



ENDLINE REPORT SHARDA- MAHAKALI BASIN (NEPAL & INDIA)

The impact on river basin communities participating
in the Transboundary Rivers of South Asia (TROSA)
Program

February 2022

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EXECUTIVE SUMMARY

Transboundary Rivers of South Asia (TROSA) is a five-year (2017-2021) program, funded by Swedish International Development Cooperation Agency (Sida). The program aims to reduce poverty of marginalized and vulnerable river basin communities through increased access to and control over water resources. The program works with marginalized and vulnerable communities along the Sharda-Mahakali, Brahmaputra-Saralbhanga-Teesta, Meghna and Salween River basins in Bangladesh, India, Myanmar, and Nepal.

This report focuses on the impact achieved by the TROSA program in the Sharda-Mahali basin by comparing results of the endline study (September-October 2021) with the baseline (February-May 2018). The main objective of this study was to determine to what extent the TROSA program had an impact on reduced poverty and marginalization of river basin communities (impact), communities being better able to reduce their vulnerability to water related shocks (outcome 4.1), communities having more secure access and control over water resources (outcome 4.2), and increased participation and influence of women in transboundary water governance, policies, and practices (outcome 5). This study builds primarily on insights from community members gathered through surveys. A two-day online reflection workshop ensured results were put into context and perspective.

We found positive changes in almost all outcome areas when comparing the baseline situation to the situation at the endline. According to reflection workshop participants, most important findings were the progress made regarding women's participation in water governance (outcome 5), improved cross-border collaboration (outcome 4.1), and improved timely access to early warning information (outcome 4.2). For many of the indicators, endline levels for TROSA participants were higher than the baseline levels, indicating the likely role of TROSA in contributing to these improvements. However, for many indicators, non-participants also experienced improvements. Consequently, it is important to acknowledge possible external factors that might also have contributed to positive changes. Furthermore, the fact that TROSA is primarily an advocacy and influencing program working at multiple administrative levels might point to potential spill-over effects of TROSA activities beyond directly targeted areas. Hence, TROSA may also be (partly) responsible for the progress for non-participants.

The last two implementation years of TROSA were amidst the Covid-19 pandemic, hence the fact that we still found improvements in many outcome areas is promising.

Lastly, it should be mentioned that many of the results for the Indian side of the Sharda-Mahakali basin did not match the experience of experts in both Nepal and India. Hence, by taking a quantitative approach to the endline evaluation we have likely missed out on some of the in-depth stories of change established because of TROSA.

Based on the insights, experiences and results presented in this report and discussed with program staff and partners, the following recommendations for future programs have been formulated:

- **Acknowledge, account for, and aim to shift social norms to contribute to an enabling environment, especially for young women:** Social norms have a direct bearing on the possibilities for female leadership. Society needs to accept that women can be equal partners in decision-making for women to start taking leadership roles and have influence in decision-making. Hence, future programs should explore a greater emphasis on social norms change and should include male counterparts in women empowerment activities.
- **Include activities, like Citizen Science, to improve drinking water quality:** Drinking water quality from the principal source is perceived to be fair or poor. Hence, future programs should consider a component on improving drinking water quality, for instance through Citizen Science.
- **Continue community participation initiatives, up to higher administrative levels:** Through TROSA's support, community participation in water governance has been strengthened and taken up at local levels of administration. However, future programs should continue to strengthen this participation up to higher administrative levels. In this way, community participation is more likely to become part and parcel of water governance.
- **When working on water governance involving multiple countries, adopt a transboundary approach:** A best practice from TROSA worth sharing is the focus on basins, which are transboundary, rather than on separate countries. By taking this basin-wise approach, an opportunity was created for different actors in different countries to learn from and inspire each other, and not the least to diminish prejudices. Furthermore, transboundary awareness and collaboration was strengthened by connecting cross-border communities.
- **To conserve, utilize, and develop river resources, consider establishing a Transboundary Mahakali River Commission as provisioned in the Mahakali Treaty:** Future programs should support federal and provincial levels of the government to implement a Mahakali River basin program, in consultation with concerned stakeholders (including communities). The objective is to increase communities' ownership of the river basin, and together with the government to conserve the Mahakali River.
- **Consider the sustainability of the program, even after program implementation has ended:** Future programs should consider ways in which to continue and sustain the work and progress made by TROSA. A best practice by TROSA worth sharing is the setting-up of networks, community institutions, and (cross-border) water committees, which should facilitate (cross-border) collaboration on water governance even after the program has ended.

