Champion CSA Screening Methodology

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Authors

Kiran P. BHATTA, PhD
Monitoring and Evaluation Expert, LI-BIRD

Bikash Paudel, PhD
Senior Program Manager, LI-BIRD

Pashupati Chaudhary, PhD
Program Development Director, LI-BIRD

Arun Khatri-Chhetri, PhD
Socio-Economist, CCAFS-SA

Ram B. Rana, PhD
Program Operations Director, LI-BIRD

Puna Bhaila
Research Officer, LI-BIRD

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For further details, please contact:
Kiran P. Bhatta, PhD
Monitoring and Evaluation Expert
LI-BIRD, Kaski, Nepal
Email: kiran.bhatta@libird.org
Telephone: (++977)-61-535357

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Abbreviations

CSA	Climate Smart Agriculture
GDP	Gross Domestic Product
CCAFS	Climate Change, Agriculture and Food Security
LI-BIRD	Local Initiatives for Biodiversity, Research and Development
CDKN	Climate and Development Knowledge Network
CGIAR	Consultative Group on International Agricultural Research
GESI	Gender Equality and Social Inclusion
FGD	Focus Group Discussion
KII	Key Informant Interview
WTP	Willingness to Pay
AHP	Analytic Hierarchy Process
VDC	Village Development Committee
GoN	Government of Nepal
INGOs	International Non-Government Organizations
NGOs	Non-Governmental Organizations
IRD	Informal Research and Development
SRI	System of Rice Intensification
NUS	Neglected and Under-Utilized (Crop) Species
ICT	Information Communication Technology
MUS	Multi-water Use System
CAMC	Conservation Area Management Committee
VC4	Village Climate Change Coordination Committee
BCDC	Biodiversity Conservation and Development Committee
ASC	Agricultural Service Center
LSC	Livestock Service Center
DDC	District Development Committee (Office)
DADO	District Agricultural Development Office
DSCO	District Soil Conservation Office
DLSO	District Livestock Service Office
PAC	Project Advisory Committee

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Executive Summary

This report highlights the part C of the Climate-Smart Agriculture (CSA) methodology report that comprise (part A) Identification and prioritization of potential CSAs, (part B) Piloting, testing and validation of promising CSAs, and (part C) Selection of champion CSAs, and (D) Extrapolation of CSA scaling up options across Nepal. The methodology for part A, B and C has been reported in "Technology Identification and Piloting Methodology Report".

The selection of champion CSAs involves the following steps: (I) Selection of potential CSAs for evaluation, (II) documenting evidences, (III) consolidation of results, and (IV) validation and finalization of champion CSAs. The selection of the potential CSAs for evaluation is based on the 'CSA screening process' where CSAs are screened by experts regarding its qualification as CSA, and by farmers regarding its suitability to address local climatic vulnerability and feasibility. In this study, evidences gathered through various methods such as on-farm experimentation, data recorded during piloting, collection of stakeholder opinion, key informant survey, household surveys to evaluate the effect of CSA implementation, and analytical hierarchy process (AHP) to evaluate farmers' preference has been used to evaluate and compare CSAs. The final list of champion CSAs was prepared using 'expert's judgement' based on the data and results obtained from different evaluation methods. This was validated by local communities and district level stakeholders through field observations, interactions, and Focus Group Discussions (FGDs). Feedbacks were collected from national level stakeholders through sharing of document for review, invitation to field for direct observation and a national level workshop.

The results shows that farmers, irrespective of place and gender, provide overwhelmingly high importance to 'food security' and low importance to gender equity and social inclusion (GESI) dimensions while selecting the CSA options. The final list of champion CSAs constitutes 17 CSAs or package of CSAs for Nepal. Among them, nine CSAs are champion for high-hill region, 12 CSAs are for mid-hill region and 10 CSAs are for Terai region. Six CSAs from the list are champions for all three agro-ecological regions. The scaling up of these champion CSAs would greatly contribute to build resilient agriculture systems in all agro-ecological regions.

Combined with 'CSA Identification and Piloting Methodology Report' submitted earlier, this 'Champion Screening Methodology Report' provides a complete framework to identify, prioritize, pilot, and evaluate the champion CSAs. The pillars/themes developed to define CSA for Nepal, criteria constructed for different pillars/themes, and indicators identified for each criteria; constitutes contribution to the art of knowledge for CSA discourse in Nepal and worldwide. The methodology developed in Nepal can be applied everywhere, although the CSA pillars, criteria and indicators may vary by location and conditions.

1. Introduction and Background

Nepalese agriculture is highly vulnerable to climate change due to high exposure to climatic hazards. It is also highly sensitive due to its overdependence on climate. But the adaptive capacity of people is too low owing to high poverty levels and less capacity for capital generation (MoE, 2011). Climate change is already having its toll on livelihood assets and livelihoods, and is expected to exacerbate in the future. Although future impacts of climate change on production and productivity of the three key crops of rice, maize, and wheat shows different patterns of changes over time and across agro-ecological regions, the net annual agricultural loss by 2070 is likely to be around 0.8 percent of the current GDP equivalent (IDS–Nepal, PAC, and GCAP, 2014). Therefore, current and future agricultural development in Nepal need to be responsive to the current as well as future climate variability. There is an urgent need to identify and promote agriculture technologies and practices that can contribute to achieving the country's food security goal by increasing productivity, providing options for smallholder farmers to adapt to climatic variabilities, and, if possible, contribute to achieve national mitigation targets. Promotion of Climate Smart Agriculture (CSA) could be the way forward for Nepalese agriculture development since it gives a framework for reconciling adaptation to climate change, enhancing crop production and national food security, and promoting mitigation in agriculture.

In response to this situation in Nepal, project entitled "Scaling-Up of Climate Smart Agriculture in Nepal" (hereafter the CSA project) is being implemented by Local Initiatives for Biodiversity, Research and Development (LI-BIRD) and CGIAR's Research Program on Climate Change, Agriculture and Food Security (CCAFS), with funding support from the Climate and Development Knowledge Network (CDKN). The project aims to develop portfolios of champion CSA technologies and practices for different agro-ecological zones of Nepal; assess challenges, strategies and key enabling factors for scaling-up CSA; and develop scaling-up pathways and implementation plans for CSAs to contribute to climate change adaptation in agriculture systems, ultimately targeting to reduce the vulnerability of women and poor farmers of Nepal that encompasses the majority of farming community of the country.

Several steps of analysis has to be conducted to be able to recommend champion CSAs for a given condition. Firstly, potential CSAs are identified through various means such as previous experiences of the institutions, literature review, stakeholder consultations etc. After that, CSAs need to be put under first-level of screening for finding out its suitability for given agro-ecological zone. The potential CSAs, then undergo piloting and verification for finding out their practical suitability at the given location under given set of conditions. The methodology up to this stage of CSA evaluation has been covered in the previous methodology report, namely, "Technology Identification and Piloting Methodology Report" (Bhatta et al., 2016). The focus of the report was on identification and screening of technologies based on theoretical set of criteria developed by the project. After the CSAs obtained through first level of screening (theoretical methodology) have undergone

field piloting, this report outlines the methodologies for selection of champion CSAs among the potential CSAs. This report highlights the methods and tools that are useful to evaluate the appropriateness and/or suitability of CSAs based on evaluation conducted through the use of different indicators developed by the project.

2. Champion CSA Screening Methodology

Given the limited resources, every country needs to find out the priority areas for investment. Although, there can be many CSAs suitable for different agro-ecological regions of Nepal, it is essential to identify and invest for those technologies that are very cost effective. The set of CSAs which are best feasible for different agro-ecological regions and provide highest gain in term of resilience to climate change can be termed as Champion CSAs. The main deliverable of the CSA project is the scaling-up pathways for the selected champion CSAs. For the selection of the champion CSAs, a rigorous 4-step method was adopted.

The first step in the champion CSA screening methodology was selection of those CSAs which merits further analysis, more simply, identification of the initial list of CSAs which will undergo further evaluation. This is followed by rigorous process of creating and documenting the evidences from various data sources, new data collection and analysis. The third step in the process is consolidating the results of various analysis and selection of champion CSAs. The fourth and final step is validation of the champion CSA list from various stakeholders. Since the first step of the process (i.e. selection of potential CSAs) has been described in the first methodology report in detail, this report will briefly present the first step. Further, this report will discuss the other steps of the Champion CSA Screening Methodology, with details of the tools and methods used for the analysis, results of the analysis and key learnings during application of those methods. The steps followed for champion screening can be highlighted as in Figure 1:

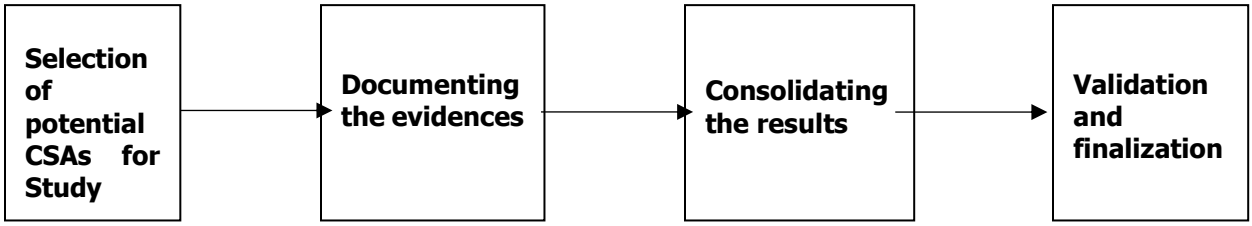


Figure 1: Overview of Champion CSA Screening Methodology

The final output of the process is selection of the champion CSAs for three agro-ecological regions of Nepal. With the generated evidence from field, the possible impact of scaling-up of selected champion CSAs will be evaluated through extrapolation. Later, a pathways for scaling-up will be developed along with the implementation plan and financing mechanism for scaling-up champion CSAs. The following sub-sections elaborates the process in detail.

STEP I
SELECTION OF POTENTIAL CSAS

These methodologies followed the CSA identification and prioritization methods described in detail in the previous methodology report titled "Technology Identification and Piloting Methodology Report" (Bhatta et al., 2016a). The brief steps for the selection of potential CSAs are outlined below:

- The process began with the creation of a pool of possible CSA technologies and practices from various sources including literature review; learnings from the experience of LI-BIRD, CCAFS, and other organizations; interaction with government, non-government, and private sector agencies; and documentation of local adaptation practices innovated by farmers.
- After creation of the pool of CSAs, these were short listed and prioritized. This was done using a multi-criteria analysis method that employed weighing of CSAs based on a set of criteria developed under the three pillars (Food Security, Climate Change Adaptation, and Mitigation) and a GESI theme and, thereafter, a scoring exercise.
- Among the short-listed CSAs, the CSAs suitable for piloting and demonstration were selected based on farmers' preference to pilot the technology, technical feasibility of the technology in a particular location, potential of a technology to responding to climate change, and other criteria.

The list of technologies and practices piloted by this project in the field is provided in Table 1. Some of the technologies/practices are not piloted by this project, yet considered for analysis of champion CSAs which is discussed in the subsequent sections.

Table 1: Technologies piloted by the project in different Agro-Ecological Zones

Agyouli (Nawalparasi)	Majhthana (Kaski)	Ghanpokhara (Lamjung)
Cattle-shed and Manure Management	Bio-engineering	Agro-forestry
Home Garden	Cattle-shed and Manure Management	Bio-engineering
ICT-based agro-advisory	Community Pond	Cardamom Dryer
New crops and varieties	Grain Pro Bag	Cattle-shed and Manure Management
Nutrient Management	Green Manuring (Rice)	Home Garden
Riverside Protection	ICT-based Agro-advisory	ICT-based agro-advisory
Solar-based irrigation	New crops and varieties	New crops and varieties
System of Rice Intensification	Nursery	Nursery
Zero Tillage Garlic	Plastic House (only)	Plastic House
-	Plastic House with Drip Irrigation	Plastic Pond
-	Plastic Pond	-
-	Stress (Drought) Tolerance (Rice)	-
-	Water Source Management / Protection	-

The selected technologies and practices underwent further evaluation and validation in the form of piloting, on-farm experimentations, and on-farm demonstrations. The location-specific CSA practices were chosen based on assessment of climatic risks to existing agricultural production systems as well as other socio-economic and biophysical vulnerabilities, using a combination of top-down (science-based) and bottom-up (farmers' perception based) methods.

STEP II
DOCUMENTATION OF EVIDENCES

Criteria and Indicators for Evaluation

For Nepalese context, CSA is defined through three main pillars (ability to contribute to food security, ability to contribute to adaptation, and contribute to mitigation, if possible) and potential to enhance condition and position of women and disadvantaged groups (GESI). CSAs are therefore evaluated through 13 criteria which helps to define the pillars. The Figure 2 shows the criteria used to define each pillars and the cross-cutting theme (see "Technology Identification and Piloting Methodology Report" for detail elaboration on these pillars and criteria).

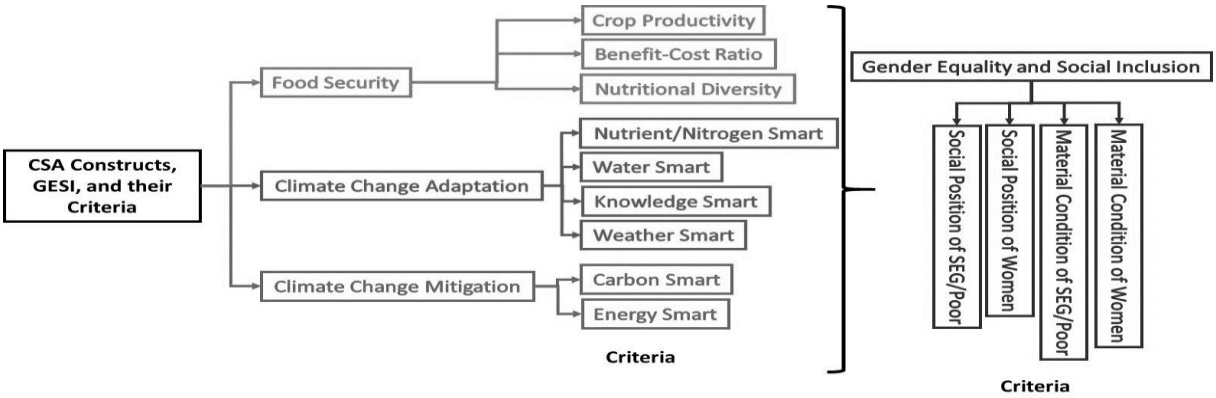


Figure 2: Criteria for defining CSA

For making the evaluation simpler, at least 2 indicators were developed for each of the 13 criteria. While defining the criteria, particular attention was given to make SMART indicators (simple or specific; measurable; achievable or attainable; realistic or relevant; and time-bound). Figure 3 shows the indicators developed for each of the criteria under three pillars and a cross-cutting theme (see "Technology Identification and Piloting Methodology Report" for detail elaboration on indicators).

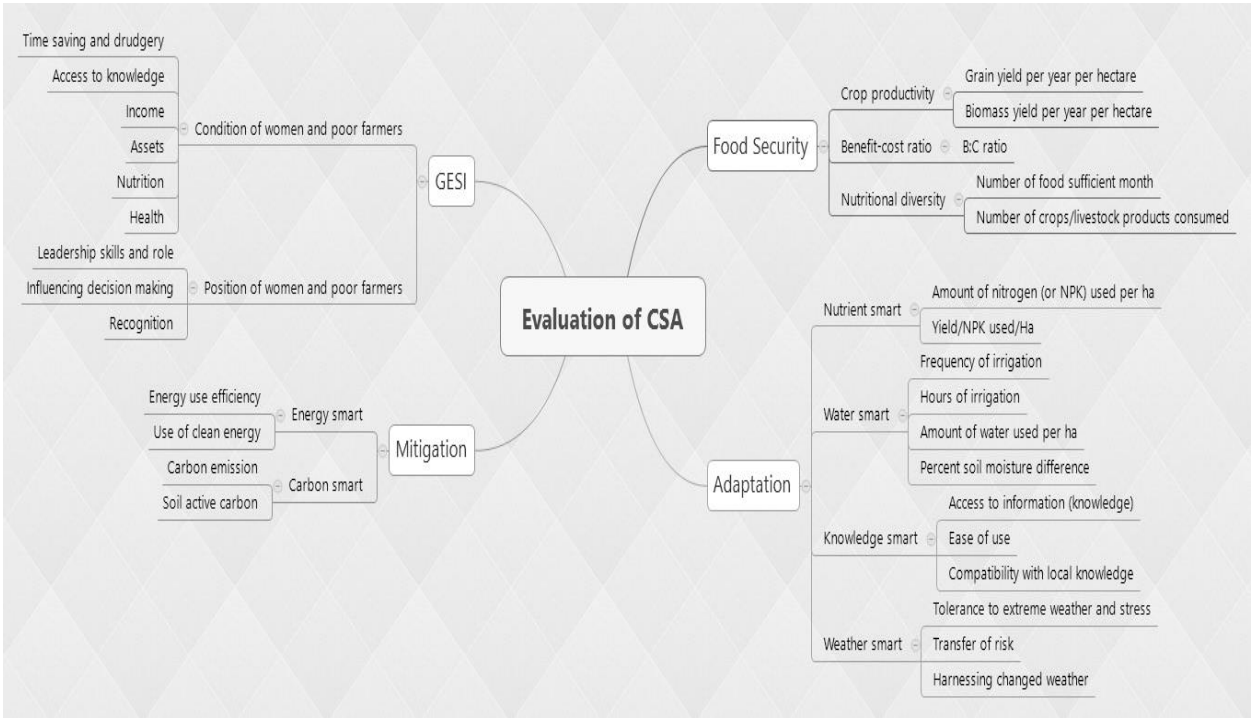


Figure 3: Indicators of CSA

Methods used for documenting the evidences

Various quantitative and qualitative methods were applied to document the evidences regarding performances of CSAs during the project period.

1. On-Farm Experimentation

On farm experiments were set-up to evaluate the CSAs which were technically feasible for on-farm evaluation, farmers' were willing to evaluate the technology in their field, and the results is achievable within project period. In most of the case, new CSAs are implemented together with the farmers' own practice for making paired comparisons. Eventually, these trials were also useful to demonstrate the benefits of the new CSA to farmers. Before conducting on-fam trials, detail research protocol were developed which included what to investigate, how to investigate, and what data to be recorded. Table (2) shows the CSAs for which on-farm trials were established.

