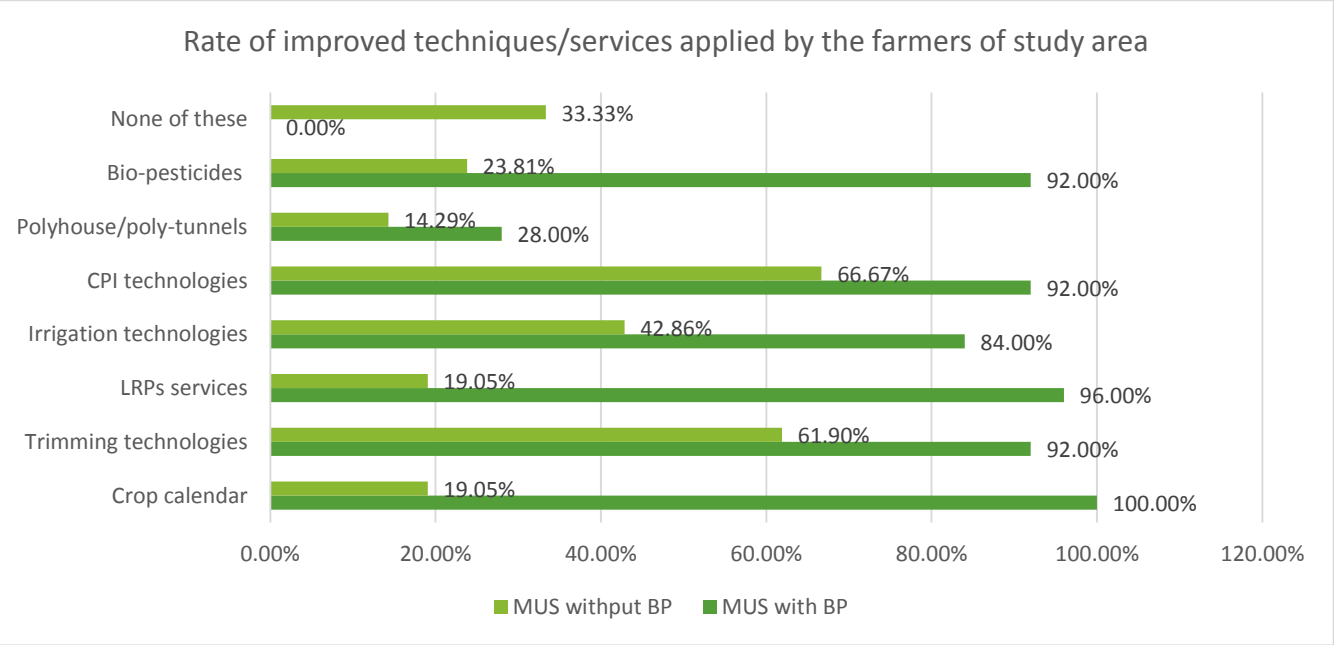
Most of the farmers of almost of the MUS-BP are improving the quality of their production by cleaning, sorting and grading, packaging, storage techniques as added value tasks. In case of the farmers in MUS without BP only the farmers of two MUS areas apply added value works like cleaning, grading, packaging and storage. Indeed, the farmers of the MUS-BP areas have planned better the field of post-harvest/value adding tasks.

What types of added value works do the farmers apply to improve the quality of their productions?			
MUS With BP	Dominant value addition works	MUS without BP	Value addition works
Sankhet MUS	Cleaning, sorting, grading, packaging, storage	Ramakhola-Selgadi-Simwan MUS	Cleaning
Silka MUS	Sorting, packaging, grading	Basain MUS	NA

Ghattekhola MUS	Cleaning, sorting, grading, packaging	Sattar Irrigation MUS	Grading, cleaning, packaging, storage
Bagjewala MUS	Cleaning and grading	Khalla Kafal MUS	NA