ACKNOWLEDGEMENTS

This report is based on the information provided by hundreds of community members who were interviewed in Nepali districts of Kanchanpur, Baitadi, Darchula, Dadeldhura and Saptari, and Indian district of Lakhimpur Khiri, over the course of four years (in 2018 and 2021). First and foremost, we want to express our gratitude to all of them for participating. Their willingness to give their time and discuss their vulnerability to water related shocks, access and control over water resources, and participation in water governance resulted in valuable information to ensure evidence-based and adaptive program implementation (at baseline stage) and made this evaluation (endline) possible. The evaluation will be useful for accountability purposes as well as for informing the design of future programs with similar objectives.

This endline evaluation was achieved through the extensive contributions and expertise of the entire TROSA team, including National Environment and Equite Development Society (NEEDS Nepal), Rural Women's Development and Unity Center (RUWDUC), Rural Development & Environment Management Society (RUDES), Community Rural Development Society (CRDS), Grameen Development Services (GDS), and The International Centre for Integrated Mountain Development (ICIMOD), Oxfam staff in Nepal and India, Oxfam TROSA PMU, the Impact Measurement and Knowledge (IMK) team of Oxfam Novib (part of the Learning, Innovation and Knowledge (LINK) unit), and of course the data collection team MRDF Nepal and SRNO India.

Finally, we are grateful to the Swedish International Development Cooperation Agency (Sida) for funding the TROSA program and this evaluation.

ACRONYMS

CBO	Community Based Organization
Covid-19	Coronavirus Disease 2019
CRDS	Community Rural Development Society
CSO	Civil Society Organization
CWOS	Citizen Water Observatories
EWS	Early Warning System
GDS	Grameen Development Services
GPDP	Gram Panchayat Development Plan
HRVA	Hazard, Risk and Vulnerability Analysis
ICIMOD	International Centre for Integrated Mountain Development
IMK	Impact Measurement and Knowledge
IWRM	Integrated Water Resources Management
KPI	Key Performance Indicator
LINK	Learning, Innovation and Knowledge
MSC	Most Significant Change
NEEDS	National Environment and Equity Development Society
NGO	Non-Governmental Organization
OH	Outcome Harvesting
PMU	Program Management Unit
PRI	Panchayati Raj Institution
RUDES	Rural Development & Environment Management Society
RUWDUC	Rural Women's Development and Unity Center
SDG	Sustainable Development Goal
SIDA	Swedish International Development Cooperation Agency
SNNM	Sharda Nadi Nagrik Manch
ToC	Theory of Change
TROSA	Transboundary Rivers of South Asia
VDMC	Village Development Management Committee
VWMC	Village Water Management Committee
WEC	Women Empowerment Center
WG-CAN	Water Governance Collective Action Network
WUG	Water User Group

1 INTRODUCTION

Transboundary Rivers of South Asia (TROSAs) is a five-year (2017-2021) program, funded by Swedish International Development Cooperation Agency (Sida). The program aims to reduce poverty of marginalized and vulnerable river basin communities through increased access to and control over water resources. The program works with marginalized and vulnerable communities along the Sharda-Mahakali, Brahmaputra-Saralbhanga-Teesta, Meghna and Salween River basins in Bangladesh, India, Myanmar, and Nepal.

The Impact Measurement and Knowledge (IMK) team, part of the Learning, Innovation and Knowledge (LINK) unit, of Oxfam Novib conducted an endline study of the TROSAs program in each of these four basins. In the Sharda-Mahakali basin (shared by Nepal & India), the endline study is conducted in collaboration with Oxfam in Nepal and India and their partners National Environment and Equity Development Society (NEEDS Nepal), Rural Women's Development and Unity Center (RUWDUC), Rural Development & Environment Management Society (RUDES), Community Rural Development Society (CRDS), Grameen Development Services (GDS), and The International Centre for Integrated Mountain Development (ICIMOD). This endline study compares findings of the endline situation (September 2021) to the situation at the baseline (February-May 2018).

A quantitative approach was used to estimate the impact of the TROSAs program. The endline study focuses on changes in people's lives, and is therefore only concerned with outcome 4.1, 4.2, 5 and the impact level of the TROSAs program. These are:

- Impact: Reduced poverty and marginalization of vulnerable river basin communities through increased access to, and control over, riverine water resources on which their livelihoods depend.
- Outcome 4.1: Local communities are better able to reduce their vulnerability to water resource related shock including from conflict & disasters.
- Outcome 4.2: Local communities have more secure access and control over their water resources.
- Outcome 5: Increased participation & influence of women in transboundary water governance, policies and processes.