Table 2: List of on-farm trials which provided information for selection of Champion CSAs

SN	Trial type	Agro-ecology	Objective	Numbers of trials	Remarks
1	Zero Tillage Garlic	Terai	Evaluating alternative tillage method for garlic cultivation during water stressed period	12	
2	Improved FYM	Mid-hill	Evaluating the efficacy of manure received from improved cattle-shed management package	12	
3	Stress tolerant rice varieties trial	Mid-hill	Evaluating the best stress (drought) tolerance rice variety for mid-hill region	1	
4	Green manuring	Mid-hill	Evaluate the effect of green manuring on rice (Ekle Dhan: a local rice variety)	1	
5	SRI on rice	Terai	Evaluate the benefits and costs of SRI practice on rice	3	Since the trials were established in 2016 season, the data are yet to come
6	Nutrition management on rice	Terai	Evaluate the benefits of precision nutrition management in comparison to farmers' practice	3	Since the trials were established in 2016 season, the data are yet to come
7	Crop establishment trials for maize	Terai and hills	Evaluate the performance of Jap Planter for maize	2	
8	Nutrient management trial for maize	Terai and hills	Evaluate the benefits of precisions nutrition management (nutrient expert tool) in comparison to farmers' practice	3	

Due to the short project period, quantitative data collected from household surveys and qualitative data generated through focus group discussions with farmers (the ultimate beneficiaries and the one who will decide on adoption/rejection of any of the potential CSA technologies and practices) and stakeholders are used for evaluation of champion CSAs. Besides, due to difference in the nature of technologies, quantitative on-farm trial data could not be used for conducting the universal comparison of all CSAs. Therefore, the results of the on-farm trials has been used in final evaluation of the CSAs as evidences, and the results have been reported as separate case studies.

2. Data recording during piloting of CSAs

While some CSAs were put under on-farm experimentation for validation, some others were piloted on farmers' field. Project supported certain percentage of the initial investment cost of implementing CSAs for piloting purpose. The objective of piloting of CSA technology was to demonstrate the benefits of adoption to farmers, and if required, refine, revise and improve the CSA from the feedbacks received during the implementation. Various quantitative and qualitative information were recorded during the piloting of the CSAs. Again, due to short research duration and diversity of the CSAs, the information recorded during pilots are not easily comparable among CSAs. However, the costs of implementation (investment cost and recurring costs) as well as benefits received by farmers in one-season can, theoretically, be compared. However, comparison of the one-season benefits can lead to false conclusion, particularly for those technologies which provides long-term and sustained benefits (e.g. solar-based irrigation). Therefore, this data was also used as evidence to provide basis for ratings on the CSA criteria but not universally compared.

Table 3: Type of data recorded from piloting of CSA technologies

CSAs	Locations	Type of recorded data
Solar-based irrigation	Nawalparasi	Installation cost, potential benefits
Plastic house, plastic pond, drip irrigation	Kaski, Lamjung	Construction cost, one-season benefits
Community pond	Lamjung	Construction cost, potential benefits
Improved farm yard manure, cardamom drier, bio-engineering, agro-forestry, riverside protection	Kaski, Lamjung, Nawalparasi	One time investment cost
ICT based agro-advisory, new crops and new varieties, grain-pro bags, improved home garden	Kaski, Lamjung, Nawalparasi	Recurring cost

3. Collecting Stakeholders' Opinion

Majority of the investment required for scaling-up CSAs in Nepal is likely to come from government agencies, farmers', local institutions, development partners and private sectors. Therefore, emphasis was given to strategically collect the opinion and feedback of these stakeholders during selection of champion CSAs. This step was crucial for selection of CSAs at the beginning, and this process was continued throughout the piloting period.

The views and opinions of different stakeholders were incorporated during selection of champion CSAs. Multiple visits from local level stakeholders (e.g. officials from District Agriculture Development Office), a visit from National Planning Commission Team including honorable member and the Joint-Secretary, two field visit from multi-sectoral Project Advisory Committee members (including officers from seven different ministries and departments), were some of the opportunities for gathering views and opinions from policy makers to integrate national priorities into the process of champion CSA selection. These events were also successful to build the agreement among the stakeholders regarding what types of CSAs should be prioritized for different agro-ecological conditions. Besides, project organized a national 'learning-sharing workshop', where various CSAs were shared with participating organizations, with examples of success and failures on scaling up. Annex 1 presents the list of CSAs being tested by the various organizations, their level of progress and potential champion technologies that can be used by the CSA project for further development of sclaing-up pathways, implementation plans, and financing mechanisms. It was found that many CSAs piloted in CSA project are also being implemented by other organizations, hence the workshop provided the opportunity to interact with them and know their findings (including personal observation and opinion of implementers). Through the discussions and dialogues during these events, some of the CSAs which were previously not considered for piloting and analysis, were also taken as champion CSAs. For example, although project has piloted the 'mobile based agro-advisory' in project sites, the response from the farmers was underwhelming. However, the panel discussion of the policy makers in the national 'sharing and learning workshop' highlighted the need for scaling up 'Information and Communication Technology (ICT) based agro-advisory' for climate change adaptation, hence this CSA is considered as the champion CSA. Similarly, despite not having field-level evidence for Weather-Index based Insurance in Nepal, this practice is selected as champion CSA based on the international experience and strong recommendations from stakeholders. The major events organized for this case, and the feedbacks are summarized below (Table 4).

Table 4: Events Utilized for Taking Stakeholders' Feedback

Event	Date	Location	Feedback received
Project inception workshops	July 30, 2015	Kathmandu	Prioritize the CSAs that addressed local vulnerabilities
Field visit of Hon. Member of National Planning Commission	August 6, 2016	Kaski	Recommend appropriate technology which has high potential for scaling up, share the learnings to government institution
Field visit of Project Advisory committee members	August 10, 2016	Kaski	Prioritize the 'water-smart' technologies in hill region. Give higher weights to adaptation and food security rather than mitigation goals. Include the CSAs which can build resilience at ecosystem level, and that can be adopted without high external inputs.
Field visit of Project Advisory Committee members	September 12-13, 2016	Nawalparasi	Promote portfolio of CSAs rather than individual practice. For example - Solar-based pump without adoption of water-smart technologies (e.g. drip irrigation) cannot increase the resilience of the system. Higher emphasis should be given to develop best management practice (CSA portfolio) for major crops like rice, wheat and maize to develop resilient agriculture system. In addition, higher priority should be given to technologies that helps to increase cropping intensity.
Joint-field visits of district stakeholders	September 5, 2016	Nawalparasi	Prioritize the CSAs with visible benefits to farmers – e.g. solar-based irrigation services. There are government supports to some CSAs such as small-tools and machines, small and micro-irrigation, farm-yard manure improvements etc. These technologies are easily scalable than other relatively new technologies.
Joint-field visits of district stakeholders	July 2016	Lamjung	Give higher weight to CSAs which supports local priorities. E.g. for Lamjung, prioritize CSAs suitable for Cardamom crop because it is the priority commodity in the district.
Joint-field visits of district stakeholders	May 2016	Kaski	Prioritize the CSAs which are already under governments' extension schemes. Coordinate with government and follow government norms while implementing those CSAs (e.g. cattle-shed subsidy), prioritize technologies that are simple (e.g. yam in Sack) and which provide immediate benefits to farmers (e.g. plastic house)
Policy interaction workshop	June 9, 2016	Kathmandu	Provide higher weight to the CSAs which has potential to contribute in future adaptation, and be a part of National Adaptation Plan (NAP), which are aligned with the objectives of Agriculture Development Strategy (ADS) and 14th development plans
National CSA learning and sharing workshop	August 25, 2016	Kathmandu	Agriculture insurance and ICT based agro-advisory are very important for building CSA system. However, these technologies should be facilitated at national level. Farmers' may not see immediate benefits to these CSAs, yet they are crucial for building resilience to climate change.

4. Key Informant's Interview

Key Informant Interviews were conducted to evaluate some technologies and a video documentary has been prepared from these interviews. Key informants, including leader/progressive farmers, group leaders and facilitators, staffs and members of local institutions, people from VDC and local government, staffs of agriculture and livestock extension offices, district agriculture development offices, district soil offices, companies and other stakeholders were interviewed to collect information about the benefits, limitation and scope for scaling up CSAs. This interview were needed to verity the technical aspects as well as verifying the cost-benefit of CSAs.

5. Evaluation of effect of piloting CSAs (Farmers' Perception Analysis)

The abovementioned methods provided information of CSAs which were relevant for the evaluation. However, for a comparison of all CSAs at the same time, a household survey was conducted to rate all CSAs against the identified evaluation indicators. If the CSA has already produced results, farmers were asked to answer how the technology supported different indicators of food security, adaptation, mitigation and GESI. However, in majority of the cases, results of CSA adoption were yet to be seen due to very recent implementation. Therefore, farmers did not have clear-cut idea to provide quantitative data for each evaluation criteria. In such case, farmers were asked to provide their outlook (opinion) about what do they feel about the potential impact of the CSA in future. This evaluation was conducted for following CSAs (Table 5).

Table 5: Technologies and practices selected for evaluation (study) *

Terai	Mid-Hills	High-Hills
Cattle-shed and Manure Management	Cattle-shed and Manure Management	Agro-forestry
Community Seed Bank	Community Pond	Bio-engineering
Crop Insurance	Crop Insurance	Bio-pesticide
Direct Seeded Rice	Grain Pro Bag	Cardamom Dryer
Drip Irrigation	Hand-held Agricultural Machineries/Tools	Cattle-shed and Manure Management
Green Manure and Residue Management	Hand-held Agricultural Machineries/Tools (Corn Sheller)	Crop Insurance
Hand Weeder	Hand-held Agricultural Machineries/Tools (Jab Planter)	Exposure Visit
Home Garden	ICT-based Agro-advisory	Grain Pro Bag and Agricultural Tools
ICT-based agro-advisory	Maize and Ginger Intercropping	Home Garden
Intercropping	Maize and Soybean Intercropping	ICT-based agro-advisory
New crops and varieties	New crops and varieties	New crops and varieties
Nutrient Management	Plastic House (only)	Nursery
Riverside Protection	Plastic House with Drip Irrigation	NUS crops
Solar-based irrigation	Plastic Pond	Plastic House
SRI	Water Source Management / Protection	Plastic Pond
Zero Tillage Machine and Technology	Yam in Sacks	-

** Technology evaluated through household survey and AHP differs slightly since evaluation was done for only those technologies and practices that are tested in the field but for AHP even those not tested are included (e.g. crop insurance)*

For this evaluation, a detailed semi-structured questionnaire was developed based on the CSA evaluation indicators (questionnaire provided in the Annex II) and pretesting was done in a small group of non-sampled households. External enumerators were hired and trained for carrying out the household surveys in the project villages. The data enumerators were provided a one-day intensive training at Pokhara Office of LI-BIRD before sending to fields, and regularly guided by the project team. All data enumerators were agricultural graduates and hence they are knowledgeable about most of the technologies and can easily grasp the questions. The enumerators were further supported by a volunteer from the same village where they are residing and/or conducting the survey in order to guide them about the location (showing route and household) and other necessary support as and when required.

Since, most of the CSAs were piloted in less than 30 households, all of the households testing the CSA technologies/practices under consideration are selected for survey, although some of the households were not found during data collection and hence data collection from these households could not be done. If a household was involved in more than one CSA testing it was interviewed more than one times and the data enumerator interviewing him/her each time was different so that the process does not become monotonous for both of them. The data collection started as early as September 20 and ended latest by October 5, 2016.

BOX I

Points considered while evaluating CSAs

During the data collection and evaluation process following things are considered properly:

1. What achievements (with respect to Food Security, Climate Change Adaptation, Mitigation, and GESI) the selected CSA technologies and practices wishes to accomplish? What changes it wishes to bring about in the changed climatic context that has affected the agriculture with negative consequences?
2. What vulnerability or problem it wishes to solve?
3. How it addresses that problem/issue/vulnerability? What is the mechanism followed in addressing it?
4. How to verify that it is addressing such issue? How to collect such data/information?
5. What is the perception of farmers in it?
6. What is the perception of other stakeholders, especially government authorities?
7. What is the perception of other stakeholders (GoN, I/NGOs) for scaling-out?
8. What policy favors/hinders scaling-up?

The collected data from the piloting and evaluation were analyzed to measure the effectiveness of the CSAs for achieving food security, adaptation, mitigation benefits, and GESI outcomes. This survey provided the quantitative data based on benefit or loss from adopting the CSA under consideration under different indicators of CSAs (that is, increased=1; constant=0; and decreased=-1). The results obtained from the evaluation of CSAs to different indicators of CSAs are presented in the annex (Annex III to V). The results from different sites are briefed in tables below (Table 6 to 8).

Table 6: Changes brought by CSAs implementation in Agyouli, Nawalparasi

Technology/Practice	Farmers' Perception
Cattle-shed Improvement Package	Increases yield, income, and crop/food diversity; improves quality of manure and requires less FYM use; reduces chemical fertilizer requirements; increases productivity of fertilizer; reduces irrigation but increases soil moisture; reduces farm labor need as well as time and workload of women; enhances social status of farmers
Community Seed Bank	Improves crop production as well as income; diversity also enhanced; reduces pressure on production resources like irrigation (probably due to stress tolerant varieties); less impact on time and workload; improves social status, especially participation and networking
Zero Tillage Machine	Improves yield and income; requires less irrigation but improves soil moisture; reduces labor and machinery use; reduces time and workload, especially that of women
Direct Seeded Rice	Improves production and income; requires less productive resources like irrigation, machinery use, etc; reduces time and workload of women that need more engagement in field works; somewhat beneficial impact on social recognition of participating farmers
Hand Weeder (based on KII)	Positive impact on yield and income; reduces need for manures and fertilizers; reduces time and workload of women farmers
Home Garden	Enhances production, income, as well as crop/food diversity; however, it mostly increases time, workload, and inputs required (e.g. irrigation); somewhat positive impact was found on social status (condition and position of women, poor/small-holder farmers)
ICT-based Agro-advisories	Increase yield, income, and food security of participating farmers; has positive impact on reducing time and workload of farmers; has positive impact on social status (condition and position of women and poor farmers)
Inter-cropping (based on KII)	Improves food production and diversity as well as income; requires less fertilizer; soil moisture is high in intercropped field; but it increases time and workload due to more farm operation required; enhances social condition of women and poor
New Seeds and Varieties	Increases production and income; some find it increasing crop/food diversity but some found opposite (may be due to mono-culture); improves food security; irrigation need is also fluctuating, that is, some farmer say it increases some say it decreases; time and workload decreased but usually other social indicators have positive effect
Nutrient Management (Rice)	Increases yield and income but also needs increased fertilizer, irrigation, time and labor from women, who are de-facto agriculture labor available in the rural areas nowadays; somewhat helpful to uplift social status of the involved farmers
Riverside Protection Works	Although helpful in improving and securing livelihoods have little direct effect on yield, income, and food security (though some farmers stated improvement in that); helped reduce time and workload of women and poor farmers due to less flooding effect and hence less frequent need to tend agricultural lend; improves social cohesion and networking
Solar-based Irrigation	Increases production, income, food security, and crop diversity; increases irrigation due to more availability of water and hence soil moisture content; decreases time and workload; increase community participation and other social condition and position
System of Rice Intensification	Increases yield, income, and hence food security; reduces frequency of irrigation but increases duration of irrigation as well as amount of water in each irrigation; saves time but workload is said to be increased/decrease by equal proportion of farmers; somewhat improves social status

Table 7: Changes brought by CSAs implementation in Majhthana, Kaski

Technology/Practice	Farmers' Perception
Cattle-shed Improvement	Increases production, food security as well as crop diversity; enhances quality of manure and hence required less chemical fertilizer needed thereby increasing the productivity per unit of fertilizer used; reduces time and workload of women
Community Pond Rehabilitation	Increases income and food security; a few also showed increase in crop yield; reduces workload of women; improves social condition
Corn Sheller	Since it is related to post harvest handling of maize and reducing drudgery/workload of women almost all of them verified reduction of women's workload as well as health benefits from it
Grain Pro Bag	Used to store seeds (or grains), it improves high quality seed availability as well as post-harvest loss is low resulting in high germination and hence crop production/productivity
ICT-based Agro-advisory	Increase production and income; reduces time, workload, and social status of marginalized groups of people (women, poor, etc)
Jab Planter	Used to reduce machinery need for plowing; since sowing is the job of women, it helps reduce time and workload but general perception is that it is difficult and not hassle-free
Maize-Ginger Intercropping	Increase in yield and income; increase in diversity of crops; although compared to mono-cropping workload increases, if two crops are to be planted separately the workload is comparatively low in this inter-cropping
Maize-Soybean Intercropping	Increases yield and diversity; improves women's health
Plastic House with Drip Irrigation	Increase yield and income; reduces number of irrigation required as well as amount of water required but duration of irrigation increases each time; increases soil moisture content; time required increases but workload decreases (since women need to carry less water compared to traditional irrigation)
Plastic House	Increase yield and income; increase time required for women in the field; unlike combined with drip irrigation it increases workload of women farmers
Plastic Pond	Increases yield and income as well as food security and diversity; increases irrigation since availability of water is high compared to earlier; soil moisture is obviously high since in past irrigation is less; time and workload reduction is observed, especially to carry water and also have positive health benefits
Water Source Protection	Little changes in production or income was reported due to more focus on drinking since it is based on Multiple-use Water System (MUS); reduces time and workload (carrying water by women); reduces distance to be travelled; have several other social benefits to women and poor households
Yam Cultivation in Sack	Reduces yield and hence income (compared to traditional farming of yam) but increases crop diversity since otherwise they have no place to cultivate yam; needs less labor for cultivation and hence saves time and reduces workload of women; have social benefits too

Table 8: Changes brought by CSAs implementation in Ghanpokhara, Lamjung

Technology/Practice	Farmers' Perception
Agro-forestry	Increases production of agricultural produce and hence income, food security, as well as diversity of crops and foods; reduces time and workload of women and poor
Bio-engineering	Based on FGD data it is found that it helps improve livelihoods through reduction in natural disasters like flood and landslides, which in turn helps secure maximum agricultural production; have food security benefits; reduces time and workload of women and poor, which will have to be utilized if they had to be engaged in combating these disasters
Bio-pesticide	Increases yield and hence food security; reduces time and workload of women and poor
Cardamom Dryer	Based on FGD data it is found to increase the availability of amount of cardamom due to less losses and hence increases income; reduces time, workload and health of women and poor households; increases social cooperation between community people since it is a community-based item
Cattle-shed Improvement	Increases yield and income; reduces time and workload of women; enhances social condition and position of women/poor
Nursery Management	Based on KII; increase production and/or income; increases crop diversity; increase time and workload but simultaneously increases social recognition and social status
Home Garden	Increase yield/production, diversity, and food security; in most cases reduces time and workload
ICT-based Agro-advisory	To some extent is found to increase yield and hence income; reduce labor required as well as time and workload of women; enhances social status
New Seeds and Varieties	Increases yield, income, and food security; less impact on time and workload of women but enhances their social status
Neglected and Under-utilized (Crop) Species	Have more production compared to other crops since already adapted and are hardy crops; increase food security as well as diversity; reduces time and workload
Plastic House	Increases yield and income; requires less irrigation and water but enhances soil moisture; reduces time and workload of women; increases social status
Plastic Pond	Increases yield, income, and diversity; due to high availability of water people tend to increase frequency as well as duration of water; reduces time, workload, and distance to travel (e.g. carry water); enhances social status

Since most of the piloted CSAs were pre-screened based on expert's judgements, none of them had negative effects to food and nutrition security, adaptation or mitigation. However, difference CSAs have varied level of positive effects to food security, adaptation, and mitigation and GESI criteria's.