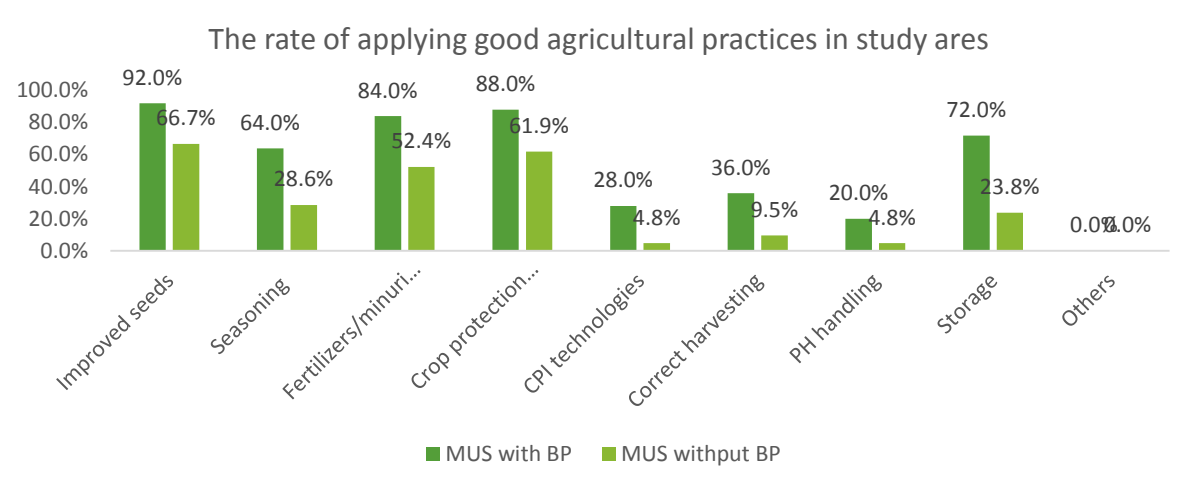
Which of the listed technologies/services, the farmers are adopting for better production of the crops?

The application of crop calendar, LRPs services, CPI technologies and bio-pesticides in MUS-BP area is higher compared to other techniques/services for better productions and increased productivity .The rate of application of improved techniques/services shows that the farmers from MUS-BP areas use every techniques/services more than the farmers of Non-MUS-BP areas. Around 33.33% of farmers from Non-MUS-BP areas applied none of the techniques/services.



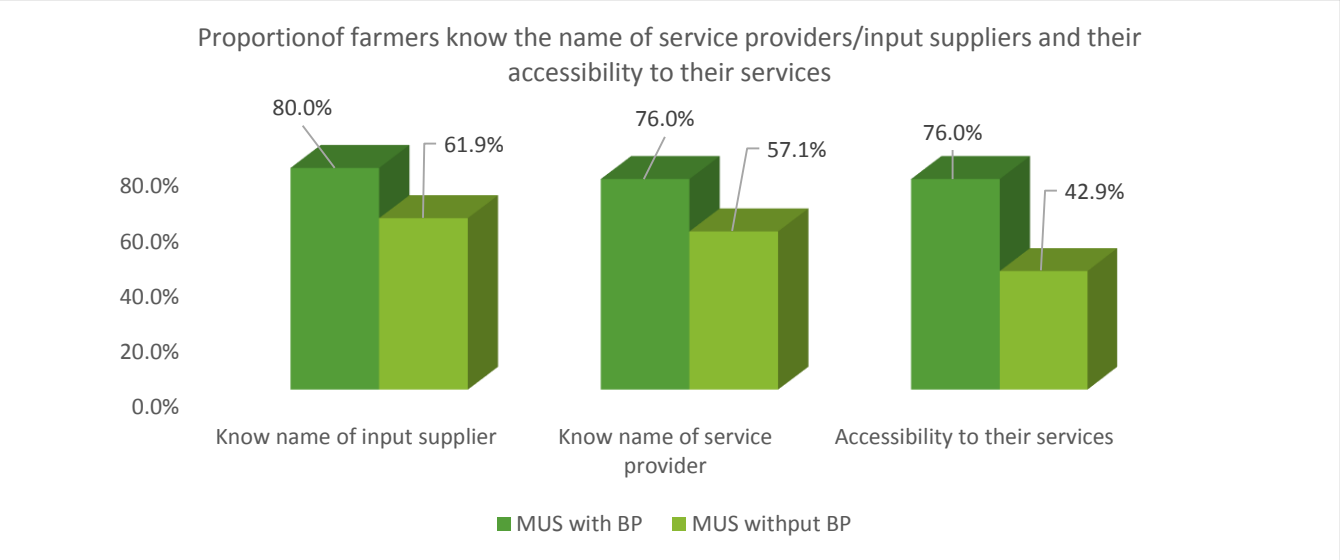
What good agricultural practices are the farmers adopting? (eg. types of seeds, timely cultivations, good fertilizers, crop protection measures, correct harvesting, post-harvest handling, storage etc.)