This endline study aims to measure progress with respect to these outcomes, and to what extent this progress can be attributed to TROSAs program activities. Furthermore, some findings related to change in government, private sector, and civil society (outcome 1-3) are included in the report as well. In addition, the report aims to shed light on some dynamics that are basin specific. For the Sharda-Mahakali basin this means analysing the relationship between having a transboundary outlook and satisfaction with cross-border collaboration, and confidence with expressing voice towards the local government.

During program implementation, and at the time of writing this report, the world, including communities residing along the Sharda-Mahakali basin, were hit by the coronavirus pandemic (Covid-19). Since the Covid-19 pandemic likely has an impact on the poverty situation of river basin communities, findings of this study are contextualized with respect to Covid-19 wherever applicable.

2 PROGRAM OVERVIEW

The TROSA program aims to reduce poverty of marginalized and vulnerable river basin communities through increased access to and control over water resources.

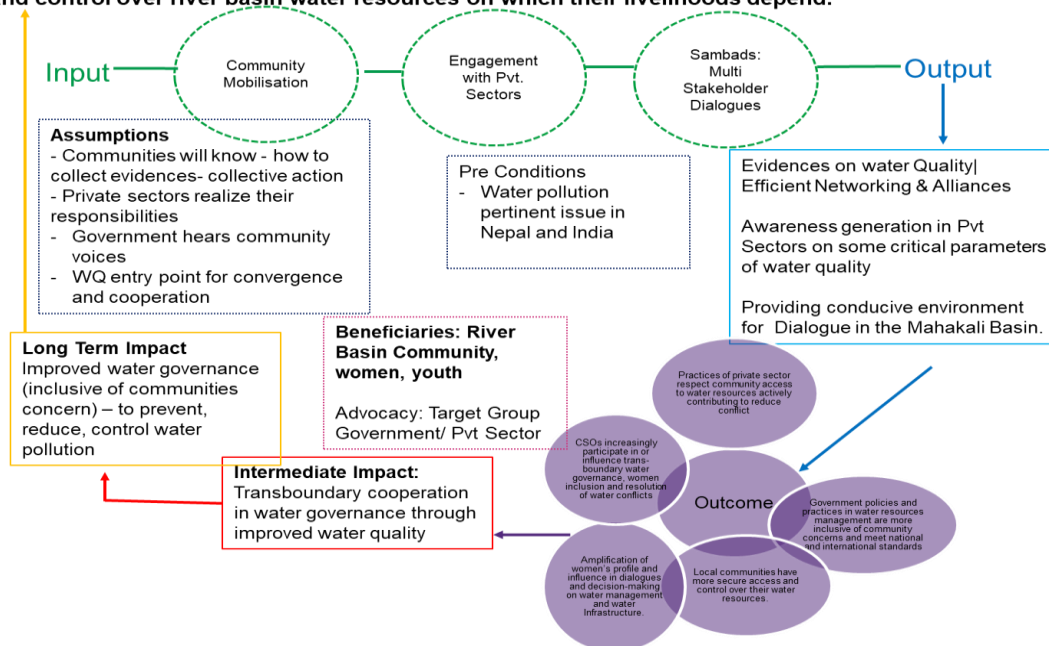
The Sharda-Mahakali basin, sharing borders with Nepal and India, had a specific focus on water quality and early warning systems. TROSA activities in this basin were implemented through a so-called 'Citizen Science Approach'. Key herein was the bringing together of various stakeholders, including youth, for water sampling and testing and subsequently community dialogue on the results¹.

The Theory of Change (ToC) of the Sharda-Mahakali basin is visually depicted in Figure 1 below.

Figure 1

MAHAKALI BASIN-THEORY OF CHANGE:

Poverty reduction of the marginalized and vulnerable river basin communities **through increased access to and control over river basin water resources on which their livelihoods depend.**



¹ "A Citizen Science Project can involve a person or the whole communities collaborating towards a common goal. The public involvement includes data collection, analysis or reporting and so forth. For the TROSA program in the Sharda-Mahakali basin, a common goal is to strengthen citizen water observatories (CWOS) through citizen science tests. Citizen science tests cover a host of innovative tools to engage with the public to apply their curiosity and contribute their talent to science and technology. Citizen scientists (community members) can provide information that would not otherwise be available due to temporal, geographic, or resource constraints. Data obtained with the help of citizen scientists can be useful to determine the real scenario and plan further activities for improvement." (RUWDUC and Oxfam in Nepal, 2021. PROCEEDINGS Of the International Conference on Youth Initiative on Transboundary Water Governance and Sustainable Development Goals [SDGs], p7.)