6. Farmers' Preference Analysis Using Analytic Hierarchy Process (AHP)

A separate survey was also conducted for multi-criteria analysis based on AHP method. Analytic Hierarchy Process (AHP) method was applied for prioritization of the CSA practices using analysis method based on multiple criteria. The AHP, method originally developed by Thomas L. Saaty (Saaty, 1988), provides a framework for solving multi-criterion decision making problems. Firstly, AHP method provide relative priorities to different criterion and run a benefit measurement (scoring) model based on subjective pairwise comparisons of possible alternatives for each criterion. The inputs are converted into scores which are used to identify the alternatives which are of higher importance to the decision makers. The detail method and questionnaire of AHP survey is provided in the Annex VI and VII. Farmers used their judgments about the elements' relative meaning and importance while providing their response. Altogether 46 (87% female), 68 (41%

female) and 69 (59% female) farmers in Kaski, Lamjung and Nawalparasi district, respectively, provided their response in this survey. The results from the AHP method was presented below.

Calculating Weightage to CSA Pillars through AHP

The results shows that farmers provide overwhelmingly highest importance to 'food security' irrespective of place and gender (Figure 3). Increasing and diversifying food production and enhancing benefit-cost ratio are the ultimate priority for Nepalese farmers, even under the context of climate change. There is few disagreements regarding second important priority by sites and by gender of the respondents. In Nawalparasi, both male and female farmers agree that 'Adaptation to climate change' is the second priority followed by mitigation and GESI. In Lamjung, however, men provided higher importance to adaptation while women provided higher weights to mitigation although the differences are mere within 1% variation. Both men and women farmers agreed that consideration of 'GESI' is least important considering the goal of 'building climate resilient agriculture system'. The highest level of disagreement between men farmers and female farmers is in Kaski. Men farmers identified 'GESI' as the second important criteria followed by 'adaptation' and 'mitigation' as third and last respectively, but female farmers ranked 'adaptation' to be second important followed by 'mitigation' and 'GESI' as third and fourth.

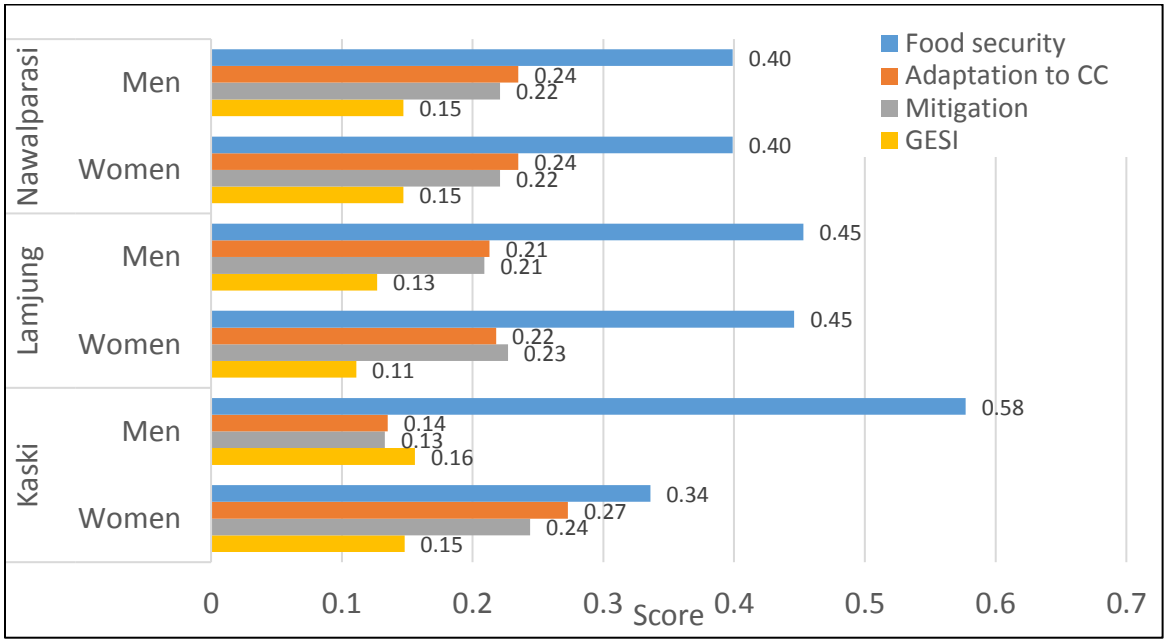
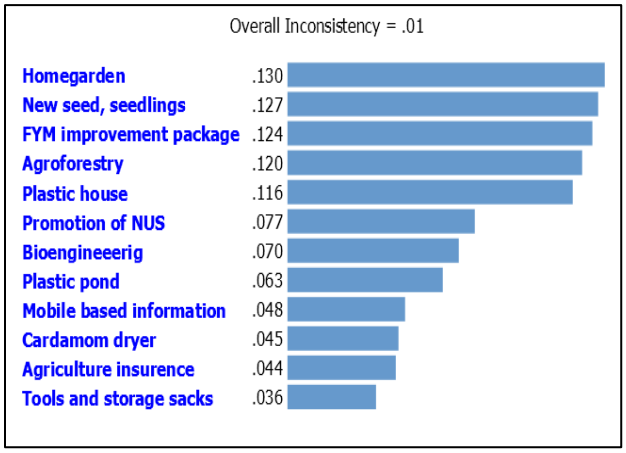


Figure 4: Scores of three pillars and GESI compared by gender and study sites

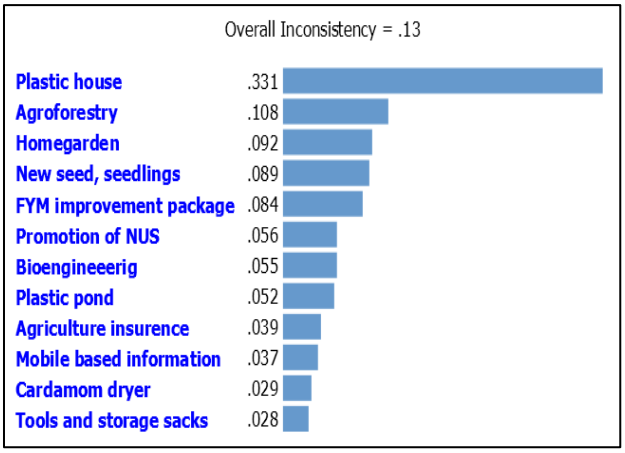
Prioritization of CSA Technologies/Practices

Like the difference in the importance to different CSA criteria and GESI, clear differences were observed in the prioritization of the CSAs in three sites. The gender difference is also noticeable on the list of priority CSAs in all three sites.

In Lamjung, female farmers ranked 'home garden' as the most useful technology to enhance resilience to climate change followed by provision of new seeds and seedlings resistant to climatic variabilities in second (Figure 4). In contrary to that, men farmers identified 'plastic house' followed by 'agroforestry'. Apparently, the choice of women farmers were driven by the lack of diverse vegetables and fruits to feed the family which can be improved by having a home garden and introduction of new seeds and seedlings. However, the priority CSA choices of men farmers is governed by their aspirations to increase farm income through adoption of more commercial farming practices such as vegetable cultivation in plastic houses and plantations in agroforestry. CSAs that need to be purchased from outside the village in relatively expensive rates – such as agriculture tools, equipment, cardamom drier, mobile based agro-advisory, agriculture insurance, were among those ranked lowest by both men and women farmers.



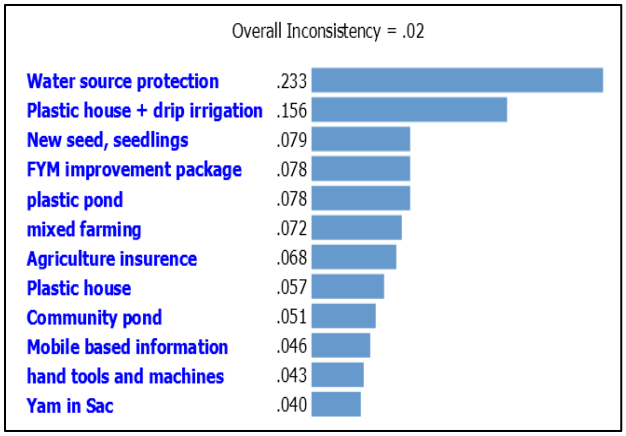
Female's Perception



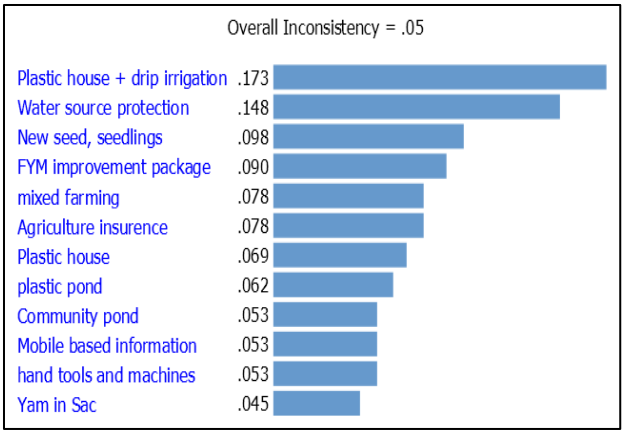
Male's Perception

Figure 5: Prioritization of CSAs by females and males in Ghanpokhara, Lamjung

In Kaski, there is greater agreement between men and women farmers on CSA ranking (Figure 5). Water smart technologies, such as 'water-source protection' and 'plastic house and drip irrigation package' ranked among two most important technology by both men and women groups. Understandably, women ranked 'water source protection' as most important because water is very scarce resource in village and making water available in household is principally regarded as women's job. In contrary, men ranked 'plastic house and drip irrigation package' as their first choice because this package of technology creates new potential for income generation, even under the situation of limited water availability. Both men and women farmers' groups provided lowest scores to 'Yam farming in Sacs', provision of 'hand tools and machines' and 'mobile based agro-advisory service'. This is possibly due to lack of immediate returns from these CSAs to farmers.

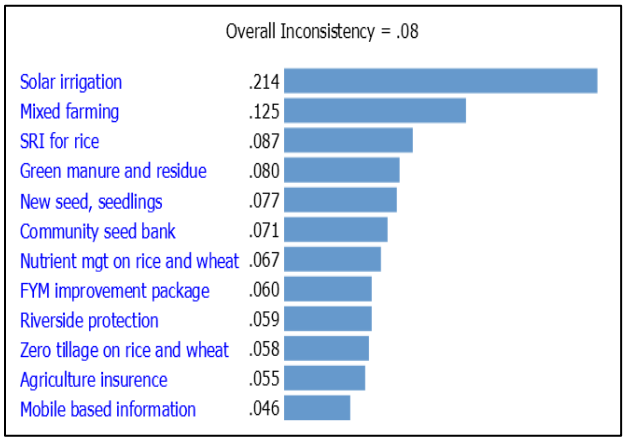


Female's Perception

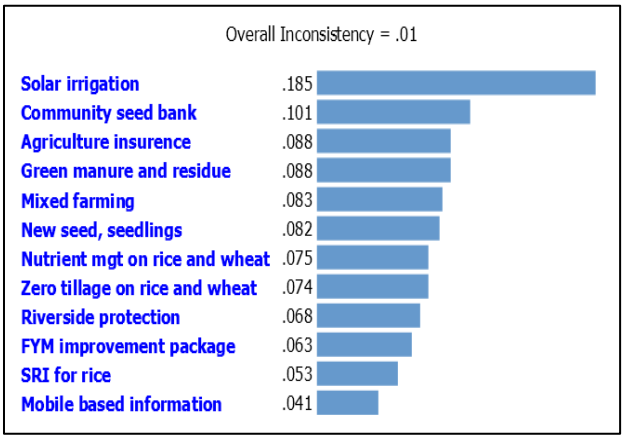


Male's Perception

Figure 6: Prioritization of CSAs by females and males in mid-hill region (Majhthana, Kaski)



Female's Perception



Male's Perception

Figure 7: Prioritization of CSAs by females and males in Agyouli, Nawalparasi

In Nawalparasi, 'solar based irrigation' was prioritized overwhelmingly first CSA by both women and men farmers (Figure 6). This is reasonable since introduction of solar-based irrigation in water-stressed areas increases food production, support adaptation to droughts and immediately higher income by allowing higher cropping intensity. Similarly, there is agreement between both men and women groups that mobile-based agro-advisory is the least prioritized CSA. Although, farmers testimony in other occasions show that the mobile-based weather and market information has supported them in decision making, the result shows that farmers are not convinced about the value of this CSA, possibly due to either the message is not effective or farmers have not been able to use the message. There is some disagreements between men group and women groups while ranking remaining technologies in the middle. Mixed farming of cereal and legumes, SRI for rice etc. were prioritized high by female farmers while community seed banks and

agriculture insurance were prioritized high by male farmers. However, the difference among the weights is too-narrow to ask for focused elaboration.

During the course of evaluation, it has been realized that the packages of technologies rather than the individual stand-alone technology is useful to address the growing challenges of climate change and to adapt the farming household in order to increase their food security and income. Hence, the study recommends packaging different technologies in one set of technology in order to meet the demand and need of households while tackling the problems and challenges posed by the changing climate and need to grow more.

BOX II
Packaging of CSA technologies and practices
In order for CSA technologies and practices to be effective in any given condition, it has been found that the best suited technologies for any given region need to be packaged appropriately to make a standard set of CSA technology/practice (herein after referred as "CSA Packages"). This not only solve a single problem (as in case of stand-alone technology) but also be helpful in addressing multitude of related problems. One of the most prominent case is that related technology introduced to address water-stress condition. The project has intervened through water-source protection/improvement; rainwater and run-off water harvesting; renovation of community pond; gray water collection; using water for multiple purposes; etc. However, if these interventions is combined to make a set of CSA package, it is more effective to combat the water problem than the individual technologies.

STEP III
CONSOLIDATION OF RESULTS FOR FINALIZING CHAMPION CSA

Several methods of data collection and analysis was finally consolidated through expert's discussions for finalizing the numbers of CSAs for high-hill, mid-hill and terai regions. Special considerations were given to following three criteria while finalizing the CSAs for different agro-ecologies.

Criteria for Consolidation

1) **Potential to reduce climate vulnerability of the agro-ecology:** In baseline study, landslide and hailstone was identified as main vulnerability issue in high hill, while drought and water stress was main challenge in hill region. In terai, unpredictable rainfall, winter drought and flood were the main climatic vulnerability (Bhatta et al., 2015). Therefore, while finalizing champion CSAs, special attention was given to select those technology which can directly address the vulnerability issue in significant way.
2) **Potential to develop package of champion CSAs:** One or two standalone CSAs would not make much difference to resilience of overall system. As the target is building a resilient agro-ecosystem, special attention was given to identify CSAs which can be combined to develop a complete portfolio of CSAs for crop cultivation or agro-ecosystem management. Therefore, it was ensured that at least two champion CSAs are from each of water, weather, knowledge, carbon, nutrition, energy smart categories.
3) **Scalability:** The consolidation also follows the hypothesis that the Champion CSAs are scalable in the sense that there exists a favorable policy for its scaling-up, there are appropriate institutional setup for supporting its scaling-out, and there are appropriate financing mechanism, if needed.

Champion CSAs for Different Agro-Ecological Regions of Nepal

Since there were various methods of data collection and analysis, a group of experts, consisting of the project team and stakeholders, discussed the findings of each studies and applied expert-judgement to propose the final list of champion CSAs for high-hill, mid-hill and terai regions.

Table 9: Champion CSA technologies and practices

Champion CSAs	High-hill	Mid-hill	Terai	Smartness
Solar-based Irrigation			√	Water and Energy Smart
Introduction of New Crops, Seeds, Varieties, Seedlings, etc.	√	√	√	Weather and Knowledge Smart
Conservation Agriculture (Zero Tillage, Residue Retention)			√	Carbon, Water, and weather Smart
Home Garden	√	√	√	Weather and Knowledge Smart
Plastic Pond	√	√		Water Smart
Plastic House	√			Weather and Water Smart
Drip Irrigation		√		Water Smart
Cattle-shed Improvement	√	√		Nutrient and Carbon Smart
Package of Plastic Pond, Plastic House, Drip Irrigation, and Improved Cattle-shed	√	√		Water, Weather and Nutrient Smart
Mixed Farming (Legume Integration)	√	√	√	Nutrient and Weather smart
Community Seed Banks	√	√	√	Knowledge Smart
System of Rice Intensification			√	Water Smart
Water Harvesting Ponds, Multiple Use and Water Source Protection	√	√		Water Smart
Plantation and Agro-forestry	√	√		Carbon Smart
Small Hand-Tools, Machines	√	√	√	GESI and Labor/Energy Smart
Agriculture Insurance (particularly Index-based)	√	√	√	Weather Smart
ICT-based Agro-advisory	√	√	√	Knowledge and Weather Smart
Total Number	**9**	**12**	**10**	

Altogether, 17 CSAs or package of CSAs are finalized as champion CSAs for Nepal. Among them, 9 CSAs are champion for high-hill region, 12 CSAs are for mid-hill region and 10 CSAs are for terai region. Six CSAs (i.e. introduction of seeds/seedlings of new crops, improved home garden, varieties and breeds; mixed farming through legume integration, introduction of small hand-tools and machines, agriculture insurance and ICT based agro-advisory) are champions for all three agro-ecological regions since these CSAs are essential to enhance resilience of any agro-ecological system. The CSAs suitable for terai region only are crop based agronomic practices such as conservation agriculture (zero tillage plus residue management) for wheat and system of rice intensification (SRI) for rice. Community Seed Bank is identified as champion CSA since it acts as a docking

stations for knowledge and information and it also increases communities' access to diverse seeds. Despite high level of resilience gain, solar-based irrigation technology is only feasible for terai region because of unavailability of underground water in hills and mountains. Yet, solar-based pumping cab be applied for lifting irrigation in any place.

Due to high water scarcity problem in mid-hill region, water-smart CSAs such as water harvesting pond, multiple-use system and water source protection, plastic pond, drip irrigation appeared to be champion CSAs for the region. Particularly for mid-hill region, a package of plastic pond, plastic house, drip irrigation plus improved cattle-shed practice is best fitted for reducing weather vulnerability, ensuring efficient water and nutrient management and improving farmers' income and profit.