The agricultural practices being applied in the MUS areas shows mixed results. The application of good agricultural practices include improved seeds, seasoning, fertilizers, crop protection, CPI technologies, correct harvesting, soil PH management, correct storage among others. Farmers of MUS-BP areas use such techniques more frequently than the farmers of Non-MUS-BP areas. Both the farmers of MUS-BP and Non-MUS-BP apply improved seeds, fertilizers/manures, crop protection inputs frequently while farmers in both MUS-BP and Non-MUS-BP less frequently apply CPIs technologies, correct-harvesting and soil PH management. The application of good agricultural practices by farmers of MUS-BP ranges from 20% to 92%, while it ranges in Non-MUS-BP from 4.8% to 66.7%. The farmers of MUS-BP areas have been trained through the development of their BP and are better aware of good agricultural practices than farmers of Non-MUS-BP areas.



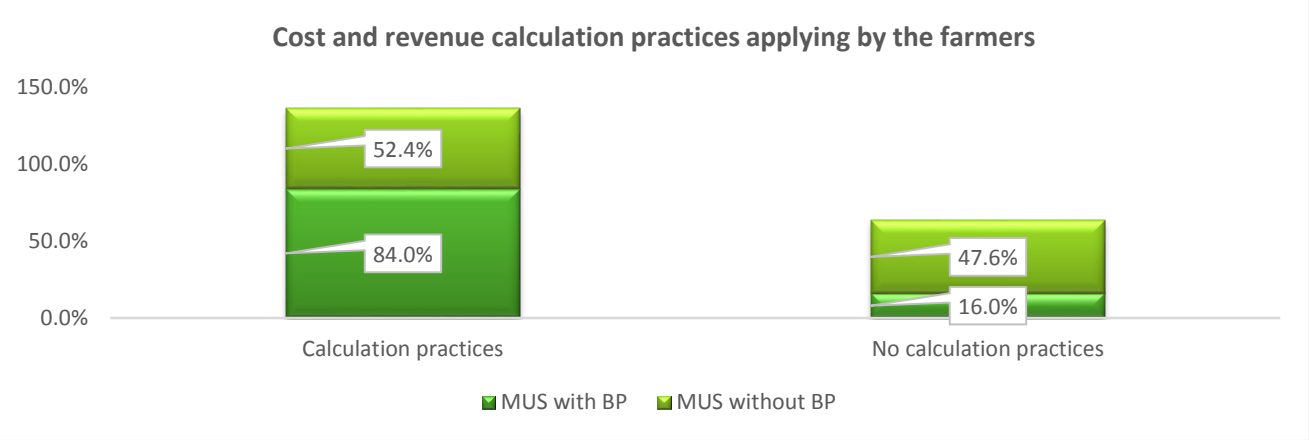
Do the farmers know the names of major agricultural service providers and input suppliers for their agricultural production? Do they have accesses to their services?

The below table shows the responses of the farmers regarding to above questions. The results shows that 80.0% farmers of MUS-BP know the name of input suppliers whereas the only 61.9% farmers of Non-MUS-BP knows the name of input suppliers. Likewise, 76% farmers of MUS-BP areas know the name of service providers and only 57.1% farmers of Non-MUS-BP areas knows the name of service providers. Regarding their to the services from input suppliers and the service providers, 76% farmers from MUS-BP areas and only 42.9% farmers of Non-MUS-BP areas have access to their services. Farmers of MUS-BP areas have become more familiar with these services than farmers of Non-MUS-BP areas.



Do the farmers have any practice to calculate the input costs and revenue generated from any crop? If yes, how do they know that a particular crop is beneficial to them?

84.0% farmers of MUS-BP areas whereas only 52.4% farmers of Non-MUS-BP areas have cost and revenues calculation practices. Some business plan development training includes such calculations. Most of the farmers revealed that they can identify whether any crop is more beneficial to other crops by cost-benefit analysis and the market prices. The data illustrates that, the trainings and day to day technical support by the project in MUS-BP area enabled them to keep the costs and revenue records.



Has any farmer purchased properties from the agricultural income? If yes, what properties have they purchased?

36.0% respondents from MUS-BP areas own properties like power-tillers, land, goats, cow, gold, TV/refrigerators, buffaloes by selling the agricultural produces. Likewise, 23.8% respondents from Non-MUS-BP areas own properties like goats, retailing shops and the land through selling their agricultural products. The data indicates that the farmers from MUS-BP areas commercially grows the agricultural products from the irrigable land and also they have changed their behavior to invest for the future. Hence more proportion of the farmers from MUS-BP areas owned properties in comparison to the farmers of Non-MUS-BP areas.