In Nepal, TROSA activities included:

- *Citizen Science Approach*: Citizen Science approach provides opportunities for communities to use water quality test related scientific tools, generate evidence for water pollution and advocate with their respective local governments for conservation of Mahakali River resources. The approach was applied through community engagement, training and capacity development on water sampling and testing with citizen science tools for appropriate improvements.
- *Women Empowerment Centers (WECs)*: WECs are group of women who focus on issues related to transboundary rivers to sensitize them about their rights and responsibilities around riverine water resources, to capacitate them in becoming leaders, and to involve them in transboundary water resources planning and decision making.
- *International Day celebrations*: Civil Society Organisations (CSOs), communities, volunteers and WEC representatives and representatives of local governments participated in international day celebrations to increase the awareness level of riverine communities and to capacitate them for sustainable development of Mahakali basin. The different international days celebrated include World Environment Day, International Day for Disaster Risk Reduction, World Water Day, International Women Day, Labour Day, 16 days campaign against Gender Based Violence.
- *Community-level Lift Irrigation and Income Generation from Mahakali River for farming*: One of the important achievements of Dhangadi Declaration into actions has been lift irrigation from Mahakali River for improved income generation. It has been a historical achievement made for the first time in Mahakali basin.
- *Trainings*: For example, on seven step planning process, lobby strategies and proposal writing, documentation, social mobilisation, Citizen Science. Furthermore, series of leadership trainings, to build the capacity of the communities, private sectors, journalists, CSOs to engage in water governance such as fund raising from local governments on a regular basis. Further, local governments were provided technical support on developing sand mining guidelines, the establishment of Community Based Flood Early Warning System, Women Empowerment Center Operation Guidelines, Transboundary Water Governance Manual.
- *Lobby meetings with the local government*: For instance, on water lifting, drinking water supply, Irrigation projects, livelihoods support such as seed supports, Greenhouse Tunnel, training on off season farming, plantation on barren land, mitigation measures to control soil erosion, embankment management to address issues of climate change and disaster, and other development initiatives such as the establishment of a telephone tower, electrification, and road extension.
- *WEC operation guideline endorsed by Provincial government*: The guidelines helped to recognise Women Empowerment Center as an entity of local government and hence these Centers are eligible to raise funds from local governments. It helps to increase participation and influence of women in transboundary water governance, policies, and processes.
- *Webinars*: Youth engagement in transboundary water governance, follow up of Youth conference, Community Led Early Warning System, Experience from Mahakali Basin, Women Empowerment Centres' role in developing sand mining guideline at Mahakali Basin, Perspective of Women Empowerment Centres in effective Transboundary Water Governance, Youth's Engagement in Sustainable Transboundary Water Governance, Gender and Social Inclusion in Transboundary

Water Governance, Mahakali Sambad on Citizen Science Approach and Regional Youth Dialogue on Transboundary Water Governance etc.

- *Radio programs*: For instance, on Transboundary Flood Early Warning mechanism, Covid-19 pandemic, and its measures, Women Empowerment and Awareness against Gender based Violence, Seven Step Planning process.
- *Development of Sand Mining Guidelines*: TROSA provided technical support to local governments (endorsed by six municipalities) of Mahakali basin of Nepal to develop River Sand Mining Guidelines for ensuring environmentally sustainable and socially responsible mining in the transboundary Mahakali River. It aims contractors to consider environmental friendly practices respecting the communities access and control over mining for equitable sharing of benefits to the communities and further ensures the rights of riverine communities.
- *Transboundary Early Warning Simulations*: Communities, local governments (Nepal), Security forces, journalists, and CSOs from Mahakali basin of Nepal and India participated in a Physical Transboundary Early Warning Simulation in 2019 and 2020, and a virtual one in 2021.

