Chapter 5

Conclusion and Recommendations

5.1 Conclusion

The data analyzed on rainfall distribution of four villages shown the farming of short-term crops in these villages is limited only to one season, which is during the maha. There is not enough rainfall during yala season for the highland farming. The limitation of this physical factor (rainfall) is the main reason for farmers to exploit the land by short-term cultivation in this season. This reason causes a serious effect on land degradation by severe soil erosion in this region. The high rainfall erosivity during the months of October to November the period while farmers are involving in land clearing and preparation worsens this situation.

The results of logistic regression results were agree with some of the mind mapping results. In general, it can be concluded that:

- For all conservation measures, skills, ownland, low soil erodibility, attitude and off-farm income were the factors affecting for the adoption while the mind mapping exercise show ownership, labor, incentives, cost involvement, skills and income as the concerns of farmers in adopting conservation measures.

- Factors affecting for SALT conservation measures by logistic regression were number of years stay in the village, skills and slope while from the mind mapping, ownership, shade, maintenance problems, farmers believes, and incentives were identified as concerns for adoption.

- In adoption of stone terrace conservation measure, factors affecting adoption were found to be the skills and attitude by logistic regression while from the mind mapping ownership, high cost, skilled labor and experience, time involvement, and incentives were found out as main concerns of farmers for this soil conservation measure.

- In case of contour drains the factors affecting on adoption by logistic regression were marketing facilities, erodibility1, attitude, and off-farm income of the farmer while from the mind mapping farmers concern about the high cost, skills and experience, labor, ownership, space to important this conservation measure.

- Slope is a main factor affecting the adoption, more non-adopters were found in very steep slopes than moderate steep slopes. The steepness of the land contributes to serious soil erosion, and it is a main considering factor for land conservation. The results show the difficulties in implementing conservation measures on the steep slopes, especially the high labor cost, high material cost, and narrow strip for cultivation of the cash crops especially for SALT conservation.

- The adoption of conservation measures is directly correlated with the land ownership status of the farmer. If the farmer is a tenant farmer he is not willing to invest in conservation measures.

- The social factors of the farmers, education status was analyzed by dividing farmers into four groups the illiterate, literate, completed the primary education, and completed the high school or higher education. Results show adopters education level in all groups is better than non-adopters. Less percentage of adopters is illiterate compare with non-adopters. Level of education of the farmers is very important in enhancing the farmer's attitude and introduction of new technologies.

- Own land area is an important personal factor of the farmer, in securing the adoption. The highly significant difference between the adopters and non-adopters in this regard and lower adoption of conservation among the leased holders giving evidence for the situation.

- Skill is another social factor mainly contributing for adoption of soil conservation measures. The results of logistic regression and descriptive analysis by cross tabulation both confirm the significant difference of skill of adopters and non-adopters. The secondary information collected from earlier research gave evidence of the higher cost and higher number of labor unit's requirement with un-skilled labor.

- There is no significant difference among the labor availability for the household for both groups. The period of land preparation and establishment of the conservation are the peak period of labor requirement and scarce periods of the labor. The results of mind mapping giving evidence for the problem situations of the establishments of conservations measures overlap with the land preparation and planting.

- Attitude of the farmer towards soil conservation is highly significant different between adopters and non-adopters. Differences among the way of innovation made for the farmers by various organizations in the watershed management programs are important to consider on adoption.

- The economic factors, especially the on-farm and off-farm income affect significantly the odds-ratio of the adoption and for the selection of the conservation measures. Those who have higher economic status with on and off-farm income were willing to adopt and choose the long-term investments for mechanical soil conservation measures. The farmers with lower income select SALT system because the investment is low.

- Among the institutional factors, the tenure status is the most contributing factor for the adoption of soil conservation measures. The mind mapping for each of the conservation measures revealed that tenure problem is a main reason for non-adoption and for not to invest in mechanical measures in other peoples lands.

- Incentives play a key role to attract the farmers to adopt the soil conservation technology. However, farmers do not satisfy with the kind of incentives paid for the constructions, and in some cases the incentives were not paid for them.

- Technical assistance and farmer participation for the programs both are responsible by the technical agents. If the technical officer is duty conscious the farmer agrees to work with technical officer any time. The technical officers' friendly characters can encourage the farmer to easily adopt the technology.

- Marketing facilities is an important factor to promote soil conservation measure. The farm companies organized within the farmer organizations are the best solution to the problems, both for facilitating the purchasing and sale of the products to the merchants. The arrangement of transport to wholesale market can greatly increase the well being of the farmers.