Properties purchased by selling the agricultural products		
MUS type	**% of respondents owingn the properties**	**Types of property owned by the farmers**
MUS with BP	36.0%	Power tiller, land, goat, cow, gold, TV/refrigerator, buffalo
MUS without BP	23.8%	Goats, retailing shop and the land

What are the farmers going to cultivate in irrigable land in upcoming season? And why?

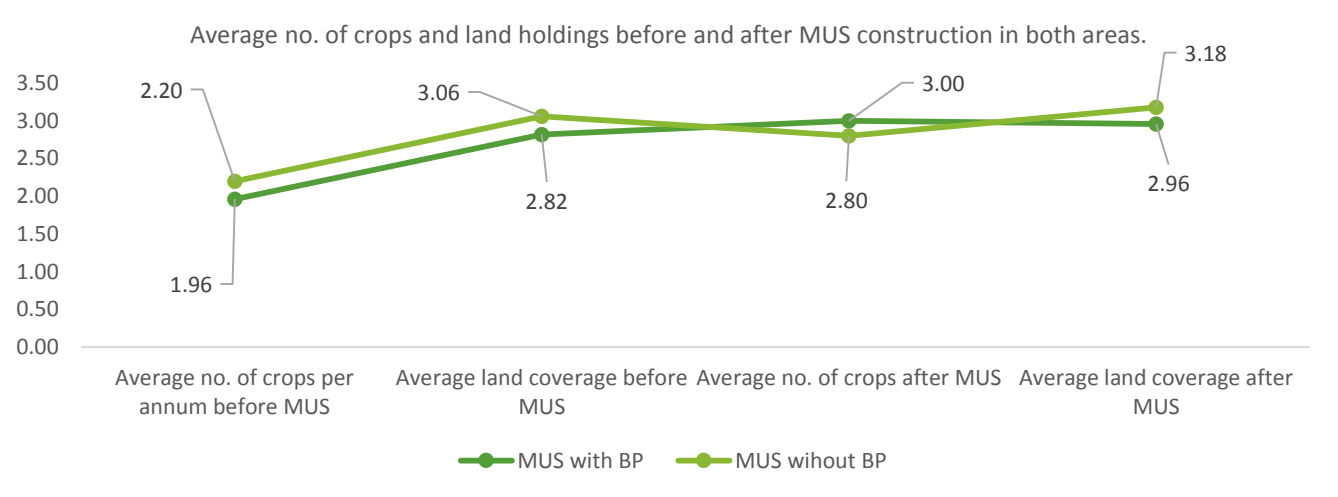
Almost all the farmers from both MUS areas are going to cultivate vegetables, cash crops, fruits, etc. due to accessible irrigation facilities, highly saleable in the market, internal exposures, realization of high price in the market, high market demand of those products. Only the farmers of the Khalla-Kafal MUS (MUS without business plan) are partially going to cultivate the vegetable for self-consumptions as nutritious supplements. Whatsoever, both types of farmers are aware of cultivating high return generating crops in next season?

Cropping Plans of the farmers of MUS areas for next season							
MUS with BP	**No. of farmers**	**Planned crops**	**Reason**	**MUS without BP**	**No. of farmers**	**Planned crops**	**Reason**
Sankhet MUS	5	Cucumber, bitter gourd, brinjal, bean, onion potatoes	Irrigation facilities and market access	Ramakhola-Selgadi-Simwan MUS	5	Cucumber, pumpkin, brinjal, bean, capsicum	Internal exposure

Silka MUS	5	Vegetable, fruits and cash crops	Good returns and irrigation	Basain MUS	5	Kiwi, Walnut and Orange, apple, cucumber,	Irrigation facilities
Ghattekhola MUS	5	Cucumber, tomato, beans, large cardamom, onion, cauli	High demand in the market and irrigation	Sattar Irrigation MUS	5	Tomato, cauli, cabbage, onion, okra, bean, chilli	Market price, irrigation
Bagjewala MUS	5	Cucumber, capsicum, cabbage, cauli,	High price, market demand and irrigation	Khalla Kafal MUS	5	Cereal crops and partially vegetable	Self-consumption
Gharelu Lamjile MUS	5	Cucumber, bean, tomato, onion, mustard, chilli	Easily saleable and irrigation	Khaluwa-Dipalmare MUS	1	Cucumber, pumpkin, brinjal, bean, capsicum	Market and irrigation

What crop types did the farmers sow in irrigable land <u>before and after</u> the MUS and what was the average area/no., average productions and monetary value of the productions and cash earning?