The champion CSAs for high-hills are closely similar to mid-hill region, however farmers in high hill region provided lower importance to the water harvesting technologies. Considering the fact that the water-scarcity is more severe in mid-hills than in high-hills, this choice is understandable. Along with the six champion CSAs relevant to all three agro-ecology, plastic house technology is selected as champion to high hills. Due to long cold winter season, people in high-hill can hardly grow vegetables in winter season, hence technologies such as plastic house enables to cultivate vegetables throughout the year.

STEP IV
VALIDATION AND FINALIZATION

Validation with Farmers

Focus group discussion was also conducted with farmers' groups for finding out the most prominent technologies that had helped them combat the ill-effects of climate change. The pairwise-ranking method, one of participatory rural appraisal tool, was employed to rank the CSAs from first-to-last ranking. The main purpose of the exercise was to validate the list of champion CSAs selected through evaluation process by cross-checking. The result of the ranking exercise in all three sites closely matched to the result of the CSA evaluation exercise confirming the results of two methods of evaluation, hence the list of champion CSAs is validated with the farmers' groups.

Validation with Stakeholders

The project has planned for a final outcome-sharing workshop inviting different stakeholders, from government to non-government and private sector, including the participation of Project Advisory Committee. It is also planned that the consolidated analysis for the selection of champion CSAs along with the rationale behind it will be presented in this workshop. The representation of PAC for this final verification and validation of the project findings ensures that PAC owns these findings. This will also help Government of Nepal to prepare appropriate policies in the future based on recommendation of the project. Comments and suggestions from this workshop will be incorporated before finalizing the list of champion CSAs.

3. Conclusion and Recommendation

This "Champion Screening Methodology" report builds on and completes the previous methodology report entitled "Identification and Piloting Methodology Report". The combination of these two reports provides a complete steps for identification, prioritization, and piloting and evaluation process for selection of the champion CSAs through participatory action research method.

The results from the analysis showed that most of the CSAs piloted by the projects have increased the production and income of the participating households. They are also helpful to sustain their productivity in the changed climatic context. Some of them also helps minimize fossil fuel consumption rather use renewable energy sources. Plantation like activities also sequesters carbon and help minimize green-house gas effect. Various CSAs are found to be reducing women's drudgery, workload, time uses, and distance to travel, heath, etc. hence beneficial for improving their condition. Many of these technologies and practices are also useful to enhance or improve the social status of the participating household and hence could be considered important for improving their social position.

It is evident that farmers considers income, productivity, and food security to be of utmost importance among the CSA pillars hence most of the CSAs prioritized by farmers are targeted for that goal. Thus results indicates that despite widespread visible signs of climate change, farmers see adaptation technologies as the part of broad agriculture development activities. Although there are some differences in the degree of importance provided by males groups and females groups for various CSA pillars, the findings largely conforms the weightage applied by the expert team to screen potential CSAs. Food security is first priority CSA pillar for both experts and farmers followed by adaptation. While GESI was given higher weight than mitigation by experts, it was given lesser priority in almost all sites by both men and women farmers. More disaggregated analysis based on caste group would have provided better light on this issue.

Revisiting the list of the CSAs by agro-ecological regions, CSAs such as plastic house, improved home garden, agro-forestry, provision of new seeds and seedlings and FYM improvement package are highly prioritized for high-hills. Water-smart technologies such as water source protection, water harvesting and plastic house plus drip irrigation; provision of new seeds and seedlings and FYM improvement package has received highest priority in mid-hill region. Finally, solar-based irrigation, legume-integration into cereal based farming system, community seed bank, SRI etc. were among the top priority Finally, combined with 'CSA Identification and Piloting Methodology Report' submitted earlier, this 'Champion Screening Methodology Report' provides a complete framework to identify, prioritize, pilot, and evaluate the champion CSAs. The pillars/themes developed to define CSA for Nepal, criteria constructed for different pillars/themes, and indicators identified for each criteria; constitutes contribution to the art of knowledge for CSA discourse in Nepal and worldwide. The methodology developed in Nepal can be applied everywhere, although the CSA pillars, criteria and indicators may vary by location and conditions.

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5. Annexes

Annex I: CSA technologies/practices tested and validated by different organizations working in Nepal

Organization	Title of Research	Remarks
Mott MacDonald and Partners	Making the irrigation systems resilient in the context of climate change in Nepal	Resilient irrigation is emphasized by this research and it is accepted as important component by CSA project. The project will package it into set of technologies for water stressed condition and a scaling-up pathways will be prepared for the same.
FORWARD-Nepal	Piloting of Nutrient Expert tool in rice, Wheat and maize: FORWARD Nepal's experience in the eastern Terai	Though nutrient expert tool is important given low levels of inorganic fertilizer use in Nepal, further research is required for its scaling-out.
Gene Bank, NARC	Climate Analogue Tool (CAT) for smart planning in the wake of climate change	CAT is important tool and hence CSA project also employed it for preparing climate analogue maps based on available primary / secondary data.
CREEW-Nepal	Climate change impact on agriculture from the perspective of water resources	Water resources are important for agriculture and hence the CSA project accepted it as a crucial point especially in rainfed-based agriculture like Nepal. A package of technologies for addressing water stress has gone for preparing scaling-up pathways.
iDE-Nepal	Multiple Use Water System (MUS): A key climate smart technology for smallholders	MUS is again one of the important technology and hence it is also combined in the package of technology for water stressed condition and a scaling-up path for it will be prepared.
ICIMOD and CEAPRED-Nepal	Mountain smallholder farmers towards resilience practices: a case study from Kavre, Koshi Hills, Nepal	Climate Smart Village model is the emphasis of this research, which is accepted by the CSA project.
FAO	Economics of CSA for smallholder farmers in Nepal	FAO coined the term CSA. This research also emphasized the need for scaling-out CSA since the economic benefits are significantly higher. CSA project has already accepted this fact and is preparing scaling-up pathways for increasing the coverage of CSA technologies and practices.
SNV-Nepal	An inclusive approach to developing climate-smart solutions for mountain agriculture in Nepal	There are several technologies promoted by the research like snow harvesting; water use efficiency increasing; improved agronomic practices; agro-advisories; investment support; value chain participation; etc. Many of these technologies are already accepted in one way or other e.g. water harvesting, ICT-based agro-advisory, etc. Other aspects (like investment support, value-chain participation) will form the part of scaling-up strategy to be prepared for different individual technologies.
WWF-Nepal	Climate-smart Agriculture for Commercial Crops	This research emphasized knowledge management and Farmer Climate School has been emphasized as an important tool to disseminate knowledge. This again will be the component of scaling-up strategy rather than taking it as a CSA technology itself.
Practical Action Nepal	Up-scaling CSA through the private sectors	Private sector involvement has been shown to be important. The CSA project accepts is as one of the important aspect for scaling-up of CSA technologies and practices.
Helvetas Nepal	Scaling up sustainable soil management (SSM) practices in Nepal	Sustainable soil management is important CSA technology, which is also tested by CSA project. This has been well accepted by the GoN (MoAD) but to increase its coverage scaling-up pathways need to be developed.
NARC	Experiences of NARC on CSA Practices	There are several promising technologies like stress-tolerant varieties; agro-advisories; nutrient, tillage, and residue management; seed bank; hand-held agricultural tools; etc. These are accepted by the project to be important and several of them are accepted as champions and scaling-up pathways will be prepared for them.
Landel Mills Development Consultant	Biochar based organic fertilizer outweigh chemical fertilizer in cabbage and cauliflower production – farmers trial results in Bandipur (Tanahu) and Nalang (Dhading) villages of Nepal	SAKS project of LI-BIRD has also tested biochar with encouraging results but more research are needed to before it can be recommended as champion CSA.
MoAD / GoN	An initiative of ICT applications in agriculture/AMIS	CSA project has itself implemented ICT-based agro-advisory services and found it important but only after the sizeable volume of production is expected from the community for market sale.
ANSAB-Nepal	Ecosystem-based commercial Agriculture: Lessons from field experimentation and demonstration	Ecosystem approach is important and is being considered by the CSA project too. Commercialization is also important for farmers to increase income and food security. Commercialization, value-chain, financing mechanism, etc will be the component of scaling-up pathways developed by the project. Several technologies like plastic house, solar-based irrigation, etc are already promoted by CSA project. Some of these will be considered for preparing scaling-up pathways.

Annex II: Household Survey Questionnaire

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उत्पादन तथा खाद्य सुरक्षामा उपलब्धि

		थोरै वा घटेको	उस्तै वा थाहा छैन	धेरै वा बढेको
१	यो प्रविधि प्रयोग गरेपछि तलका उत्पादनमा कस्तो फरक पाउनु भएको छ ?			
१क	अन्न उत्पादनमा : **फरक**			
१ख	..... (e.g. पराल) उत्पादनमा : **फरक**			
२क	उत्पादन वस्तुको आम्दानीमा कस्तो फरक पाउनु भएको छ ? रु.....			
२ख	उत्पादन लागतमा कस्तो फरक पाउनु भएको छ ? रु			
२ग	प्रतिफलमा कस्तो फरक पाउनु भएको छ ? रु			
३क	उत्पादीत बालीको विविधतामा कस्तो फरक पाउनु भएको छ ? **(पहिले र अहिले लगाउने गरेको बालीहरुको नाम अर्को पानामा टिप्ने)**			
३ख ४	खानेकुरको उपलब्धता र विविधतामा कस्तो फरक पाउनु भएको छ ? घरायसी उत्पादनले खान पुग्ने महिनामा कस्तो फरक पाउनु भएको छ ? **पहिले (महिना)** ..... **अहिले (महिना)**			

अनुकुलनमा उपलब्धि

		थोरै वा घटेको	उस्तै वा थाहा छैन	धेरै वा बढेको
५	गाईवस्तुको मलको गुणीतरमा पहिले भन्दा कस्तो फरक भए जस्तो लाग्छ ? **फरक**			
६	गाईवस्तुको मल पहिले भन्दा कति हाले पुग्छ जस्तो लाग्छ ?			
७क	यूरीया मल पहिले भन्दा कति हाले पुग्छ जस्तो लाग्छ ? **फरक**			
७ख	डि.ए.पी. मल पहिले भन्दा कति हाले पुग्छ जस्तो लाग्छ ? **फरक**			
८	त्यत्तिकै मल हाल्दा पहिले भन्दा अहिले उत्पादनमा कस्तो फरक भए जस्तो लाग्छ ?			
९क	पहिलेको तुलनामा अहिले सिंचाई धेरै/थोरै पटक गर्नुपर्छ कि उस्तै उस्तै हो ? **फरक**			
९ख	सिंचाई गर्ने अवधि (समय) मा कस्तो फरक पाउनु भएको छ ? **फरक**			
९ग	सिंचाई गर्न चाहिने पानीको मात्रामा कस्तो फरक पाउनु भएको छ ? **फरक**			
९घ	जमीन/माटोको चिस्यानमा कस्तो फरक पाउनु भएको छ ?			
१०	यो प्रविधिले सुचना तथा जानकारी पाउन कतिको मदत गरेको छ ?			
११	यो प्रविधि उपयोग (Use) गर्न कतिको सजिलो छ ?			
१२	यो प्रविधि अपनाउन (Adopt) कत्तिको सजिलो छ ?			
१३	यो प्रविधि तपाईले पहिले गर्दै आएको कृषिसँग कत्तिको मिल्दोजुल्दो छ ?			

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(Depending on Household, once may be sufficient. Ask only about his/her perception.)

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Interviewer's Note

Part 2

WILLINGNESS TO PAY

Kaski:	**Lamjung:**	**Nawalparasi**
Improved Cattle-shed	*Improved Cattle-shed*	*Improved cattle-shed*
ICT based agro-advisory	*ICT based agro-advisory*	*ICT based agro-advisory*
Homegarden	*Homegarden*	*Zero tillage machine*
Water harvesting pond (community)	*Water harvesting pond (community)*	*Homegarden*
Drip irrigation set	*Plastic pond (waste water harvesting)*	*Solar-water lifting pump (community level)*
Plastic pond (waste water harvesting)	*Plastic house*	*Solar-water lifting pump (individual)*
Plastic house	*Improved cardamom dryer*	
Hailstone net	*Hailstone net*	

Tick the technologies which farmers know / have seen. Fill the following information for one of the technology. Try to balance equal number of households for each technologies.

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Put 50% of total cost in the box →　　? ______　　nufgLugx'G5 <

Tick one →　　u5{.　　ulb{g.

Fill if relevant　　olbugx'G5 eg] st Lj 6f <______

Put 75% of total cost in the box　　? ______

Tick one →　　u5{.　　ulb{g.

Fill if relevant　　olbugx'G5 eg] st Lj 6f <______

Put 100% of total cost in the box →　　? ______

Tick one →　　u5{.　　ulb{g.

Fill if relevant　　olbugx'G5 eg] st Lj 6f <______

? ______　　←*Put 25% of total cost*

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? ______　　← *Put 0% of total cost*

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Annex III: Results from Household Survey (Ghanpokhara, Lamjung)

Technologies / Indicators	Agroforestry		Bioengineering		Bio-Pesticide	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		21		9		12
Grain Production	76	0	100	0	92	0
Biomass Production	33	0	100	0	83	0
Income	95	0	100	0	67	8
Costs	0	86	0	100	25	42
Profit	95	0	100	0	67	0
Crop Diversity	95	0	100	0	58	0
Food Diversity	90	0	100	0	50	0
No. of Food Secure Months	76	0	100	0	50	0
Quality of Manure	10	0	0	0	8	0
Quantity of Manure Required	5	10	0	0	0	0
Urea Required	0	10	0	0	0	0
DAP Required	0	5	0	0	0	0
production with same amount of Fertilizer	14	0	0	0	0	0
Frequency of Irrigation	0	0	0	0	0	0
duration of irrigation	0	0	0	0	0	0
Difference in amount of water required for irrigation	0	5	0	0	0	0
soil moisture	71	0	0	0	25	0
Access to information due to Technology Adoption	100	0	100	0	92	0
Ease of Use of Technology	90	0	100	0	92	0
Ease of Adoption of Technology	95	0	100	0	100	0
Similarity with Indigenous Technology	95	0	0	0	50	33
Use of Machineries consuming Petroleum Products	0	0	0	0	0	0
Use of Petroleum	0	0	0	0	0	0
Ease of use of Renewable Energy	5	0	0	0	0	0
Labor use	0	10	0	0	8	0
use of Animal Power	0	0	0	0	0	0
use of Tractor (Machines)	0	0	0	0	0	0
Women's labor time	0	95	0	100	25	67
Women's Workload	0	95	0	100	8	58
Women's distance from home to work	0	95	0	100	17	42
Women's access to Information	100	0	100	0	75	0
Women's Income	86	0	100	0	92	0
Women's Health	86	0	100	0	67	0
Women's Decision making capacity	100	0	100	0	83	0
Women's Risk taking capacity	100	0	100	0	83	0
Women's Engagement in social works	100	0	100	0	92	0
Women Joining Institutions/Groups	95	0	100	0	83	0
Women's Leadership in Institutions/ Groups	43	0	100	0	50	0
Women's Recognition in Society	95	0	100	0	83	0
Women's perception of Society	100	0	100	0	100	0
Women's Engagement in Social decision making	100	0	100	0	83	0
Women's Representation in VDC	52	0	100	0	67	0
Women's ability to allocate budget in VDC	29	0	100	0	33	0
DAG's labor time	0	95	0	100	17	67
DAG's Workload	0	95	0	100	8	58
DAG's Distance from home to work	0	95	0	100	17	42
DAG's Access to Information	95	5	100	0	75	0
DAG's Income	86	0	100	0	92	0
DAG's Health	86	0	100	0	67	0
DAG's Decision making capacity	100	0	100	0	92	0
DAG's Risk taking capacity	100	0	100	0	75	0
DAG's Engagement in social works	100	0	100	0	100	0
DAG Joining Institutions/Groups	95	0	100	0	83	0
DAG's Leadership in Institutions/ Groups	33	0	100	0	58	0
DAG's Recognition in Society	100	0	100	0	75	8
DAG's Improvement in perception of Society	100	0	100	0	92	8
DAG's Engagement in Social decision making	100	0	100	0	92	0
DAG's Representation in VDC	52	0	100	0	58	0
DAG's ability to allocate budget in VDC	19	0	100	0	17	0
Helpful in addressing the current need		100		100		100
Helpful in combating the climatic risk		100		100		100
Helpful in taking advantage of climate change		95		100		100

DAG = disadvantaged groups (poor, Dalits and ethnic minorities)

Technologies / Indicators	Cardamom Dryer		Cattle-shed Improvement		Nursery Establishment	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		10		48		2
Grain Production	100	0	85	0	100	0
Biomass Production	0	0	69	0	0	0
Income	100	0	73	0	100	0
Costs	0	100	4	52	50	0
Profit	100	0	69	0	100	0
Crop Diversity	100	0	50	0	100	0
Food Diversity	100	0	52	0	100	0
No. of Food Secure Months	100	0	56	4	50	0
Quality of Manure	0	0	85	0	0	0
Quantity of Manure Required	0	0	4	63	0	0
Urea Required	0	0	0	15	0	0
DAP Required	0	0	0	4	0	0
production with same amount of Fertilizer	0	0	65	0	0	0
Frequency of Irrigation	0	0	0	8	50	0
duration of irrigation	0	0	0	6	50	0
Difference in amount of water required for irrigation	0	0	0	8	0	0
soil moisture	100	0	54	0	0	0
Access to information due to Technology Adoption	100	0	67	0	50	0
Ease of Use of Technology	100	0	85	0	100	0
Ease of Adoption of Technology	100	0	90	0	100	0
Similarity with Indigenous Technology	100	0	71	0	50	0
Use of Machineries consuming Petroleum Products	0	100	4	2	0	0
Use of Petroleum	0	0	2	2	0	0
Ease of use of Renewable Energy	0	0	10	0	0	0
Labor use	0	0	4	35	0	0
use of Animal Power	0	0	0	0	0	0
use of Tractor (Machines)	0	0	0	0	0	0
Women's labor time	0	100	4	75	50	0
Women's Workload	0	100	0	75	50	0
Women's distance from home to work	0	100	0	54	0	0
Women's access to Information	100	0	67	0	50	0
Women's Income	100	0	71	0	50	0
Women's Health	100	0	75	0	50	0
Women's Decision making capacity	100	0	71	0	100	0
Women's Risk taking capacity	100	0	63	0	100	0
Women's Engagement in social works	100	0	83	0	100	0
Women Joining Institutions/Groups	100	0	79	4	100	0
Women's Leadership in Institutions/ Groups	100	0	46	0	100	0
Women's Recognition in Society	100	0	77	0	100	0
Women's perception of Society	100	0	79	0	100	0
Women's Engagement in Social decision making	100	0	85	0	100	0
Women's Representation in VDC	100	0	58	0	50	0
Women's ability to allocate budget in VDC	100	0	31	0	0	0
DAG's labor time	0	100	4	75	0	0
DAG's Workload	0	100	0	75	0	0
DAG's Distance from home to work	0	100	4	58	0	0
DAG's Access to Information	100	0	71	0	0	0
DAG's Income	100	0	73	0	0	0
DAG's Health	100	0	73	0	0	0
DAG's Decision making capacity	100	0	67	0	50	0
DAG's Risk taking capacity	100	0	63	0	50	0
DAG's Engagement in social works	100	0	88	0	100	0
DAG Joining Institutions/Groups	0	0	75	4	100	0
DAG's Leadership in Institutions/ Groups	0	0	35	0	100	0
DAG's Recognition in Society	100	0	81	0	100	0
DAG's Improvement in perception of Society	100	0	83	2	100	0
DAG's Engagement in Social decision making	100	0	85	0	100	0
DAG's Representation in VDC	100	0	69	0	0	0
DAG's ability to allocate budget in VDC	0	0	29	0	0	0
Helpful in addressing the current need		100		100		100
Helpful in combating the climatic risk		100		100		100
Helpful in taking advantage of climate change		100		100		100