In India, TROSA activities included:

- *Citizen Science Approach*: Community engagement, training and capacity development on water sampling and testing with systronic water analysers.
- *Village Water Management Committee (VWMC)*: In close coordination with local governments, TROSA facilitated the formation of a community institution namely, VWMC, for addressing community water issues and challenges.
- *Community dialogues and consultations on Citizen Science data*: These dialogues and consultations were facilitated by women-led Sharda Nadi Nagrik Manch (SNNM) members. Citizen Science data informed advocacy messages for responsible water management practices from private and public stakeholders.
- *Early Warning System (EWS) network*: Development of an EWS network for information dissemination on floods (Water Governance Collective Action Network (WG-CAN)). The network disseminated EWS information in the entire Sharda-Mahakali basin through volunteers, CSOs, community-based organizations (CBOs) and government stakeholders.
- *Hazard, Risk and Vulnerability Analysis (HRVA)*: To evaluate key vulnerabilities and capacities.
- *Interface and consultation with government*: Interface and consultation between government officials and Panchayati Raj Institution (PRI) members on water contamination and management.
- *Advocacy*: Influencing local government policies through inclusion of Integrated Water Resources Management (IWRM) components in the Gram Panchayat Development Plan (GPDP) planning process; and also, to raise awareness and have access to the multiple welfare development schemes of the government.
- *Transformative leadership for women*: Facilitation for transformative leadership among women for water governance related decision-making processes.

The Covid-19 pandemic made regular program implementation challenging. In Nepal, TROSA continued its advocacy and influencing objectives despite the Covid-19 pandemic. However, to align these efforts with the challenges of Covid-19, humanitarian projects were established in TROSA project areas through various ways of funding. These projects strengthened the relationships between

partners, CSOs, communities, and the government. The major challenge because of Covid-19 was to continue with regular TROSA activities physically; instead, virtual methods were applied to continue the program. In India, especially in year 3 and 4, many of the TROSA activities have moved online. Furthermore, in addition to the implementation of regular activities, staff spent considerable time in disseminating awareness on Covid-19 (including safety protocols).

3 EVALUATION DESIGN

3.1 EVALUATION AND LEARNING QUESTIONS

The main objective of this endline study was to determine to what extent the TROSA program had an impact on reduced poverty and marginalization of river basin communities (impact), communities being better able to reduce their vulnerability to water related shocks (outcome 4.1), communities having more secure access and control over water resources (outcome 4.2), and increased participation and influence of women in transboundary water governance, policies and practices (outcome 5). The report will also explore more deeply the regional (country) and gendered differences for the relevant outcomes and will contextualize findings with respect to Covid-19. Findings of the evaluation questions are presented in chapter 4.

Table 1: Overview of evaluation questions

- **Impact:** To what extent is there reduced poverty and marginalization of river basin communities, and can these changes be attributed to the TROSA program?
- **Outcome 4.1:** To what extent are local communities better able to reduce their vulnerability to water resource related shocks, and can these changes be attributed to the TROSA program?
- **Outcome 4.2:** To what extent have local communities more secure access and control over water resources, and can these changes be attributed to the TROSA program?
- **Outcome 5:** To what extent is there increased participation and influence of women in transboundary water governance, policies and practices, and can these changes be attributed to the TROSA program?

In addition to answering these evaluation questions, program staff in the Sharda-Mahakali basin were interested in understanding the relationship between having a transboundary outlook and satisfaction with cross-border collaboration, as well as whether people (especially women and youth) are confident with expressing their voice towards the local government and/or other political bodies. Findings of the learning questions are presented in chapter 5.

Table 2: Overview of learning questions

- To what extent are people with a transboundary outlook more positive about cross-border collaboration compared to people with a more in-country focus? And to what extent is the level of transboundary outlook different for TROSA participants compared to non-TROSA participants?
- To what extent are people, especially women and youth, confident with expressing their voice towards local government and/or other political bodies?

3.2 EVALUATION DESIGN

This evaluation is a quasi-experimental² impact assessment, meaning that it benefits from (quantitative) data collected from a target group of program participants as well as a comparison group of respondents with a similar demographic profile as the target group who are living in communities that are not targeted by TROSA program activities. The selection of respondents and their assignment to the target and comparison groups is not random, which is what makes this study “quasi-experimental”, in contrast to a fully randomized control trial. Still, comparing data from these two groups allowed us to look not only at trends in outcomes over time for the target group, but also whether any changes over time may be attributable to program activities (i.e., the impact of the TROSA program). Please refer to Annex 8.1 for more details on the statistical methodology.

A series of hybrid workshops were held on 15-16 December 2021 to reflect on preliminary results of the endline study. In total there were 30-37 participants from different geographies in Nepal and India: they include Oxfam staff (Oxfam in Nepal, Oxfam in India, program management unit (PMU)), partner staff (GDS, RUWDUC, RUDES, CRDS, NEEDS), community volunteers, and community representatives. Over the two days, participants reflected together on the results presented. The main objective was to validate the results and find possible explanations for certain results. Reflections and suggestions from participants have been incorporated into this report and are clearly labelled where they appear.