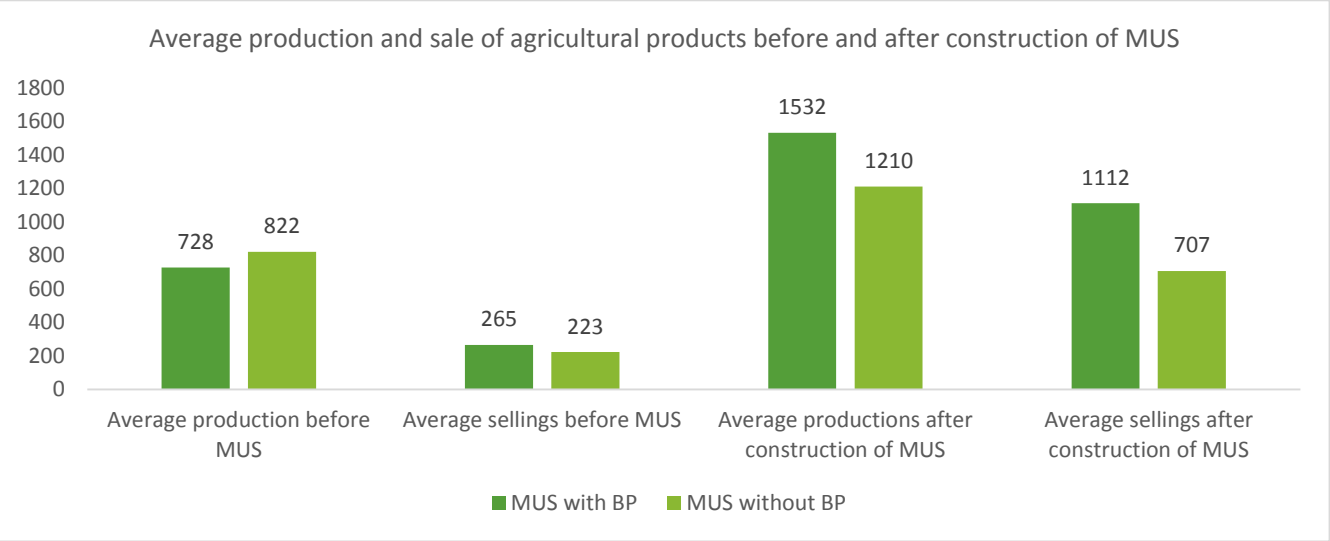
Regarding to **<u>average no. of crops</u>** in MUS areas reached 3.00 from 1.96 (53% increase) in MUS with BP and in MUS without BP reached 2.80 from 2.20 (27% increase). The average irrigation land holdings in MUS-BP areas increased to 2.82 to 2.96 (5% increase) and to 3.18 Ropani. from 3.06 Ropani(4%) in Non-MUS-BP areas. The results indicates that the farmers having developed a business plan have learnt improved technologies, market oriented productions, increased their farmland and intensified their production.



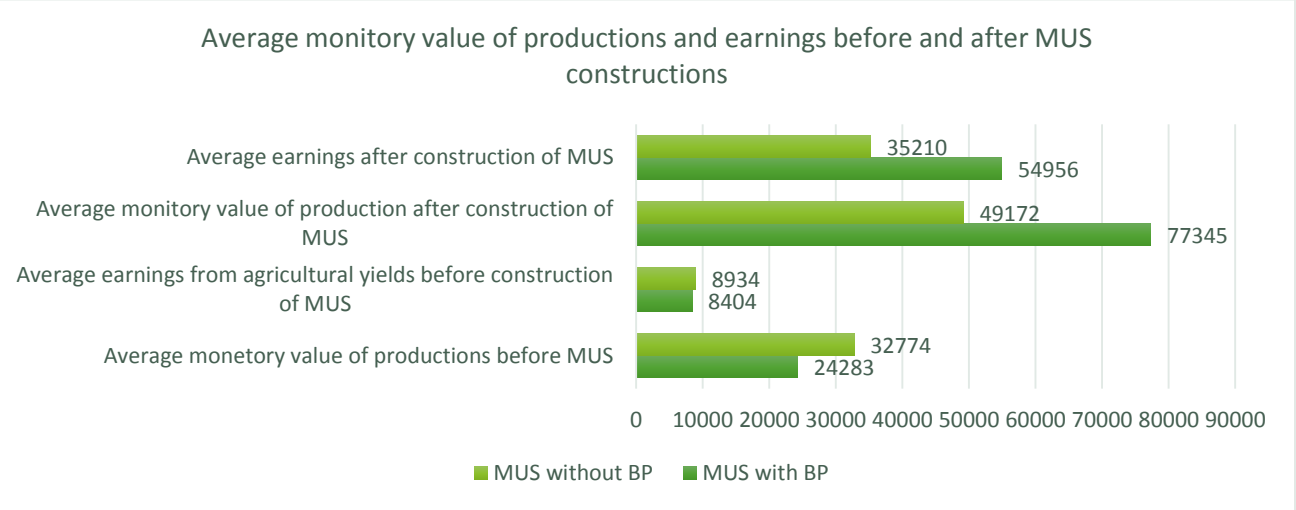
The majority of MUS area farmers used to cultivate cereal crops before the construction of MUS scheme but it changed into vegetable, cash crops, fruits after construction of the MUS scheme. In both types of MUS areas the majority of the farmers also started to cultivate off-season vegetables after the construction of the MUS scheme. The only difference is that in MUS-BP areas the conversion of crops is slightly more than in the Non-MUS-BP areas. The below table shows that farmers of both types of MUSes started to cultivate high earning crops in all seasons. Although the table doesn't show the uses of land for vegetable and cash crop cultivation in MUS without BP areas is low and majority of the farmers produce the vegetable for huge self-consumptions.