Technologies / Indicators	Home Garden		ICT-based Agro-advisory		New Seeds and Varieties	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		21		30		78
Grain Production	81	0	40	0	51	13
Biomass Production	5	0	33	0	22	6
Income	86	0	30	0	42	9
Costs	14	71	0	13	8	24
Profit	86	0	17	0	32	5
Crop Diversity	86	0	17	0	44	1
Food Diversity	90	0	20	0	44	1
No. of Food Secure Months	81	5	17	0	24	6
Quality of Manure	5	0	0	0	0	0
Quantity of Manure Required	0	0	0	0	0	1
Urea Required	0	0	0	0	0	0
DAP Required	0	0	0	0	0	0
production with same amount of Fertilizer	10	0	7	0	5	0
Frequency of Irrigation	0	0	0	0	1	0
duration of irrigation	0	0	0	0	0	1
Difference in amount of water required for irrigation	5	0	0	0	1	0
soil moisture	19	0	3	0	15	0
Access to information due to Technology Adoption	81	0	90	0	50	0
Ease of Use of Technology	86	0	93	0	56	1
Ease of Adoption of Technology	81	0	83	10	62	3
Similarity with Indigenous Technology	67	0	33	37	26	0
Use of Machineries consuming Petroleum Products	0	0	0	0	0	0
Use of Petroleum	0	0	0	0	0	0
Ease of use of Renewable Energy	5	0	0	0	0	0
Labor use	5	14	0	0	0	5
use of Animal Power	0	0	0	0	0	0
use of Tractor (Machines)	0	0	0	0	0	0
Women's labor time	10	67	3	60	12	29
Women's Workload	0	81	3	50	9	32
Women's distance from home to work	0	52	0	47	6	26
Women's access to Information	81	5	97	3	72	0
Women's Income	90	5	60	7	47	22
Women's Health	81	0	37	3	40	0
Women's Decision making capacity	90	0	77	0	64	0
Women's Risk taking capacity	86	0	80	0	63	1
Women's Engagement in social works	95	0	90	0	88	0
Women Joining Institutions/Groups	76	0	90	0	86	0
Women's Leadership in Institutions/ Groups	43	0	67	0	60	0
Women's Recognition in Society	90	0	83	0	79	0
Women's perception of Society	95	0	80	0	85	0
Women's Engagement in Social decision making	95	0	87	0	91	0
Women's Representation in VDC	43	0	47	0	50	0
Women's ability to allocate budget in VDC	24	0	37	0	35	0
DAG's labor time	10	67	3	57	10	33
DAG's Workload	0	86	3	50	9	31
DAG's Distance from home to work	5	57	0	47	9	22
DAG's Access to Information	81	5	93	3	67	1
DAG's Income	100	0	70	3	49	17
DAG's Health	81	0	40	0	38	0
DAG's Decision making capacity	95	0	77	0	59	1
DAG's Risk taking capacity	81	0	80	0	65	3
DAG's Engagement in social works	95	0	87	0	86	0
DAG Joining Institutions/Groups	76	0	90	0	82	1
DAG's Leadership in Institutions/ Groups	43	0	60	0	50	0
DAG's Recognition in Society	95	0	90	0	81	0
DAG's Improvement in perception of Society	95	0	83	3	83	3
DAG's Engagement in Social decision making	95	0	87	0	85	0
DAG's Representation in VDC	48	0	43	0	49	0
DAG's ability to allocate budget in VDC	29	0	27	0	29	0
Helpful in addressing the current need		95		100		45
Helpful in combating the climatic risk		90		93		41
Helpful in taking advantage of climate change		90		87		49

Technologies / Indicators	Neglected and Underutilized Crops		Plastic House		Plastic Pond	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		11		28		8
Grain Production	100	0	93	0	100	0
Biomass Production	9	0	11	0	50	0
Income	91	0	100	0	100	0
Costs	0	91	4	96	0	100
Profit	91	0	100	0	75	0
Crop Diversity	91	0	86	0	75	0
Food Diversity	91	0	93	0	100	0
No. of Food Secure Months	73	0	93	0	88	0
Quality of Manure	0	0	4	0	13	0
Quantity of Manure Required	0	0	0	14	0	25
Urea Required	0	0	0	0	0	0
DAP Required	9	0	0	0	0	0
production with same amount of Fertilizer	45	0	50	0	38	0
Frequency of Irrigation	0	0	7	54	25	25
duration of irrigation	0	0	0	64	25	13
Difference in amount of water required for irrigation	0	0	7	39	0	38
soil moisture	9	0	86	0	88	0
Access to information due to Technology Adoption	100	0	86	0	100	0
Ease of Use of Technology	100	0	100	0	100	0
Ease of Adoption of Technology	100	0	96	4	100	0
Similarity with Indigenous Technology	100	0	79	18	63	25
Use of Machineries consuming Petroleum Products	0	0	0	0	0	0
Use of Petroleum	0	0	0	0	0	0
Ease of use of Renewable Energy	0	0	11	0	25	0
Labor use	0	0	4	32	0	38
use of Animal Power	0	0	0	18	0	0
use of Tractor (Machines)	0	0	0	0	0	0
Women's labor time	0	100	0	96	13	88
Women's Workload	0	100	0	96	13	88
Women's distance from home to work	0	27	0	64	0	75
Women's access to Information	100	0	96	4	100	0
Women's Income	100	0	96	4	88	0
Women's Health	100	0	86	4	88	0
Women's Decision making capacity	100	0	93	0	88	0
Women's Risk taking capacity	64	0	82	0	100	0
Women's Engagement in social works	73	0	100	0	100	0
Women Joining Institutions/Groups	64	0	89	0	100	0
Women's Leadership in Institutions/ Groups	55	0	68	0	50	0
Women's Recognition in Society	100	0	89	0	75	0
Women's perception of Society	100	0	89	0	88	0
Women's Engagement in Social decision making	100	0	96	0	100	0
Women's Representation in VDC	55	0	54	4	63	13
Women's ability to allocate budget in VDC	55	0	32	4	38	13
DAG's labor time	0	100	0	96	13	88
DAG's Workload	0	100	0	96	13	88
DAG's Distance from home to work	9	9	0	64	0	75
DAG's Access to Information	100	0	86	4	75	0
DAG's Income	100	0	96	4	100	0
DAG's Health	100	0	86	4	100	0
DAG's Decision making capacity	100	0	89	0	100	0
DAG's Risk taking capacity	45	0	82	0	88	0
DAG's Engagement in social works	55	0	93	0	75	0
DAG Joining Institutions/Groups	55	0	89	0	75	0
DAG's Leadership in Institutions/ Groups	45	0	54	0	25	0
DAG's Recognition in Society	91	0	86	0	88	0
DAG's Improvement in perception of Society	100	0	86	0	100	0
DAG's Engagement in Social decision making	100	0	96	0	100	0
DAG's Representation in VDC	18	0	61	0	63	0
DAG's ability to allocate budget in VDC	18	0	25	0	25	0
Helpful in addressing the current need		100		100		100
Helpful in combating the climatic risk		100		100		100
Helpful in taking advantage of climate change		100		96		100

Annex IV: Results from Household Survey (Majhthana, Kaski)

Technologies / Indicators	Cattle-shed Improvement		Community Pond Rehabilitation		Corn Sheller	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		26		13		20
Grain Production	85	4	8	0	5	0
Biomass Production	73	0	0	0	20	0
Income	54	8	46	0	15	0
Cost	19	19	15	8	5	30
Profit	35	0	38	0	35	0
Crop Diversity	46	0	8	0	5	0
Food Diversity	31	0	8	0	20	0
No. of Food Secure Months	46	0	15	8	15	0
Quality of Manure	92	0	0	0	0	0
Quantity of Manure Required	8	62	0	0	0	0
Urea Required	0	46	0	0	0	0
DAP Required	0	38	0	0	0	0
production with same amount of Fertilizer	65	0	0	0	0	0
Frequency of Irrigation	0	4	0	0	0	0
duration of irrigation	0	4	0	0	0	0
Difference in amount of water required for irrigation	0	8	0	0	0	0
soil moisture	23	0	0	0	0	0
Access to information due to Technology Adoption	65	0	92	0	25	0
Ease of Use of Technology	92	8	100	0	100	0
Ease of Adoption of Technology	85	15	100	0	100	0
Similarity with Indigenous Technology	62	0	31	0	15	85
Use of Machineries consuming Petroleum Products	0	4	0	8	0	0
Use of Petroleum	0	8	0	0	0	0
Ease of use of Renewable Energy	0	0	0	0	0	0
Labor use	0	62	0	46	0	80
use of Animal Power	0	27	0	0	0	0
use of Tractor (Machines)	0	0	0	0	0	0
Women's labor time	4	88	0	100	0	95
Women's Workload	0	92	0	100	0	100
Women's distance from home to work	0	19	8	92	0	15
Women's access to Information	77	4	85	0	75	0
Women's Income	73	0	69	0	65	0
Women's Health	73	4	100	0	90	0
Women's Decision making capacity	65	4	85	0	80	0
Women's Risk taking capacity	65	0	85	0	80	0
Women's Engagement in social works	77	0	85	0	80	5
Women Joining Institutions/Groups	73	0	85	0	80	0
Women's Leadership in Institutions/ Groups	42	0	62	0	45	0
Women's Recognition in Society	65	4	92	0	80	0
Women's perception of Society	73	0	92	0	90	0
Women's Engagement in Social decision making	73	0	85	0	80	0
Women's Representation in VDC	54	0	85	0	60	0
Women's ability to allocate budget in VDC	38	0	62	0	15	0
DAG's labor time	8	81	0	100	0	95
DAG's Workload	0	88	0	100	0	100
DAG's Distance from home to work	0	27	0	100	0	15
DAG's Access to Information	85	0	100	0	75	0
DAG's Income	81	0	100	0	65	0
DAG's Health	73	0	100	0	90	0
DAG's Decision making capacity	73	0	85	0	80	0
DAG's Risk taking capacity	73	0	85	0	80	0
DAG's Engagement in social works	77	0	92	0	85	0
DAG Joining Institutions/Groups	77	0	85	0	80	0
DAG's Leadership in Institutions/ Groups	62	0	77	0	50	0
DAG's Recognition in Society	73	0	85	0	75	0
DAG's Improvement in perception of Society	69	0	92	0	90	0
DAG's Engagement in Social decision making	73	4	92	0	80	0
DAG's Representation in VDC	69	4	85	0	60	0
DAG's ability to allocate budget in VDC	50	0	69	0	20	0
Helpful in addressing the current need		100		92		80
Helpful in combating the climatic risk		96		92		15
Helpful in taking advantage of climate change		81		92		10

Indicators \ Technologies	Grain Pro Bag		ICT-based Agro-advisory		Jab Planter		Maize Ginger Inter-Cropping	
	Increased	Decreased	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		31		22		6		12
Grain Production	19	0	50	0	67	0	100	0
Biomass Production	13	0	36	0	17	0	100	0
Income	16	0	45	0	17	0	100	0
Cost	6	6	0	9	17	17	8	50
Profit	10	0	32	0	33	17	33	0
Crop Diversity	10	0	41	0	33	0	42	0
Food Diversity	19	0	36	0	17	0	75	0
No. of Food Secure Months	3	0	23	0	17	0	33	0
Quality of Manure	0	0	0	0	0	0	0	8
Quantity of Manure Required	0	0	0	0	0	0	17	25
Urea Required	0	0	0	0	0	0	8	33
DAP Required	0	0	0	0	0	0	8	8
production with same amount of Fertilizer	0	0	0	0	0	0	33	0
Frequency of Irrigation	3	0	0	0	0	0	8	0
duration of irrigation	3	0	0	0	0	0	0	0
Difference in amount of water required for irrigation	0	0	0	0	0	0	17	0
soil moisture	0	3	0	0	0	0	58	0
Access to information due to Technology Adoption	55	0	86	0	50	0	83	0
Ease of Use of Technology	77	0	86	5	100	0	100	0
Ease of Adoption of Technology	81	0	86	5	100	0	100	0
Similarity with Indigenous Technology	35	10	50	32	50	0	75	8
Use of Machineries consuming Petroleum Products	0	0	0	5	0	33	0	8
Use of Petroleum	0	0	0	0	0	0	0	0
Ease of use of Renewable Energy	0	0	0	0	0	0	0	0
Labor use	0	10	0	18	0	50	25	67
use of Animal Power	0	0	0	0	0	17	0	25
use of Tractor (Machines)	0	0	0	0	0	0	0	0
Women's labor time	0	39	0	82	0	100	17	67
Women's Workload	0	26	0	82	0	100	8	58
Women's distance from home to work	0	6	0	86	0	67	8	33
Women's access to Information	58	0	91	5	50	0	83	0
Women's Income	42	0	68	5	83	0	92	0
Women's Health	61	0	45	0	83	0	83	0
Women's Decision making capacity	65	0	91	0	83	0	100	0
Women's Risk taking capacity	65	0	91	0	67	0	100	0
Women's Engagement in social works	74	0	86	0	83	0	92	0
Women Joining Institutions/Groups	68	0	86	0	83	0	100	0
Women's Leadership in Institutions/ Groups	39	0	73	0	67	0	58	0
Women's Recognition in Society	68	0	86	0	83	0	92	0
Women's perception of Society	68	0	86	0	83	0	92	0
Women's Engagement in Social decision making	71	0	86	0	83	0	92	0
Women's Representation in VDC	55	3	73	0	67	0	83	0
Women's ability to allocate budget in VDC	23	0	41	0	0	0	25	0
DAG's labor time	0	39	0	82	0	83	8	83
DAG's Workload	3	23	0	82	0	83	8	75
DAG's Distance from home to work	0	3	0	86	0	67	0	50
DAG's Access to Information	58	0	95	0	50	0	83	0
DAG's Income	48	0	73	0	67	0	92	0
DAG's Health	61	0	55	0	67	0	83	0
DAG's Decision making capacity	65	0	86	0	67	0	100	0
DAG's Risk taking capacity	68	0	86	0	67	0	100	0
DAG's Engagement in social works	74	0	86	0	67	0	100	0
DAG Joining Institutions/Groups	61	0	82	0	67	0	92	0
DAG's Leadership in Institutions/ Groups	42	0	68	0	33	0	92	0
DAG's Recognition in Society	65	0	82	0	67	0	100	0
DAG's Improvement in perception of Society	68	0	82	0	67	0	100	0
DAG's Engagement in Social decision making	68	0	82	0	67	0	100	0
DAG's Representation in VDC	55	0	64	0	67	0	100	0
DAG's ability to allocate budget in VDC	35	0	41	0	0	0	75	0
Helpful in addressing the current need		74		91		33		75
Helpful in combating the climatic risk		52		91		17		42
Helpful in taking advantage of climate change		32		77		0		8

Technologies / Indicators	Maize Soybean Inter-Cropping		Plastic House with Drip Irrigation		Plastic House	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		11		13		12
Grain Production	55	9	77	15	75	8
Biomass Production	64	9	0	8	67	8
Income	55	9	62	15	67	8
Cost	0	9	38	8	75	0
Profit	45	9	54	8	50	8
Crop Diversity	27	0	46	8	92	0
Food Diversity	55	0	54	0	83	0
No. of Food Secure Months	27	9	8	0	58	8
Quality of Manure	0	0	0	0	0	0
Quantity of Manure Required	0	0	0	0	0	0
Urea Required	0	0	0	0	0	0
DAP Required	0	0	0	0	0	0
production with same amount of Fertilizer	9	0	0	0	0	0
Frequency of Irrigation	0	0	23	38	58	25
duration of irrigation	0	0	54	38	58	25
Difference in amount of water required for irrigation	0	0	0	100	58	25
soil moisture	18	0	92	0	25	67
Access to information due to Technology Adoption	64	0	54	0	25	0
Ease of Use of Technology	55	45	100	0	83	8
Ease of Adoption of Technology	45	55	100	0	83	8
Similarity with Indigenous Technology	45	36	62	15	42	42
Use of Machineries consuming Petroleum Products	0	0	0	0	0	0
Use of Petroleum	0	0	0	0	0	0
Ease of use of Renewable Energy	0	0	0	0	0	0
Labor use	27	36	31	23	58	8
use of Animal Power	0	9	0	31	0	0
use of Tractor (Machines)	0	0	0	0	0	0
Women's labor time	36	45	31	38	58	8
Women's Workload	27	45	15	46	33	17
Women's distance from home to work	0	18	0	23	0	67
Women's access to Information	73	0	85	0	75	0
Women's Income	64	0	69	8	83	8
Women's Health	64	9	46	0	92	0
Women's Decision making capacity	82	0	85	0	92	8
Women's Risk taking capacity	82	0	85	0	92	8
Women's Engagement in social works	64	18	85	0	100	0
Women Joining Institutions/Groups	64	9	85	0	92	0
Women's Leadership in Institutions/ Groups	45	9	46	0	75	0
Women's Recognition in Society	64	0	69	0	100	0
Women's perception of Society	64	0	77	0	100	0
Women's Engagement in Social decision making	64	0	85	0	100	0
Women's Representation in VDC	45	9	46	0	83	0
Women's ability to allocate budget in VDC	27	0	31	0	17	0
DAG's labor time	36	55	38	31	58	17
DAG's Workload	27	55	8	38	33	17
DAG's Distance from home to work	0	18	0	31	0	75
DAG's Access to Information	73	0	85	0	75	0
DAG's Income	64	0	54	0	92	8
DAG's Health	73	9	46	0	83	0
DAG's Decision making capacity	82	0	62	8	83	8
DAG's Risk taking capacity	82	0	54	8	83	8
DAG's Engagement in social works	82	0	54	8	92	0
DAG Joining Institutions/Groups	73	0	54	0	83	0
DAG's Leadership in Institutions/ Groups	45	0	31	0	67	0
DAG's Recognition in Society	73	0	38	0	83	0
DAG's Improvement in perception of Society	82	0	46	8	83	0
DAG's Engagement in Social decision making	73	0	46	0	92	0
DAG's Representation in VDC	55	0	38	0	67	0
DAG's ability to allocate budget in VDC	27	0	15	0	8	0
Helpful in addressing the current need		18		92		92
Helpful in combating the climatic risk		0		92		92
Helpful in taking advantage of climate change		0		77		67