- The results from mind mapping reveal some of the key linkages among the factors that may lead to enhance the adoption. For the non-adoption of SALT conservation measure in steep slopes, it shows the higher labor cost involvement, difficulties to maintain during the off and dry windy periods. Fewer incentives allocation for the SALT conservation is another constraint to adoption. The main reason behind the adoption is lower cost involvement compare with other measures and the extra income generation from the selling of the bean sticks. In moderate slopes, easiness to establishment by farm women, and less labor need enhance the adoption, while the problems of rats and mites of the SALT mulch, and the farmers believe on the high uptake of water by the hedgerows are the constraints to adoption.

- The main reasons for adoption of stone terraces in steep slopes include less attention after the establishment, easiness to work in steep slopes, and it is not easy to damage by wild animals. Higher cost involvement, need of technical knowledge and experience are the constraints to the adoption. The tenure

problems and the hardship in establishments are the constraints to the adoption in moderate slopes.

- The adoption of drain conservation is important in steep slopes to reduce the steepness of the lands and allow longer time to absorb runoff water during the heavy rains. The non-adoption of drain conservation was interfered by soil slides during heavy rains and the establishments are overlapped with land preparation and planting. Tolerance to damages in the moderate slopes enhances the adoption but the lands with more rocks and very shallow soil decreases the adoption.

5.2 Recommendations

The erosion problems in mid country steep land area now is in severe condition resulting in not only the degraded land and water resources but also poor livelihoods. The policies and regulations that are related to soil conservation and environmental conservation should response immediately to cope with this problem. According to the results it could find out the adoption is better on moderate and lower steep slopes. The policies should be formulated to enhance conservation, cropping in these slope ranges by providing the incentives to expand the adoption of conservation practices.

Soil conservation program of Natural Resources Management Center of Department of Agriculture should be strengthened by collaborating with the other organizations who engage in soil conservation extension. The Act of soil conservation should not formulate only to punish the farmers but cooperate with them to enhance their economic status by introducing various kinds of new programs to save the soil and entire land in the steep areas and all other sensitive areas. The soil conservation fund for the act can be strengthening to help on provide incentives. Awareness programs from the school children to all the public who engage in land based activities are important. The farmer participatory extension programs should be organized to strengthen the farmers to conserve the lands with suitable cropping

patterns and extra income generation activities. Introduction of local food crops with improved varieties will enhance the nutrition level of the household and these crops will improve the soil fertility and environment as well.

In the watershed management programs those who engage in this mid country area should consider more on economic status of the farmers, organization of the farmers to improve the marketing problems and provide the improved packages to solve agricultural problems related land tenure problems. Introduction of post harvest technologies to save the productions and value addition techniques for the products in order to find new markets may attractive.

The reduction of erosion by runoff in the steep lands and reaction to cope with water stress problem during the cropping season is very important for the farmers. Introduction of small water harvesting units in the area regarding this problem is very necessary. The water harvesting techniques collect the excess water from runoff and may indirectly support to the trapping of the fertile soil from runoff. The promotion of contour drains in suitable lands with non-degradable soils may be able to in cooperate with the water harvesting techniques in a suitable way. Protection of drain heads and stone terraces can be done by planting the improved grass varieties like clone 13, which is promoting by livestock department. This will be a chance to protect the crops and lands by stray animals in the catchments; it is very easy for the farmers to maintain as a fodder grass, because this variety is very fast growing.

Methodologies used for awareness creations and trainings are very important to enhance the adoption of farmers. On the job trainings through the farmers' demonstrations can be very effective in this regard. Payment of incentives provides farmers to combat for the credit problems and it should be attractive to them on enhance the adoption. Technical officer has to be keen and skillful to encourage the farmer to finish the establishment of conservation measures. The provision of inputs for farming is the best way to help farmers in establishing proper soil conservation measures.

According to the results of this study, skill on establishments, land ownership, soil erodibility status, attitude and income status of the farmer are key factors that have to be considered to increase the adoption of soil conservation measures. In recommending the soil conservation measures basically these factors have to be considered for different types of conservation programs.

If recommending to establishment of SALT, the skill, length of stay in the village and slope are the main factors had to be considered. For Stone terracing, most important factors to be considered are the skill and attitude of the farmers.

Establishment of contour drains mainly contributing by marketing facilities, attitude, off-farm income and the soil erodibility status. Implementation the program for establishment of the above conservation measures have to consider each type of conservation measure separately due to different dominant factors contributing to the adoption.