Name of MUS with BP	Major crops before MUS construction	Season for cropping	Major crops after MUS construction	Season for the cropping	Name of MUS without BP	Major crops before MUS constructions	Season for cropping	Major crops after MUS construction	Season for cropping
Sankhet MUS	Wheat, Mustard, cucumber, pumpkin, paddy maize	Winter and summer crops	Tomato, Cauli, Bean, Brinjal, potatoes	Winter, spring and autumn	Ramakhola-Selgadi-Simwan MUS	Wheat, Mustard, Maize	Winter and summer crops	Tomato, Cauli, Bean, Brinjal, potatoes	Winter, spring and autumn
Silka MUS	Wheat, barley, maize, millet	Winter and summer partially fallow in winter	Apple, Kiwi, Walnut, Tomato, Onion, Cabbage, Cauli, Mustard, Radish, Potato, Jukeni, Bean (Black)	Winter, spring and autumn	Basain MUS	Millet, Bean, Potatoes, Barley	Winter and summer partially fallow in winter	Apple, Kiwi, Walnut, Tomato, Onion, Cabbage, Cauli, Mustard, Radish, Potato, Jukeni, Bean (Black)	Winter, spring and autumn
Ghattekhola MUS	Wheat, maize, millet, paddy	Winter and summer, spring season partially	Tomato, Garlic, Onion, Cauli, Cabbage, Bean	Winter, spring, summer and autumn	Sattar Irrigation MUS	Paddy, wheat	Winter and summer, spring season partially	Tomato, Garlic, Onion, Cauli, Cabbage, Bean	Winter, spring, summer and autumn
Bagjewala MUS	Maize, wheat, Barley, soyabean, bean	Winter and summer	Tomato, Garlic, Onion, Cauli, Cabbage, Bean, large cardamom	Autumn and spring	Khalla Kafal MUS	Wheat, Soyabean	Winter and summer	Tomato, Garlic, Onion, Cauli, Cabbage, Bean, large cardamom	Autumn and spring
Gharelu Lamjile MUS	Cabbage, cauli, tomato, bean, potato, brinjal, cucumber	Winter and spring	Cabbage, cauli, tomato, bean, potato, brinjal, cucumber	Autumn, spring and winter	Khaluwa-Dipalmare MUS	Cabbage, cauli, tomato, bean, potato, brinjal, cucumber	Winter and spring	Cabbage, cauli, tomato, bean, potato, brinjal, cucumber	Autumn, spring and winter

Regarding to **average production and sale** of the agricultural products **before and after construction of MUS** scheme, the average productions before construction of MUS are 728 kilograms and 822 kilograms in MUS-BP and Non-MUS-BP areas respectively. After construction of the MUS the production reached 1532 and 1210 kilograms respectively in MUS-BP and Non-MUS-BP areas. The average sale of agricultural products before construction of MUS were 265 and 223 kilograms respectively in MUS-BP and Non-MUS-BP areas and increased to 1112 and 707 kilograms after construction of the MUS scheme. Before business plans were implemented and the locals trained, average productions in Non-MUS-BP areas were higher than those in the MUS-BP. After construction of MUS-BP schemes, the production is higher in those schemes than in non-MUS-BP areas. Likewise the average sale of agricultural products in MUS-BP area after construction is higher there than in non-MUS-BP areas.