Technologies / Indicators	Plastic Pond		Water Source Protection		Yam in Sack	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		20		14		9
Grain Production	90	0	7	0	22	44
Biomass Production	65	0	0	0	11	22
Income	75	0	0	0	22	44
Cost	60	10	0	0	11	0
Profit	70	0	0	0	22	33
Crop Diversity	60	0	7	0	11	0
Food Diversity	70	0	7	0	11	0
No. of Food Secure Months	50	5	0	0	11	0
Quality of Manure	0	0	0	0	0	0
Quantity of Manure Required	0	0	0	0	0	0
Urea Required	0	0	0	0	0	0
DAP Required	0	0	0	0	0	0
production with same amount of Fertilizer	0	0	0	0	0	0
Frequency of Irrigation	55	0	0	0	11	0
duration of irrigation	50	10	0	0	11	0
Difference in amount of water required for irrigation	65	5	0	0	11	0
soil moisture	80	0	7	0	11	0
Access to information due to Technology Adoption	70	5	21	0	22	0
Ease of Use of Technology	85	5	93	0	33	11
Ease of Adoption of Technology	90	5	79	14	33	22
Similarity with Indigenous Technology	50	5	29	14	33	44
Use of Machineries consuming Petroleum Products	0	0	0	0	0	0
Use of Petroleum	0	0	0	0	0	0
Ease of use of Renewable Energy	0	0	0	0	0	0
Labor use	0	100	0	0	33	44
use of Animal Power	0	0	0	0	0	0
use of Tractor (Machines)	0	0	0	0	0	0
Women's labor time	0	95	7	57	11	67
Women's Workload	0	100	0	57	11	56
Women's distance from home to work	0	90	0	57	0	22
Women's access to Information	60	0	29	0	33	0
Women's Income	90	0	14	0	33	22
Women's Health	85	5	43	0	22	0
Women's Decision making capacity	80	10	36	0	44	0
Women's Risk taking capacity	85	5	29	0	44	0
Women's Engagement in social works	80	10	7	0	44	0
Women Joining Institutions/Groups	80	5	7	0	33	11
Women's Leadership in Institutions/ Groups	50	5	7	0	22	11
Women's Recognition in Society	85	0	29	0	44	0
Women's perception of Society	80	0	21	0	44	0
Women's Engagement in Social decision making	80	0	21	0	44	0
Women's Representation in VDC	65	0	0	0	33	0
Women's ability to allocate budget in VDC	15	0	0	0	11	0
DAG's labor time	0	95	0	50	11	56
DAG's Workload	0	95	0	50	11	44
DAG's Distance from home to work	0	90	0	50	0	22
DAG's Access to Information	70	0	50	0	33	0
DAG's Income	85	0	36	0	33	22
DAG's Health	80	5	43	0	22	0
DAG's Decision making capacity	85	5	43	0	44	0
DAG's Risk taking capacity	80	5	43	0	44	0
DAG's Engagement in social works	90	5	21	0	44	0
DAG Joining Institutions/Groups	85	5	21	0	33	11
DAG's Leadership in Institutions/ Groups	65	5	14	0	22	11
DAG's Recognition in Society	85	0	21	0	44	0
DAG's Improvement in perception of Society	75	0	29	0	44	0
DAG's Engagement in Social decision making	85	0	21	0	44	0
DAG's Representation in VDC	70	0	7	0	33	0
DAG's ability to allocate budget in VDC	30	0	7	0	11	0
Helpful in addressing the current need		100		71		67
Helpful in combating the climatic risk		100		79		11
Helpful in taking advantage of climate change		95		71		0

Annex V: Results from Household Survey (Agyouli, Nawalparasi)

Technologies / Indicators	Cattle-shed Improvement		Community Seed Bank		Zero Tillage Machine	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		24		11		16
Grain Production	79	0	55	0	50	13
Biomass Production	46	0	18	0	6	6
Income	79	0	55	9	44	6
Costs	17	42	27	27	0	94
Profit	58	8	64	9	31	6
Crop Diversity	25	0	9	0	38	0
Food Diversity	17	0	9	0	38	6
No. of Food Secure Months	42	0	18	9	63	0
Quality of Manure	88	4	9	0	0	0
Quantity of Manure Required	17	42	0	0	13	6
Urea Required	4	50	9	27	6	13
DAP Required	4	42	0	36	6	6
production with same amount of Fertilizer	58	4	27	0	19	0
Frequency of Irrigation	8	13	0	18	6	31
duration of irrigation	8	13	0	9	6	19
Difference in amount of water required for irrigation	0	17	9	0	6	25
soil moisture	33	0	27	9	81	13
Access to information due to Technology Adoption	63	0	55	0	81	0
Ease of Use of Technology	100	0	82	0	88	13
Ease of Adoption of Technology	96	0	82	0	88	13
Similarity with Indigenous Technology	46	33	18	9	63	31
Use of Machineries consuming Petroleum Products	17	38	18	0	6	44
Use of Petroleum	13	29	18	0	6	25
Ease of use of Renewable Energy	8	4	9	0	38	0
Labor use	21	54	9	0	6	69
use of Animal Power	13	42	0	45	0	44
use of Tractor (Machines)	42	0	55	0	6	38
Women's labor time	13	83	36	27	6	94
Women's Workload	8	88	45	45	6	88
Women's distance from home to work	4	54	0	18	0	56
Women's access to Information	50	4	55	0	69	6
Women's Income	63	0	91	0	81	0
Women's Health	50	8	36	18	31	0
Women's Decision making capacity	46	0	82	0	81	0
Women's Risk taking capacity	33	4	91	0	75	0
Women's Engagement in social works	54	0	91	0	81	0
Women Joining Institutions/Groups	67	4	100	0	88	0
Women's Leadership in Institutions/ Groups	21	13	64	0	56	19
Women's Recognition in Society	63	4	100	0	69	0
Women's perception of Society	71	0	100	0	75	0
Women's Engagement in Social decision making	63	8	91	0	56	6
Women's Representation in VDC	17	4	55	0	13	13
Women's ability to allocate budget in VDC	4	8	0	0	13	13
DAG's labor time	4	92	36	27	0	100
DAG's Workload	4	92	36	36	0	94
DAG's Distance from home to work	8	42	0	27	0	31
DAG's Access to Information	46	0	64	0	88	0
DAG's Income	58	0	91	0	69	0
DAG's Health	54	0	36	18	38	0
DAG's Decision making capacity	58	0	91	0	81	0
DAG's Risk taking capacity	54	0	64	0	69	0
DAG's Engagement in social works	67	0	91	0	81	0
DAG Joining Institutions/Groups	71	4	100	0	75	0
DAG's Leadership in Institutions/ Groups	33	0	64	0	38	6
DAG's Recognition in Society	67	0	100	0	69	0
DAG's Improvement in perception of Society	67	0	100	0	63	0
DAG's Engagement in Social decision making	63	0	82	0	56	0
DAG's Representation in VDC	8	0	45	0	6	6
DAG's ability to allocate budget in VDC	4	4	0	0	6	13
Helpful in addressing the current need		100		100		100
Helpful in combating the climatic risk		96		64		94
Helpful in taking advantage of climate change		63		45		44

Technologies / Indicators	Direct Seeded Rice		Hand-Weeder		Home Garden	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		2		1		50
Grain Production	50	50	100	0	58	10
Biomass Production	50	0	100	0	2	4
Income	50	50	100	0	50	10
Costs	0	100	100	0	6	50
Profit	50	50	100	0	50	8
Crop Diversity	0	0	0	0	30	2
Food Diversity	0	0	0	0	38	4
No. of Food Secure Months	0	0	0	0	42	4
Quality of Manure	0	0	0	100	4	0
Quantity of Manure Required	100	0	0	100	14	8
Urea Required	50	50	0	100	8	14
DAP Required	50	50	0	100	8	14
production with same amount of Fertilizer	0	50	0	0	46	4
Frequency of Irrigation	0	50	0	0	30	6
duration of irrigation	0	50	0	0	24	10
Difference in amount of water required for irrigation	0	50	0	0	26	6
soil moisture	50	0	100	0	44	6
Access to information due to Technology Adoption	100	0	100	0	64	0
Ease of Use of Technology	100	0	0	100	70	4
Ease of Adoption of Technology	50	0	0	100	70	2
Similarity with Indigenous Technology	100	0	0	100	30	12
Use of Machineries consuming Petroleum Products	0	100	0	0	10	8
Use of Petroleum	0	100	0	0	8	6
Ease of use of Renewable Energy	50	50	0	0	14	0
Labor use	50	50	0	0	10	12
use of Animal Power	0	0	0	100	4	32
use of Tractor (Machines)	50	50	100	0	40	8
Women's labor time	0	100	0	100	30	30
Women's Workload	0	50	0	100	18	36
Women's distance from home to work	0	0	0	0	0	36
Women's access to Information	100	0	100	0	54	8
Women's Income	50	50	100	0	48	10
Women's Health	50	0	100	0	52	4
Women's Decision making capacity	100	0	100	0	46	0
Women's Risk taking capacity	50	0	100	0	52	6
Women's Engagement in social works	100	0	100	0	56	2
Women Joining Institutions/Groups	100	0	0	0	58	4
Women's Leadership in Institutions/ Groups	50	0	0	0	34	8
Women's Recognition in Society	100	0	100	0	56	2
Women's perception of Society	100	0	100	0	62	2
Women's Engagement in Social decision making	50	0	100	0	56	2
Women's Representation in VDC	50	0	0	0	28	0
Women's ability to allocate budget in VDC	50	0	0	0	22	0
DAG's labor time	50	50	100	0	28	28
DAG's Workload	50	50	100	0	12	36
DAG's Distance from home to work	0	0	100	0	2	34
DAG's Access to Information	100	0	100	0	46	6
DAG's Income	50	50	100	0	56	4
DAG's Health	100	0	0	0	56	2
DAG's Decision making capacity	50	0	100	0	52	0
DAG's Risk taking capacity	50	0	100	0	50	2
DAG's Engagement in social works	100	0	100	0	56	2
DAG Joining Institutions/Groups	50	0	100	0	54	2
DAG's Leadership in Institutions/ Groups	0	0	100	0	34	2
DAG's Recognition in Society	100	0	100	0	58	2
DAG's Improvement in perception of Society	100	0	100	0	64	2
DAG's Engagement in Social decision making	50	0	100	0	52	2
DAG's Representation in VDC	0	0	0	0	26	0
DAG's ability to allocate budget in VDC	0	0	0	0	18	0
Helpful in addressing the current need		50		0		76
Helpful in combating the climatic risk		50		0		44
Helpful in taking advantage of climate change		0		0		30

Technologies / Indicators	ICT-based Agro-Advisory		Intercropping		New Seeds and Varieties	
	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		32		1		21
Grain Production	50	0	100	0	95	5
Biomass Production	22	0	0	0	86	0
Income	50	0	100	0	90	5
Costs	3	19	0	0	24	38
Profit	53	0	100	0	71	10
Crop Diversity	25	0	100	0	24	10
Food Diversity	47	0	100	0	24	5
No. of Food Secure Months	25	6	0	0	33	5
Quality of Manure	9	0	0	0	5	10
Quantity of Manure Required	6	9	0	0	14	0
Urea Required	0	16	100	0	10	33
DAP Required	0	13	100	0	5	33
production with same amount of Fertilizer	16	3	100	0	48	0
Frequency of Irrigation	6	9	0	0	10	5
duration of irrigation	13	3	0	0	10	10
Difference in amount of water required for irrigation	13	3	0	0	10	10
soil moisture	16	0	100	0	38	0
Access to information due to Technology Adoption	88	0	100	0	71	0
Ease of Use of Technology	97	0	100	0	95	0
Ease of Adoption of Technology	97	0	100	0	95	0
Similarity with Indigenous Technology	50	19	100	0	62	14
Use of Machineries consuming Petroleum Products	13	6	0	0	43	5
Use of Petroleum	13	6	0	0	38	5
Ease of use of Renewable Energy	28	0	0	0	24	5
Labor use	3	6	100	0	24	5
use of Animal Power	0	19	0	0	0	43
use of Tractor (Machines)	25	0	100	0	52	5
Women's labor time	3	56	100	0	10	57
Women's Workload	3	47	100	0	10	43
Women's distance from home to work	3	31	0	0	10	10
Women's access to Information	94	3	100	0	71	0
Women's Income	69	0	100	0	95	0
Women's Health	16	0	100	0	43	5
Women's Decision making capacity	81	3	0	0	86	0
Women's Risk taking capacity	69	3	100	0	71	5
Women's Engagement in social works	72	0	100	0	100	0
Women Joining Institutions/Groups	91	0	100	0	100	0
Women's Leadership in Institutions/ Groups	66	0	100	0	67	0
Women's Recognition in Society	81	0	100	0	100	0
Women's perception of Society	84	0	100	0	95	0
Women's Engagement in Social decision making	75	0	100	0	86	0
Women's Representation in VDC	44	0	0	0	33	5
Women's ability to allocate budget in VDC	25	0	0	0	10	5
DAG's labor time	9	41	100	0	10	48
DAG's Workload	3	47	100	0	10	33
DAG's Distance from home to work	0	41	0	0	5	10
DAG's Access to Information	94	0	100	0	67	0
DAG's Income	66	0	100	0	90	0
DAG's Health	25	0	100	0	33	5
DAG's Decision making capacity	84	0	0	0	86	0
DAG's Risk taking capacity	81	6	100	0	71	0
DAG's Engagement in social works	75	0	100	0	90	0
DAG Joining Institutions/Groups	97	0	100	0	100	0
DAG's Leadership in Institutions/ Groups	63	0	100	0	62	0
DAG's Recognition in Society	88	0	100	0	100	0
DAG's Improvement in perception of Society	88	0	100	0	90	0
DAG's Engagement in Social decision making	78	0	100	0	76	0
DAG's Representation in VDC	50	0	0	0	29	5
DAG's ability to allocate budget in VDC	19	0	0	0	5	5
Helpful in addressing the current need		100		100		95
Helpful in combating the climatic risk		97		0		62
Helpful in taking advantage of climate change		69		0		48

Technologies / Indicators	Nutrient Management		Riverside Protection		Solar-based Irrigation		System of Rice Intensification	
	Increased	Decreased	Increased	Decreased	Increased	Decreased	Increased	Decreased
Sample Size		4		18		75		7
Grain Production	75	0	39	17	75	3	100	0
Biomass Production	75	0	22	11	48	1	100	0
Income	75	0	28	17	68	0	86	0
Costs	50	50	50	6	20	40	57	43
Profit	75	0	39	6	64	3	71	0
Crop Diversity	0	0	22	6	43	0	0	0
Food Diversity	50	0	6	0	33	1	14	0
No. of Food Secure Months	25	0	11	11	39	4	29	0
Quality of Manure	25	0	0	0	11	0	14	0
Quantity of Manure Required	50	0	17	0	5	7	29	14
Urea Required	50	0	0	22	9	20	14	14
DAP Required	25	0	0	22	9	19	14	14
production with same amount of Fertilizer	50	0	28	6	47	1	43	29
Frequency of Irrigation	25	0	39	0	47	8	14	43
duration of irrigation	25	0	22	0	45	9	29	14
Difference in amount of water required for irrigation	25	0	17	11	51	1	43	14
soil moisture	75	0	17	33	64	3	57	14
Access to information due to Technology Adoption	100	0	56	6	75	0	71	0
Ease of Use of Technology	100	0	72	17	89	0	86	14
Ease of Adoption of Technology	75	0	72	17	89	1	86	14
Similarity with Indigenous Technology	50	25	44	0	55	13	29	29
Use of Machineries consuming Petroleum Products	25	0	28	0	20	47	29	14
Use of Petroleum	25	0	28	0	17	51	43	14
Ease of use of Renewable Energy	0	0	28	0	68	0	14	0
Labor use	25	0	22	6	9	28	71	14
use of Animal Power	0	50	0	11	0	48	14	57
use of Tractor (Machines)	50	0	28	0	63	5	57	29
Women's labor time	75	0	67	22	16	55	71	14
Women's Workload	50	0	33	44	17	56	43	43
Women's distance from home to work	25	0	11	44	12	37	0	14
Women's access to Information	50	0	72	0	53	3	71	0
Women's Income	50	0	39	0	72	1	57	0
Women's Health	25	0	33	0	35	4	29	0
Women's Decision making capacity	75	0	56	0	57	0	57	0
Women's Risk taking capacity	75	0	50	0	61	0	86	0
Women's Engagement in social works	75	0	72	6	61	0	100	0
Women Joining Institutions/Groups	75	0	67	6	67	0	100	0
Women's Leadership in Institutions/ Groups	25	0	44	0	31	3	71	0
Women's Recognition in Society	100	0	44	0	56	0	100	0
Women's perception of Society	50	0	44	0	59	0	100	0
Women's Engagement in Social decision making	75	0	39	0	59	0	57	0
Women's Representation in VDC	25	0	33	0	32	3	57	0
Women's ability to allocate budget in VDC	25	0	33	0	11	4	29	0
DAG's labor time	75	0	39	44	13	56	86	0
DAG's Workload	100	0	22	56	9	51	57	29
DAG's Distance from home to work	25	0	11	56	8	33	0	14
DAG's Access to Information	100	0	67	0	52	4	86	0
DAG's Income	100	0	33	0	65	3	71	0
DAG's Health	25	0	28	0	33	4	29	14
DAG's Decision making capacity	100	0	39	0	60	1	71	0
DAG's Risk taking capacity	100	0	44	0	53	3	86	0
DAG's Engagement in social works	100	0	67	0	64	0	100	0
DAG Joining Institutions/Groups	100	0	56	0	65	0	100	0
DAG's Leadership in Institutions/ Groups	50	0	22	0	32	3	71	0
DAG's Recognition in Society	100	0	44	0	60	1	86	0
DAG's Improvement in perception of Society	100	0	50	0	63	1	86	0
DAG's Engagement in Social decision making	100	0	22	0	53	1	86	0
DAG's Representation in VDC	75	0	28	0	27	4	43	0
DAG's ability to allocate budget in VDC	50	0	22	0	11	4	29	0
Helpful in addressing the current need		100		89		96		71
Helpful in combating the climatic risk		25		83		96		57
Helpful in taking advantage of climate change		50		39		77		71

Annex VI: Analytic Hierarchy Process for Multi-Criteria Analysis

Analytic Hierarchy Process (AHP) method was applied for prioritization of the CSA practices using multiple criteria. The AHP, method originally developed by Saaty (1980), provides a framework for solving multi-criterion decision making problems. Firstly, AHP method provide relative priorities to different criterion and run a benefit measurement (scoring) model based on subjective pairwise comparisons of possible alternatives for each criterion. The inputs are converted into scores which are used to identify the alternatives which are of higher importance to the decision makers.