3.3 OVERVIEW OF THE SAMPLE

The sampling approach for this endline study was designed for maximum comparability between the baseline and the endline and to be representative of TROSA program areas. Practically speaking, this meant that the municipalities included in the baseline study were purposely selected for the endline study. Some considerations were made for Nepal and India respectively.

In Nepal, the total sample size was slightly reduced in favour of the target group (from N= 751 at the baseline to N= 700 at the endline). This decision was informed based on power calculations and subsequently analyses of minimum detectable effect sizes. The reduction in the comparison group at the endline considered the distribution of respondents across municipalities at the baseline. The target group at the endline largely mimicked the baseline target group. One exception was made: the exclusion of Melaulee municipality since this municipality was no longer part of TROSA's working areas. We collected panel data for 71% of respondents.

The endline sample in India was the same as the baseline sample (N= 189). Target locations were selected from Lakhimpur Kehri district (Palia Kalan block). Although TROSA had worked outside Palia Kalan as well, the core program area of TROSA along the Indian side of the Sharda-Mahakali basin was Palia Kalan. This validated the decision to keep the baseline and the endline sample consistent and to not include additional locations for the endline sample. We collected panel data for 82% of respondents.

² A quasi-experiment is an empirical interventional study used to estimate the causal impact of an intervention on target population without random assignment.

At the baseline we tracked records of respondents, including their contact information. Hence, respondents for the endline sample were selected based on these baseline respondent lists. In case a respondent from the respondent list was not available for the endline interview, they were replaced with a newly selected respondent using the method of ‘random walk’³. All respondents were interviewed between September-October 2021.

Please refer to Annex 8.2 for a detailed overview of the baseline and the endline sample.

3.4 LIMITATIONS

This endline study had some limitations. The first limitation related to the way the indicators and survey questions were formulated. First, there was the trade-off between standardization across basins and adaptation to the local context. Hence, it could be that we missed progress in areas and activities that were specific for the Sharda-Mahakali basin. The basin-specific learning questions (see chapter 5) complemented the global indicator analysis at least to some extent, but still it is likely we failed to capture some of the basin-specific progress. Secondly, after data was collected for the endline survey, some innovative achievements were made, particularly in Nepal⁴. Hence, these achievements were not captured in the endline study.

Second, many of the outcomes are complex and sometimes qualitative in nature. Hence, by operationalizing these into quantitative survey questions we have risked losing some of the nuance around these outcomes and individual stories of change. To deal with this risk, we tried to complement the quantitative analysis by organizing reflection workshops, where participants could share their insights and nuances.

The third limitation relates to the comparison group in this study. First, TROSA is primarily an advocacy and influencing program, hence progress made because of advocacy efforts at higher administrative levels are likely to also impact comparison communities who are also part of this administrative level. Secondly, we could not control the activities of other actors (for example, other non-governmental organizations (NGOs), government, or the private sector). In the reflection workshop partners mentioned it to be likely that other NGOs implemented disaster risk reduction and climate change activities in comparison locations. If this is the case, this violates our ‘parallel trends assumption’. Hence, we did not know for sure if the comparison group in this study truly was a ‘pure’ comparison group or not.

Furthermore, the endline sample was designed largely based on the baseline sample to ensure maximum comparability over time (see section 3.3). Target locations included only those areas where TROSA had implemented activities. However, by prioritizing baseline locations we have excluded other areas from the endline sample where TROSA worked as well. However, in both Nepal and India,

³ Random walk is a method to randomly select households for an interview. Key is that each sample point within the study area has an equal chance of being sampled each time. This is to reduce the chances of selection bias and to generate an as representative sample as possible.

⁴ See for instance the report of the International Conference on Youth Initiative on Transboundary Water Governance and SDGs: <https://oxfam.box.com/s/86u7otkac9s5dn55hpugl9buabid4jg8>.