Regarding to the **average monitory value of the productions and average earnings of the farmers before and after** construction of the MUS, it has been found that the farmers of Non-MUS-BP areas had more monitory values of their productions and earnings than farmers of MUS-BP areas. But after constructions of the situation reversed due to the development of business plans in these schemes



5. Conclusions

The irrigation schemes and the MUS-schemes are highly appreciated by the communities. They have effectively contributed to higher standard of living of the remote farmers of Sudur Paschim and Karnali provinces. The study shows that the development of the Irrigation and MUS schemes have had positive effect on economic growth, leadership development of beneficiaries; more time used for productive works as it now pays off, environmental protections through increased greeneries and increased availability of water in the environment close to the canals; increase in variation of crops and productivity; improved management and operational capacity of the users among the many benefits.. Based on the questionnaires and their responses, the following can be concluded:

1. Irrigation scheme impact study:

- Interviewed farmers either didn't irrigate their land or irrigated their lands from traditional earthen canals, which often lacked a possibility to divert water effectively. As sources were limited, the use raised conflicts between the farmers. Now they can irrigate their lands without conflicts over the use as the new canals covers more area.
- The establishment of Users Committees have improved the management, operation and maintenance of the schemes. The UCs divide roles and responsibilities and collect funds for maintenance when required. As per surveyed farmers and the FGD the practices introduced by RVWRMP is rarely found in traditional irrigations schemes or before the intervention.
- The UCs practice to collect funds to cover the operation and maintenance costs either before the construction and/or after constructions, which enable them to solve the minor repairing issues.
- There is some practice of establishing water distributions rules in case of insufficiency. These rules reduce conflicts over the scares resources which is rarely found in traditional schemes.
- The cropping season has increased with diversified cropping patterns on their irrigable lands.
- With the increase of the average area of the irrigable lands the production and productivity have increased.
- The farmers used to spend much more time to irrigate their lands. With the new irrigation systems the time is reduced. The time saved is used for other productive works.
- Some of the respondents revealed that, they have reduced their yearly medical expenses as they now have a healthier diet with more vegetables than before. It may also be because the irrigation systems provide a cleaner environment.
- Many farmers use the irrigation facilities for cultivation of more valuable crops for the markets like vegetable, cash crops etc.
- The average monitory values and the cash earnings of the farmers increased significantly after construction of the irrigation scheme.
- The different farmers own assets like land, gold, cattle and other commodities from the income of agricultural produces after construction of irrigation scheme.
- The farmers used to spend more time for gossiping and talking about improvident matters before but after constructions of irrigation schemes they are paying more time for productive works.
- The usual diet of rice/bread+pulses has been supplemented with vegetable and pickles providing a healthier diet to all, so that the few cases of malnutrition have vanished

- The environment before construction of the irrigation schemes were dirty and dusts, which now cleaned due to water availability.
- The irrigation facilities in the villages enabled the farmers to improve their food security considerably – in some schemes by several months in others a couple. .
- The community members who are not users of the irrigation schemes area also benefitted by exchanging of the productions, copying of the behaviors of irrigation users. Hence, their livelihood also changed through the interventions.
- In overall, the farmers were very satisfied with the irrigation schemes and they have gained many benefits in terms of incomes and the food securities.

MUS Business plan impact study:

- The major crops cultivation practices by using MUS are found different both in MUS-BP and Non-BP-MUS using farmers. The proportion of the farmers cultivating vegetable, cash crops, poly-house farming is higher in MUS-BP and which is significantly low in Non-BP-MUS. The farmers of MUS-BP areas are aware of economic benefit of the vegetable and cash crops, hence more farmers are doing so.
- The proportion of the farmers who produces vegetable and cash crops for marketing purpose found different. More proportion of the farmers produce vegetable and cash crops for commercial purpose in MUS-BP areas rather than the Non-BP-MUS areas. The farmers of MUS-BP area are smarter to grab economic benefit of the MUS system.
- The farmers of MUS-BP areas are more likely to prepare their production and marketing plan whereas the farmers of Non-BP-MUS less likely do so. The MUS-BP user farmers internalize the agriculture as commercial way act accordingly.
- The high proportion of the farmers sell their agricultural productions in MUS-BP. The farmers of MUS-BP areas are able to link with regional markets as new market area to them and through the market channel like collectors and the collection centers. The farmers of MUS-BP areas have commercial traits.
- Large numbers of the returnee migrants retained in commercial farming in MUS-BP areas than the Non-BP-MUS. They have gained more knowledge on commercialization farming.
- Large number of farmers of MUS-BP areas have more earning range of >20000 whereas a few numbers of the farmers have so. This indicates that the farmers of MUS-BP are earning better with the receiving of more technical knowledge and the commercialization meaning.
- The large number of farmers of MUS-BP have contact numbers of input suppliers and the local service providers. But a few numbers of farmers have so in Non-BP-MUS user farmers. This indicates that the farmers of MUS-BP have well established the business relations.
- Large number of farmers produce the vegetable and cash crop as per market demand in MUS-BP areas whereas less number of the farmers of Non-BP-MUS areas do so. This indicates that the farmers of MUS-BP areas has better understood the market.
- The large number of farmers of MUS-BP areas applies value addition techniques like grading, sorting, cleaning and packaging and hence they are getting higher prices whereas less farmers of Non-BP-MUS do so. The farmers of MUS-BP area are better understanding the market.
- Large numbers of farmers of the MUS-BP areas are applying improved technologies of agricultures like selection of seeds, appropriate quantity of inputs, seasoning, bio-pesticides, trimming, etc. whereas the