To design an AHP model, the decision problem has to be decomposed into hierarchy of sub-problems which can be easily comprehended and analysed independently. For this analysis, at the '0' level, the main GOAL of the model was set as to identify technologies to build "climate resilient agriculture system". To achieve this goal, at the first level hierarchy, four constructs of CSA definition, i.e. adaptation, food security, mitigation and GESI, were set as four criteria. At the second layer of hierarchy, various CSAs were set as alternatives for evaluation under each criteria.

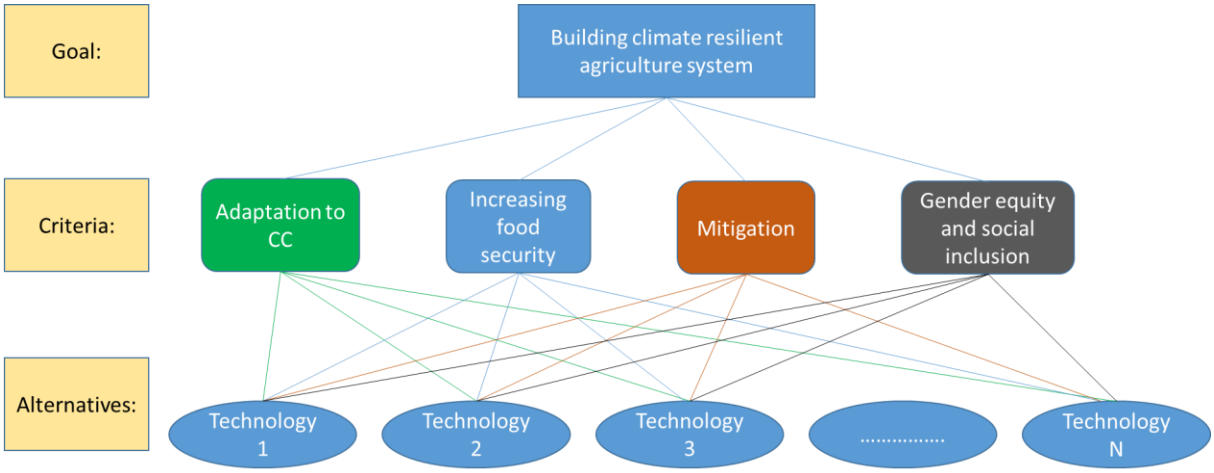


Figure A1: The analytic hierarchy model for prioritizing CSA technologies

Once the hierarchy was built, farmers systematically evaluated its various elements in first layer and second layer by comparing them to each other two at a time, with respect to their impact on an element above them in the hierarchy. For example, at the layer 1 (criteria), farmers were asked to rate which of the criteria e.g. 'adaptation to climate change' and 'increasing food security', is important to 'build climate resilient agriculture system'. Similarly, at layer 2, farmers were asked to rate which of the technology (technology 1 or technology 2; technology 1 or technology 3 and so on until all possible pairwise comparison) is important for 'adaptation to climate change', 'increasing food security' and so on. A scale of 1-9 was used to record the degree of importance.

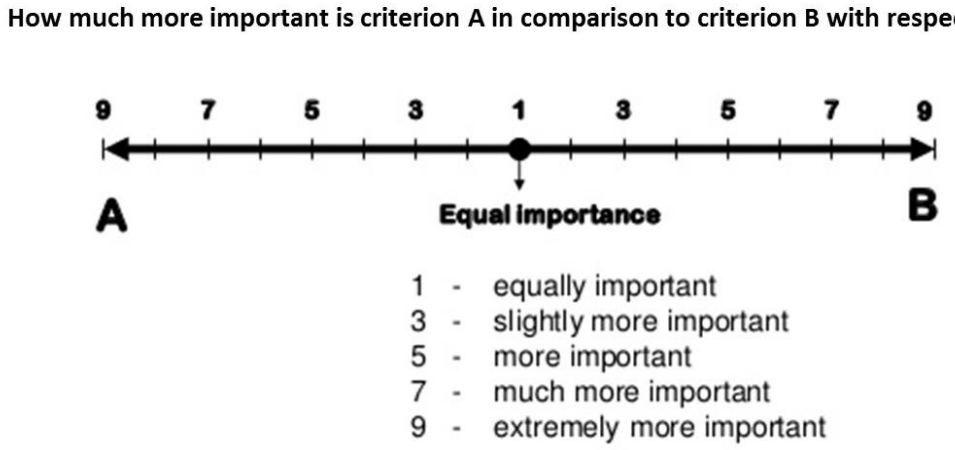
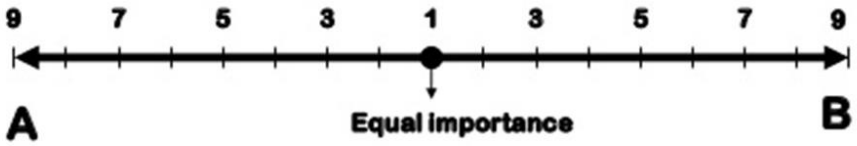


Figure A2: AHP Scale used in pairwise comparisons of criteria

How much more important is alternative A in comparison to alternative B with respect to the goal ?



1 - equally important
3 - slightly more important
5 - more important
7 - much more important
9 - extremely more important

Figure A3: AHP scale used in pairwise comparison of alternatives

Farmers used their judgments about the elements' relative meaning and importance while providing their response. Altogether xx (xx female), xx (xx female) and xx (xx female) farmers in Kaski, Lamjung and Nawalparasi district provided their response in this survey. Only those farmers who have some knowledge about the technology, by either seeing in neighbors' field, doing them in their own field or hearing and learning them from some other sources were asked to provide response.

Annex VII: AHP Questionnaire

pQ/bft f g+M ____________

hnj fo' dkm\ Ls s[if kl j wtx?s fl]j x' ; Ir

ldlt M___÷___÷___ -j if{÷dlxgf÷ut]_
uf=lj =; =÷g=kf= ____________

kl/gs t f{M ____________________

pQ/bft fsf] hfgsf/L

gfd M____________________dlxnf ÷ k'?if

pd]/ M__________j if{

cfk\r fl/s lz Iff M lg/If/, ; fIf/, k|fyflds, dfWolds, pRr

kl/j f/sf] hfgsf/L

hflt M bnt ÷ hghflt L ÷ cGo

kl/j f/sf] d'Vo cfDbfgLsf] ; f|t M s[if ÷ gf]s/L ÷ Jofkf/ ÷

hDdf kl/j f/ ; ª\Vof M

kl/j f/sf]:j ldTj df ePsf] hldgM ePsf]Q{__________
l; lrt ______, cl; lrt ______

3/df ePsf f ; j }hgfj /x?sf] cg'dflgt dNo M

j hf/df s]s] s[if pkh j F\rgx'G5 < j F\rg] ÷ gj F\rg]

j hf/j f6 vfwfGg ls g] vfgkg[dlxgf M______dlxgf

!_s=t n lbOP{s f k|To]s hf]8 p4]ox?sf] t hgf ul
hnj fo' kl/j t{g; Fu ; dfgs]hLt s[if k4t Llgdf{Of u
To; df **uf]hf] nufpg]xf]** .
v=bO{p4]ox?sf] t hgf ubf{Ps eGbf csf{[slt j
:s]hdf **uf]hf] nufpg]xf]** .

p4]ox?

p4]of ! hnj fo' kl/j t{g; Fu cg's'hg ug{[-j 9bf] v8]/L, vl'vf, j fl9,
p4]of @ vf2; 'lffsf] nflu pNkfbg, cfDbfgL j 9fpg]
p4]of # xl/t u[x lbf; x?sf] pT; hg{ w6fpg] -k[fs[Ls ds f] vkt sd
p4]of $ Nf]us / ; fdflhs ; dt f / ; dfj]lz; s /0fnfO{j 9fj f lbg]

s'g w]}dxTj kt0f{5? -Pp6fdf **uf]hf] nufpg]xf]** _			**Pp6feGbf csf{[p4** -t nsf]:s]hdf pkoQ				
			nueu p:t }		**j l9 dxTj kt0f{**		**w]}j dxT**
p4]of !	j f	p4]of @	!	@	#	$	%
p4]of !	j f	p4]of #	!	@	#	$	%
p4]of !	j f	p4]of $	!	@	#	$	%
p4]of @	j f	p4]of #	!	@	#	$	%
p4]of @	j f	p4]of $	!	@	#	$	%
p4]of #	j f	p4]of $	!	@	#	$	%

k|j lw t yf lj wL?

k|! uf]7 t yf esf/f] ; 'wf/
k|@ ; fo{phf{l; FfO{
k|# glbs 6fg /f]{g]sfd, 3f/F v]t L
k|$ wfgsf] SRI k|j lw
k|% dfj] fO{hdf dfj}zd / dNb Do;]h
k|^ gofF j p, gofF j ?j f
k|& ld; |[t v]t L-ds}/ j fl8, ds}/ cb|j f_
k|* ; 'Gb vghf]t , sd vghf]t k|j wL-ux[Fn; 'g_
k|(wfg uxF]f vfwt T] Jbj :yfkg -nLkms n/ r f6{ u|g l; s/,
k|!) ; fdbflos j Lp j }s
k|!! lj df
k|!@ xl/of]dn, lj ?j fs f] cj ;] Jbj :yfkg

@_s=t n lbOP{s f k|To]s klj lwt yf lj wLx?s f] t hg
klj lwt yf lj wLn] **hnj fo' kl/j t{g; Fi cg's]hg ug{**
klx/f] cflb ; Fi_s f] nflu j l9 dxTj k0f{ nfU5, To; c
@_v=bO{klj lwt yf lj wLx?s f] t hgf ubf{ Ps eGbf
nfU5, lbOP s f]:s]hdf **ufl]hf] nufpgxf]; .**

s'g vl}dxTj k0f{5?	**P**
Ps6fdf ufl]hf] nufpgxf]; _	**t nsf]:s**

klj wL!		**klj wL@**	**nueu p:t}**
uf]7 tyf esf/f]; 'wf/	j f	; f]o{phf{l; FfO{	!
uf]7 tyf esf/f]; 'wf/	j f	glbs 6fg /f]8g] 3f; F vf] L	!
uf]7 tyf esf/f]; 'wf/	j f	wfgs f]SRI klj lw	!
uf]7 tyf esf/f]; 'wf/	j f	dfl}zd / dNo ; 'r gf	!
uf]7 tyf esf/f]; 'wf/	j f	gofFj p, lj ?j f	!
uf]7 tyf esf/f]; 'wf/	j f	ld; |lt vf] L-ds}/ j fl8, ds}	!
uf]7 tyf esf/f]; 'wf/	j f	; tx÷s d vghfl] -uxF n; 'g_	!
uf]7 tyf esf/f]; 'wf/	j f	wfg÷uxF}f vfwt Tj	!
uf]7 tyf esf/f]; 'wf/	j f	; fdbflos j Lp j }s	!
uf]7 tyf esf/f]; 'wf/	j f	lj df	!
uf]7 tyf esf/f]; 'wf/	j f	xl/of] dn, cj ;] Jbj :yfkg	!
; f]o{phf{l; FfO{	j f	glbs 6fg /f]8g] 3f; F vf] L	!
; f]o{phf{l; FfO{	j f	wfgs f]SRI klj lw	!
; f]o{phf{l; FfO{	j f	dfl}zd / dNo ; 'r gf	!
; f]o{phf{l; FfO{	j f	gofFj p, lj ?j f	!
; f]o{phf{l; FfO{	j f	ld; |lt vf] L-ds}/ j fl8, ds}	!
; f]o{phf{l; FfO{	j f	; tx÷s d vghfl] -uxF n; 'g_	!
; f]o{phf{l; FfO{	j f	wfg÷uxF}f vfwt Tj	!
; f]o{phf{l; FfO{	j f	; fdbflos j Lp j }s	!
; f]o{phf{l; FfO{	j f	lj df	!
; f]o{phf{l; FfO{	j f	xl/of] dn, cj ;] Jbj :yfkg	!
glbs 6fg /f]8g] 3f; F vf] L	j f	wfgs f]SRI klj lw	!
glbs 6fg /f]8g] 3f; F vf] L	j f	dfl}zd / dNo ; 'r gf	!
glbs 6fg /f]8g] 3f; F vf] L	j f	gofFj p, lj ?j f	!
glbs 6fg /f]8g] 3f; F vf] L	j f	ld; |lt vf] L-ds}/ j fl8, ds}	!
glbs 6fg /f]8g] 3f; F vf] L	j f	; tx÷s d vghfl] -uxF n; 'g_	!
glbs 6fg /f]8g] 3f; F vf] L	j f	wfg÷uxF}f vfwt Tj	!
glbs 6fg /f]8g] 3f; F vf] L	j f	; fdbflos j Lp j }s	!
glbs 6fg /f]8g] 3f; F vf] L	j f	lj df	!

glbs6fg /f}Sg] 3f;F vt]L	jf	xl/of] dn, cj ;] Jbj :yfkg	!
wfgsf]SRI klj lw	jf	dfWzd / dNo ;'r gf	!
wfgsf]SRI klj lw	jf	gofFHj p, lj ?j f	!
wfgsf]SRI klj lw	jf	ld; |Lt vt] L-ds}/ jf]8, ds}	!
wfgsf]SRI klj lw	jf	; 'Go÷sd vghft] -uxF,n; 'g_	!
wfgsf]SRI klj lw	jf	wfg÷uxF{f vfwt Tj	!
wfgsf]SRI klj lw	jf	; fdbflos j Lp j}$	!
wfgsf]SRI klj lw	jf	lj df	!
wfgsf]SRI klj lw	jf	xl/of] dn, cj ;] Jbj :yfkg	!
dfWzd / dNo ;'r gf	jf	gofFHj p, lj ?j f	!
dfWzd / dNo ;'r gf	jf	ld; |Lt vt] L-ds}/ jf]8, ds}	!
dfWzd / dNo ;'r gf	jf	; 'Go÷sd vghft] -uxF,n; 'g_	!
dfWzd / dNo ;'r gf	jf	wfg÷uxF{f vfwt Tj	!
dfWzd / dNo ;'r gf	jf	; fdbflos j Lp j}$	!
dfWzd / dNo ;'r gf	jf	lj df	!
dfWzd / dNo ;'r gf	jf	xl/of] dn, cj ;] Jbj :yfkg	!
gofFHj p, gofFHj ?j f	jf	ld; |Lt vt] L-ds}/ jf]8, ds}	!
gofFHj p, gofFHj ?j f	jf	; 'Go÷sd vghft] -uxF,n; 'g_	!
gofFHj p, gofFHj ?j f	jf	wfg÷uxF{f vfwt Tj	!
gofFHj p, gofFHj ?j f	jf	; fdbflos j Lp j}$	!
gofFHj p, gofFHj ?j f	jf	lj df	!
gofFHj p, gofFHj ?j f	jf	xl/of] dn, cj ;] Jbj :yfkg	!
ld; |Lt vt] L	jf	; 'Go÷sd vghft] -uxF,n; 'g_	!
ld; |Lt vt] L	jf	wfg÷uxF{f vfwt Tj	!
ld; |Lt vt] L	jf	; fdbflos j Lp j}$	!
ld; |Lt vt] L	jf	lj df	!
ld; |Lt vt] L	jf	xl/of] dn, cj ;] Jbj :yfkg	!
; 'Go÷sd vghft] -uxF	jf	wfg÷uxF{f vfwt Tj	!
; 'Go÷sd vghft] -uxF	jf	; fdbflos j Lp j}$	!
; 'Go÷sd vghft] -uxF	jf	lj df	!
; 'Go÷sd vghft] -uxF	jf	xl/of] dn, cj ;] Jbj :yfkg	!
wfg÷uxF{f vfwt Tj	jf	; fdbflos j Lp j}$	!
wfg÷uxF{f vfwt Tj	jf	lj df	!
wfg÷uxF{f vfwt Tj	jf	xl/of] dn, cj ;] Jbj :yfkg	!
; fdbflos j Lp j}$	jf	lj df	!
; fdbflos j Lp j}$	jf	xl/of] dn, cj ;] Jbj :yfkg	!
lj df	jf	xl/of] dn, cj ;] Jbj :yfkg	!