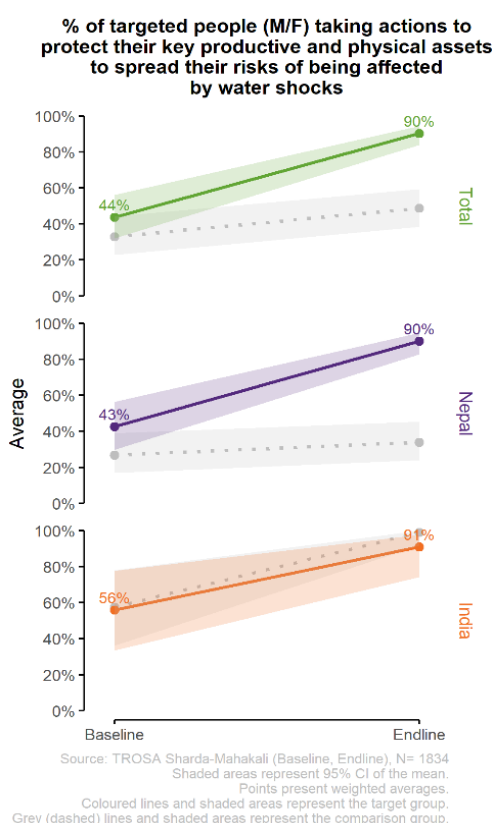
TROSA program staff has confirmed that all TROSA priority areas were included in the endline sample. Hence, the risk that we have underestimated progress of TROSA because of the exclusion of some locations is limited.

Lastly, especially in India, many of the findings of this endline study were surprising and did not match with program staff's experience. Although we have done some data quality checks and nothing strange has been found, it is important to keep this in mind when reading the results in the next chapters.

3.5 EXPLANATORY NOTE ON THE FINDINGS, FIGURES AND TABLES

The next chapter presents the main findings⁵ of the endline study. The TROSA program was judged to have made a *significant impact* on an outcome indicator if the change observed among the program participants (target group), from the baseline to the endline, was higher than the changes observed among non-participants (comparison group).

Figure 2



When the report mentions a *significant impact*, it means that the difference between program participants and non-participants for that outcome indicator between the baseline and the endline was statistically significant at a confidence level of 95%. This means that if the survey were re-run 20 times, we would find that the program had an impact for 19 of those 20 times. **In short, a significant impact means that we have enough statistical evidence to believe that a change in an outcome indicator was entirely due to TROSA program activities.**⁶

Most figures in this report visualize the results as line or bar graphs that show the average response to a given question by respondents in the baseline and endline studies (Figure 2). The y-axis indicates the highest value a certain indicator can have.

Because the data is based on responses from a sample of people in the baseline and endline studies, the results were subject to a degree of sampling error. These errors are visualized with a confidence interval, representing the

⁵ Please note that the sample size for each outcome indicator can be different from the sample size mentioned in section 3.3. This could be due to one or both of the following reasons: respondents did not answer the question(s) related to that outcome indicator, respondents answered 'I don't know', or there was missing information in any of the covariates included in the model.

⁶ It is worth noting that in some cases, the outcome indicator might not have changed among program participants, but we still may find a significant impact. This can be the case when we observed a negative change in the group of non-participants, but the program helped to maintain an outcome indicator at the same level or helped to reduce a negative trend in the political and socio-economic context.

range of the estimate at a confidence level of 95%. In graphs such as Figure 2, the confidence interval is depicted as the shaded area above and below the straight lines. Coloured lines and shaded areas represent the target group; grey (dashed) lines and shaded areas represent the comparison group.

Generally, if the confidence intervals of two estimates overlap, then it is likely that the difference between the estimates is not statistically significant. If the confidence intervals do not overlap, then the difference between the estimates is statistically significant. However, there are exceptions to this general rule, as the estimation model – and hence the conclusions on significance – rely on many interacting factors (such as the influence of weights, covariates, and sample size). Therefore, readers are encouraged to rely on the report text and summary tables for definitive results regarding which comparisons or associations were statistically significant and which were not.

In the following chapter, summary tables are presented for each section. These tables present the results of each indicator. Hence, the tables provide an overview of all the analyses performed for the section. Most of these results are described in the text. However, results for some indicators are not described extensively in the text.

In the summary tables, an equals sign (=) means that there is no significant difference or result to report. An upward arrow (↑) indicates a positive impact (the change for target group is bigger than the change for the comparison group), while a downward arrow (↓) indicates a negative impact (the change for the comparison group is bigger than the change for the target group⁷). The number of asterisks behind the arrow indicates the level of significance (*, **, *** for $p < 0.1$, $p < 0.05$, $p < 0.01$, respectively). Hence, more asterisks mean stronger evidence for the result.

Some Key Performance Indicators (KPIs) were only estimated at the endline. Here, we estimate whether the endline value is higher for the target group than the comparison group. In the table, this is indicated as 'Yes' (a higher value for the target group than the comparison group) or 'Yes, comparison' (a lower value for the target group than the comparison group). Again, asterisks indicate the level of significance.