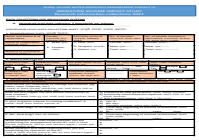
less farmers of Non-BP-MUS areas do so. This indicates the farmers of MUS-BP understand the importance of improved technologies of agricultures.

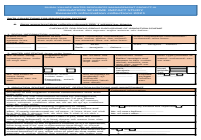
- The large number of farmers of the MUS-BP areas have practices of proper documentations of their inputs and returns and they also easily identify which particular commodities are more beneficial to them whereas a few number of the farmers of Non-BP-MUS areas do so. This indicates that the farmers of MUS-BP areas are smarter than others.
- The large number of farmers of the MUS-BP areas owned different properties whereas less proportion of the farmers of Non-BP-MUS areas do so. This indicates that the farmers of MUS-BP areas are smarter to utilize their earnings from agriculture.
- The average number of crops in MUS-BP area is significantly increased but it is less increased in Non-BP-MUS areas. This indicates that the farmers of the MUS-BP areas understood the value of the economy better than the farmers of Non-BP-MUS areas.
- The average production and productivity of agricultures in MUS-BP areas significantly increased in comparison to Non-BP-MUS areas. This indicates that the farmers of the MUS-BP areas applied suitable technologies, seasoning hence they get more benefits.

6. Annexes

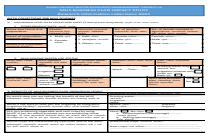
Annex 1: Study questionnaires and checklists

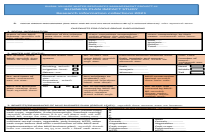
A. Irrigation impact study





B. MUS Impact Study





Annex 2: Lists of studied irrigation and MUSes schemes

A. Lists of the studied irrigation schemes

S.N.	Name of the Scheme	Address			
		District	RM	Ward	Tole
1	Sapra Irrigation	Bajhang	Thalara	9	Chigu
2	Sinyadi Irrigations	Baitadi	Dilasaini	7	Dhamigaun
3	Raichu Nunchhya Irrigations	Darchula	Naugadh	6	Majhgaun
4	Ranamul Irrigation	Achham	Ramaroshan	7	Simkhet
5	Tallokhali Gadara IS	Bajura	Gaumul	4	Gadara
6	Sahade Irrigation project	Dailekh	Bhagawatimai	4	Majhghar
7	Jhulkekhola Irrigation	Kailali	Chure	5	Jhulkepani
8	Nauli Irrigation	Dadeldhura	Aalital	7	Nauli
9	Thulo Kulo Irrigation	Doti	Sayal	5	Gakhet

B. Lists of the studied MUS Schemes with Business Plan

S.N.	Name of the Scheme	Address			
		District	RM	Ward	Tole
1	Sankhet MUS	Achham	Ramaroshan	2	Chanfamandu
2	Silka MUS	Bajura	Gaumul	6	Gairibadi
3	Ghattekhola MUS	Dailekh	Naumule	5	Naulathar
4	Bagjewala MUS	Baitadi	Shivnath	5	Bagjewala
5	Gharelu Lamjile	Dadeldhura	Aalital	4	Gharelu

C. Lists of the studied MUS Schemes without Business Plan

S.N.	Name of the Scheme	Address			
		District	RM	Ward	Tole
1	Ramakhola-Selgadi-Simwan MUS	Achham	Turmakhad	3	Ramkhola
2	Basain MUS	Bajura	Gaumul	4	Basain
3	Sattar IS MUS	Dailekh	Naumule	6	Talla Nauli
4	Khalla Kafal MUS	Baitadi	Shivnath	6	Basedi, Khaitadi
5	Khaluwa-Dipalmare	Dadeldhura	Aalital	1	Khaluwa