#_s=t n lbOPs f k|To]s kl|j lw t yf lj wLx?s f] t hg
kl|j lw t yf lj wLn] **vfB; /Of ; 'wf/ ug{-pTkfbg j 9f**
nfU5, To; df **uf]hf] nufpgxf]** .
#_v=bO{kl|j lw t yf lj wLx?s f] t hgf ubf{Ps eGbf
nfU5, lbOPs f]:s]hdf **uf]hf] nufpgxf]** .

s'g w]}dxTj k0f{5?	**Pc**
Pp6fdf uf]hf] nufpgxf] _	**t nsf]:s**

kl|j wL!		**kl|j wL@**	**nueu p:t}**	
uf]7 t yf esf/f]; 'wf/	j f	; fo{phf{l; FfO{	!	
uf]7 t yf esf/f]; 'wf/	j f	glbs 6fg /f]Sg] 3f; F vt]L	!	
uf]7 t yf esf/f]; 'wf/	j f	wfqs f]SRI kl|j lw	!	
uf]7 t yf esf/f]; 'wf/	j f	dfl}zd / dNo ; r gf	!	
uf]7 t yf esf/f]; 'wf/	j f	gofFlj p, lj ?j f	!	
uf]7 t yf esf/f]; 'wf/	j f	ld; |t vt]L-ds}/ j fl]8, ds}	!	
uf]7 t yf esf/f]; 'wf/	j f	; lG÷sd vghft] -uxF-n; g_	!	
uf]7 t yf esf/f]; 'wf/	j f	wfg÷uxBf vfwt T]	!	
uf]7 t yf esf/f]; 'wf/	j f	; fdbflos j Lp j }s	!	
uf]7 t yf esf/f]; 'wf/	j f	lj df	!	
uf]7 t yf esf/f]; 'wf/	j f	xl/of]dn, cj ;] Jbj :yfkg	!	
; fo{phf{l; FfO{	j f	glbs 6fg /f]Sg] 3f; F vt]L	!	
; fo{phf{l; FfO{	j f	wfqs f]SRI kl|j lw	!	
; fo{phf{l; FfO{	j f	dfl}zd / dNo ; r gf	!	
; fo{phf{l; FfO{	j f	gofFlj p, lj ?j f	!	
; fo{phf{l; FfO{	j f	ld; |t vt]L-ds}/ j fl]8, ds}	!	
; fo{phf{l; FfO{	j f	; lG÷sd vghft] -uxF-n; g_	!	
; fo{phf{l; FfO{	j f	wfg÷uxBf vfwt T]	!	
; fo{phf{l; FfO{	j f	; fdbflos j Lp j }s	!	
; fo{phf{l; FfO{	j f	lj df	!	
; fo{phf{l; FfO{	j f	xl/of]dn, cj ;] Jbj :yfkg	!	
glbs 6fg /f]Sg] 3f; F vt]L	j f	wfqs f]SRI kl|j lw	!	
glbs 6fg /f]Sg] 3f; F vt]L	j f	dfl}zd / dNo ; r gf	!	
glbs 6fg /f]Sg] 3f; F vt]L	j f	gofFlj p, lj ?j f	!	
glbs 6fg /f]Sg] 3f; F vt]L	j f	ld; |t vt]L-ds}/ j fl]8, ds}	!	
glbs 6fg /f]Sg] 3f; F vt]L	j f	; lG÷sd vghft] -uxF-n; g_	!	
glbs 6fg /f]Sg] 3f; F vt]L	j f	wfg÷uxBf vfwt T]	!	
glbs 6fg /f]Sg] 3f; F vt]L	j f	; fdbflos j Lp j }s	!	
glbs 6fg /f]Sg] 3f; F vt]L	j f	lj df	!	

glbs 6fg /f]Sg] 3fF vt] L	j f	xl/of]dn, cj ;] Jbj :yfkg	!
wfgsf]SRI k|j lw	j f	dfFz d / dNo ; r gf	!
wfgsf]SRI k|j lw	j f	gofFHj p, lj ?j f	!
wfgsf]SRI k|j lw	j f	ld; lt vt] L-ds}/ jf]8, ds}	!
wfgsf]SRI k|j lw	j f	; 'G÷sd vghfl] -uxFn; 'g_	!
wfgsf]SRI k|j lw	j f	wfg÷uxEf vfwt Tj	!
wfgsf]SRI k|j lw	j f	; fdbflos jLp j}$	!
wfgsf]SRI k|j lw	j f	lj df	!
wfgsf]SRI k|j lw	j f	xl/of]dn, cj ;] Jbj :yfkg	!
dfFz d / dNo ; r gf	j f	gofFHj p, lj ?j f	!
dfFz d / dNo ; r gf	j f	ld; lt vt] L-ds}/ jf]8, ds}	!
dfFz d / dNo ; r gf	j f	; 'G÷sd vghfl] -uxFn; 'g_	!
dfFz d / dNo ; r gf	j f	wfg÷uxEf vfwt Tj	!
dfFz d / dNo ; r gf	j f	; fdbflos jLp j}$	!
dfFz d / dNo ; r gf	j f	lj df	!
dfFz d / dNo ; r gf	j f	xl/of]dn, cj ;] Jbj :yfkg	!
gofFHj p, gofFHj ?j f	j f	ld; lt vt] L-ds}/ jf]8, ds}	!
gofFHj p, gofFHj ?j f	j f	; 'G÷sd vghfl] -uxFn; 'g_	!
gofFHj p, gofFHj ?j f	j f	wfg÷uxEf vfwt Tj	!
gofFHj p, gofFHj ?j f	j f	; fdbflos jLp j}$	!
gofFHj p, gofFHj ?j f	j f	lj df	!
gofFHj p, gofFHj ?j f	j f	xl/of]dn, cj ;] Jbj :yfkg	!
ld; lt vt] L	j f	; 'G÷sd vghfl] -uxFn; 'g_	!
ld; lt vt] L	j f	wfg÷uxEf vfwt Tj	!
ld; lt vt] L	j f	; fdbflos jLp j}$	!
ld; lt vt] L	j f	lj df	!
ld; lt vt] L	j f	xl/of]dn, cj ;] Jbj :yfkg	!
; 'G÷sd vghfl] -uxF	j f	wfg÷uxEf vfwt Tj	!
; 'G÷sd vghfl] -uxF	j f	; fdbflos jLp j}$	!
; 'G÷sd vghfl] -uxF	j f	lj df	!
; 'G÷sd vghfl] -uxF	j f	xl/of]dn, cj ;] Jbj :yfkg	!
wfg÷uxEf vfwt Tj	j f	; fdbflos jLp j}$	!
wfg÷uxEf vfwt Tj	j f	lj df	!
wfg÷uxEf vfwt Tj	j f	xl/of]dn, cj ;] Jbj :yfkg	!
; fdbflos jLp j}$	j f	lj df	!
; fdbflos jLp j}$	j f	xl/of]dn, cj ;] Jbj :yfkg	!
lj df	j f	xl/of]dn, cj ;] Jbj :yfkg	!

$_s=t n lbO{Psf k|Tos kl|j lw t yf lj wLx?sf] t hg
kl|j lwt yf lj wLn] **xl/t ux[x Unof; x?sf]pT; hg wf6fp**
nfU5, To; df **ufl|hf]nufpgxf]** .
$_v=bO{kl|j lw t yf lj wLx?sf] t hgf ubf{Ps eG
nfU5, lbO{Psf]:s]hdf **ufl|hf]nufpgxf]** .

sl|g w]}dxTj k0f{5?	**Pc**
Pp6fdf ufl|hf]nufpgxf] _	**t nsf]:s**

kl|j wL!		**kl|j wL@**	**nueu p:t}**
ufl7 t yf esf/f]; Wf/	j f	; fo{phf{l; FfQ{	!
ufl7 t yf esf/f]; Wf/	j f	glbs6fg /fs]g] 3fF vt] L	!
ufl7 t yf esf/f]; Wf/	j f	wfgsf]SRI kl|j lw	!
ufl7 t yf esf/f]; Wf/	j f	dfl{zd / dNo ; r gf	!
ufl7 t yf esf/f]; Wf/	j f	gofFHj p, lj ?j f	!
ufl7 t yf esf/f]; Wf/	j f	ld; |t vt] L-ds}/ j fl8, ds}	!
ufl7 t yf esf/f]; Wf/	j f	; G÷sd vghft] -uxFn; g_	!
ufl7 t yf esf/f]; Wf/	j f	wfg÷uxBf vfwt Tj	!
ufl7 t yf esf/f]; Wf/	j f	; fdbflos j Lp j }s	!
ufl7 t yf esf/f]; Wf/	j f	lj df	!
ufl7 t yf esf/f]; Wf/	j f	xl/of]dn, cj ;] Jbj :yfkg	!
; fo{phf{l; FfQ{	j f	glbs6fg /fs]g] 3fF vt] L	!
; fo{phf{l; FfQ{	j f	wfgsf]SRI kl|j lw	!
; fo{phf{l; FfQ{	j f	dfl{zd / dNo ; r gf	!
; fo{phf{l; FfQ{	j f	gofFHj p, lj ?j f	!
; fo{phf{l; FfQ{	j f	ld; |t vt] L-ds}/ j fl8, ds}	!
; fo{phf{l; FfQ{	j f	; G÷sd vghft] -uxFn; g_	!
; fo{phf{l; FfQ{	j f	wfg÷uxBf vfwt Tj	!
; fo{phf{l; FfQ{	j f	; fdbflos j Lp j }s	!
; fo{phf{l; FfQ{	j f	lj df	!
; fo{phf{l; FfQ{	j f	xl/of]dn, cj ;] Jbj :yfkg	!
glbs6fg /fs]g] 3fF vt] L	j f	wfgsf]SRI kl|j lw	!
glbs6fg /fs]g] 3fF vt] L	j f	dfl{zd / dNo ; r gf	!
glbs6fg /fs]g] 3fF vt] L	j f	gofFHj p, lj ?j f	!
glbs6fg /fs]g] 3fF vt] L	j f	ld; |t vt] L-ds}/ j fl8, ds}	!
glbs6fg /fs]g] 3fF vt] L	j f	; G÷sd vghft] -uxFn; g_	!
glbs6fg /fs]g] 3fF vt] L	j f	wfg÷uxBf vfwt Tj	!
glbs6fg /fs]g] 3fF vt] L	j f	; fdbflos j Lp j }s	!
glbs6fg /fs]g] 3fF vt] L	j f	lj df	!

glbs 6fg /f]Sg] 3f]F vt] L	j f	xl/of]dn, cj ;] Jbj :yfkg	!
wfgsf]SRI k|j lw	j f	df{zd / dNo ; 'r gf	!
wfgsf]SRI k|j lw	j f	gofFlj p, lj ?j f	!
wfgsf]SRI k|j lw	j f	ld; |t vt] L-ds}/ j fl]8, ds}	!
wfgsf]SRI k|j lw	j f	; 'G÷sd vghflt -uxFn; 'g_	!
wfgsf]SRI k|j lw	j f	wfg÷uxF]f vfwt T]	!
wfgsf]SRI k|j lw	j f	; fdbflos jLp j}$	!
wfgsf]SRI k|j lw	j f	lj df	!
wfgsf]SRI k|j lw	j f	xl/of]dn, cj ;] Jbj :yfkg	!
df{zd / dNo ; 'r gf	j f	gofFlj p, lj ?j f	!
df{zd / dNo ; 'r gf	j f	ld; |t vt] L-ds}/ j fl]8, ds}	!
df{zd / dNo ; 'r gf	j f	; 'G÷sd vghflt -uxFn; 'g_	!
df{zd / dNo ; 'r gf	j f	wfg÷uxF]f vfwt T]	!
df{zd / dNo ; 'r gf	j f	; fdbflos jLp j}$	!
df{zd / dNo ; 'r gf	j f	lj df	!
df{zd / dNo ; 'r gf	j f	xl/of]dn, cj ;] Jbj :yfkg	!
gofFlj p, gofFlj ?j f	j f	ld; |t vt] L-ds}/ j fl]8, ds}	!
gofFlj p, gofFlj ?j f	j f	; 'G÷sd vghflt -uxFn; 'g_	!
gofFlj p, gofFlj ?j f	j f	wfg÷uxF]f vfwt T]	!
gofFlj p, gofFlj ?j f	j f	; fdbflos jLp j}$	!
gofFlj p, gofFlj ?j f	j f	lj df	!
gofFlj p, gofFlj ?j f	j f	xl/of]dn, cj ;] Jbj :yfkg	!
ld; |t vt] L	j f	; 'G÷sd vghflt -uxFn; 'g_	!
ld; |t vt] L	j f	wfg÷uxF]f vfwt T]	!
ld; |t vt] L	j f	; fdbflos jLp j}$	!
ld; |t vt] L	j f	lj df	!
ld; |t vt] L	j f	xl/of]dn, cj ;] Jbj :yfkg	!
; 'G÷sd vghflt -uxF	j f	wfg÷uxF]f vfwt T]	!
; 'G÷sd vghflt -uxF	j f	; fdbflos jLp j}$	!
; 'G÷sd vghflt -uxF	j f	lj df	!
; 'G÷sd vghflt -uxF	j f	xl/of]dn, cj ;] Jbj :yfkg	!
wfg÷uxF]f vfwt T]	j f	; fdbflos jLp j}$	!
wfg÷uxF]f vfwt T]	j f	lj df	!
wfg÷uxF]f vfwt T]	j f	xl/of]dn, cj ;] Jbj :yfkg	!
; fdbflos jLp j}$	j f	lj df	!
; fdbflos jLp j}$	j f	xl/of]dn, cj ;] Jbj :yfkg	!
lj df	j f	xl/of]dn, cj ;] Jbj :yfkg	!

%_s=t n lbOP{s f k|To]s kl|j lwt yf lj wLx?sf]t hg
kl|j lwt yf lj wLn] **Nfus / ; fdflhs ; dt f / ; dfj]**
dxTj kf0f{nfU5, To; df **ufhf]nufpgXf]** .
%_v=bOQ{kl|j lwt yf lj wLx?sf]t hgf ubf{Ps eG
nfU5, lbOPsf]:s]hdf **ufhf]nufpgXf]** .

sg wl}dxTj kf0f{5?	**Pp6feG**
-Pp6fdf ufhf]nufpgXf]_	**t nsf]:s**

kl|j wL!		**kl|j wL@**	**nueu p:t}**	
uf]7 tyf esf/f]; Ww/	jf	; f]o{phf{l; F-fQ{	!	
uf]7 tyf esf/f]; Ww/	jf	glbs 6fg /f]Sg] 3f/F vt]L	!	
uf]7 tyf esf/f]; Ww/	jf	wfqsf]SRI kl|j lw	!	
uf]7 tyf esf/f]; Ww/	jf	df]zd / dNo ; r gf	!	
uf]7 tyf esf/f]; Ww/	jf	gofFHj p, lj ?j f	!	
uf]7 tyf esf/f]; Ww/	jf	ld; |]t vt]L-ds}/ jf]8, ds}	!	
uf]7 tyf esf/f]; Ww/	jf	; G÷sd vghf]t -uxFn; g_	!	
uf]7 tyf esf/f]; Ww/	jf	wfg÷uxBf vfw T]	!	
uf]7 tyf esf/f]; Ww/	jf	; fdbflos jLp j}s	!	
uf]7 tyf esf/f]; Ww/	jf	lj df	!	
uf]7 tyf esf/f]; Ww/	jf	xl/of]dn, cj ;] Jbj :yfkg	!	
; f]o{phf{l; F-fQ{	jf	glbs 6fg /f]Sg] 3f/F vt]L	!	
; f]o{phf{l; F-fQ{	jf	wfqsf]SRI kl|j lw	!	
; f]o{phf{l; F-fQ{	jf	df]zd / dNo ; r gf	!	
; f]o{phf{l; F-fQ{	jf	gofFHj p, lj ?j f	!	
; f]o{phf{l; F-fQ{	jf	ld; |]t vt]L-ds}/ jf]8, ds}	!	
; f]o{phf{l; F-fQ{	jf	; G÷sd vghf]t -uxFn; g_	!	
; f]o{phf{l; F-fQ{	jf	wfg÷uxBf vfw T]	!	
; f]o{phf{l; F-fQ{	jf	; fdbflos jLp j}s	!	
; f]o{phf{l; F-fQ{	jf	lj df	!	
; f]o{phf{l; F-fQ{	jf	xl/of]dn, cj ;] Jbj :yfkg	!	
glbs 6fg /f]Sg] 3f/F vt]L	jf	wfqsf]SRI kl|j lw	!	
glbs 6fg /f]Sg] 3f/F vt]L	jf	df]zd / dNo ; r gf	!	
glbs 6fg /f]Sg] 3f/F vt]L	jf	gofFHj p, lj ?j f	!	
glbs 6fg /f]Sg] 3f/F vt]L	jf	ld; |]t vt]L-ds}/ jf]8, ds}	!	
glbs 6fg /f]Sg] 3f/F vt]L	jf	; G÷sd vghf]t -uxFn; g_	!	
glbs 6fg /f]Sg] 3f/F vt]L	jf	wfg÷uxBf vfw T]	!	
glbs 6fg /f]Sg] 3f/F vt]L	jf	; fdbflos jLp j}s	!	
glbs 6fg /f]Sg] 3f/F vt]L	jf	lj df	!	

glbs 6fg /f]Sg] 3f6F vt]L	jf	xl/of]dn, cj;] Jbj:yfkg	!
wfgsf] SRI kljlw	jf	df}zd / dNo ;'r gf	!
wfgsf] SRI kljlw	jf	gofFjp, lj?jf	!
wfgsf] SRI kljlw	jf	ld; |lt vt]L-ds}/ jf]8, ds}	!
wfgsf] SRI kljlw	jf	; 'G÷sd vghft] -uxF, n; 'g_	!
wfgsf] SRI kljlw	jf	wfg÷uxF]f vfwt Tj	!
wfgsf] SRI kljlw	jf	; fdbflos jLp j}s	!
wfgsf] SRI kljlw	jf	lj df	!
wfgsf] SRI kljlw	jf	xl/of]dn, cj;] Jbj:yfkg	!
df}zd / dNo ;'r gf	jf	gofFjp, lj?jf	!
df}zd / dNo ;'r gf	jf	ld; |lt vt]L-ds}/ jf]8, ds}	!
df}zd / dNo ;'r gf	jf	; 'G÷sd vghft] -uxF, n; 'g_	!
df}zd / dNo ;'r gf	jf	wfg÷uxF]f vfwt Tj	!
df}zd / dNo ;'r gf	jf	; fdbflos jLp j}s	!
df}zd / dNo ;'r gf	jf	lj df	!
df}zd / dNo ;'r gf	jf	xl/of]dn, cj;] Jbj:yfkg	!
gofFjp, gofFj ?jf	jf	ld; |lt vt]L-ds}/ jf]8, ds}	!
gofFjp, gofFj ?jf	jf	; 'G÷sd vghft] -uxF, n; 'g_	!
gofFjp, gofFj ?jf	jf	wfg÷uxF]f vfwt Tj	!
gofFjp, gofFj ?jf	jf	; fdbflos jLp j}s	!
gofFjp, gofFj ?jf	jf	lj df	!
gofFjp, gofFj ?jf	jf	xl/of]dn, cj;] Jbj:yfkg	!
ld; |lt vt]L	jf	; 'G÷sd vghft] -uxF, n; 'g_	!
ld; |lt vt]L	jf	wfg÷uxF]f vfwt Tj	!
ld; |lt vt]L	jf	; fdbflos jLp j}s	!
ld; |lt vt]L	jf	lj df	!
ld; |lt vt]L	jf	xl/of]dn, cj;] Jbj:yfkg	!
; 'G÷sd vghft] -uxF	jf	wfg÷uxF]f vfwt Tj	!
; 'G÷sd vghft] -uxF	jf	; fdbflos jLp j}s	!
; 'G÷sd vghft] -uxF	jf	lj df	!
; 'G÷sd vghft] -uxF	jf	xl/of]dn, cj;] Jbj:yfkg	!
wfg÷uxF]f vfwt Tj	jf	; fdbflos jLp j}s	!
wfg÷uxF]f vfwt Tj	jf	lj df	!
wfg÷uxF]f vfwt Tj	jf	xl/of]dn, cj;] Jbj:yfkg	!
; fdbflos jLp j}s	jf	lj df	!
; fdbflos jLp j}s	jf	xl/of]dn, cj;] Jbj:yfkg	!
lj df	jf	xl/of]dn, cj;] Jbj:yfkg	!

Local Initiatives for Biodiversity, Research and Development (LI-BIRD)
Contact: POB 324, Pokhara, Kaski, Nepal
Phone: (++977) – 61 – 535357 / 526834
Fax: (++977) – 61 – 539956
Email: info@libird.org
Website: www.libird.org