⁷ Note that the change can still be in the positive direction. In these cases, the comparison group experienced a larger positive change than the target group.

4 PROGRAM IMPACT

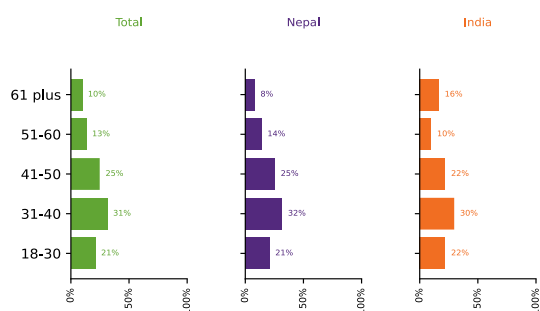
This chapter presents the findings from the endline study. The chapter begins by describing the sample of community members targeted by TROSA program activities: who they are and their characteristics (section 4.1). Next, we explore the results of five years of the TROSA program in relation to poverty and resilience (section 4.2), perceptions on institutions (section 4.3), vulnerability to water related shocks (section 4.4), access and control over water resources (section 4.5), and women’s participation in water governance (section 4.6). Please be referred to Annex 0 for an overview of how the KPIs were calculated.

4.1 CHARACTERISTICS OF INTERVIEWED PEOPLE

At the endline, we interviewed 385 TROSA program participants in Nepal and 91 in India. In Nepal, the majority were female (68%); in India the gender balance was more or less equal (53% men; 47% women). This section presents some of the key socio-demographic characteristics of TROSA participants at the endline in both countries. Although we are only presenting a limited number of characteristics, we recognize the fact that community members are a diverse group who may identify with other or additional characteristics other than the ones presented in this section.

Figure 3

What is your age?



Source: TROSA Sharda-Mahakali Basin (Endline Target), N=476.

We interviewed community members who were 18 years or older. Around half of TROSA participants in the endline sample were between 30-50 years of age (57% Nepal; 52% India).

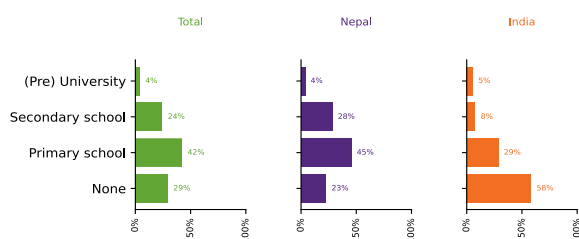
Most respondents were married or in a relationship (95% Nepal; 88% India).

TROSA participants had different levels of education. At the endline, in Nepal 77% had some level of education (primary school or higher). In India, more than half of TROSA participants had no education (58%); 42% had some level of education.

Achieved levels of education were reflected in the literacy rate: 81% of TROSA participants in Nepal were literate, compared to 46% in India.

Figure 4

What is the highest level of education you completed?



Source: TROSA Sharda-Mahakali Basin (Endline Target), N=476.

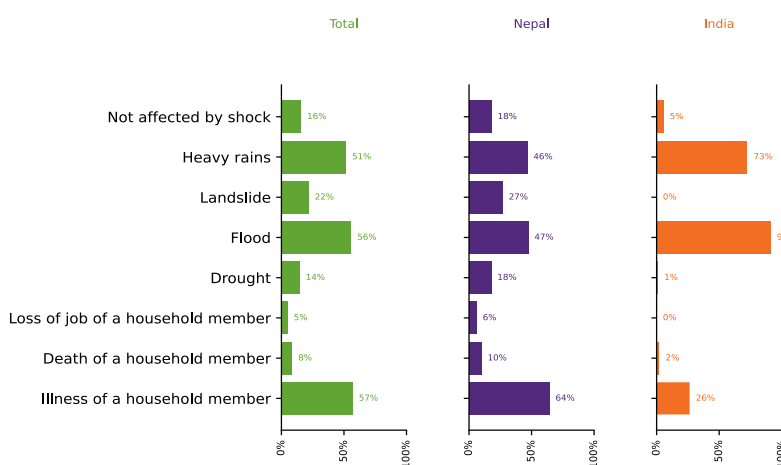
The majority of TROSA participants were engaged in agriculture as a livelihood. 94% in Nepal and 67% mentioned agriculture as a source of income, and 63% in Nepal and 49% in India depend on the river for agriculture. Other frequently mentioned income sources by TROSA participants in Nepal were

livestock (68%) and the collection of waterlogs (47%). TROSA participants in India frequently mentioned unskilled labour as source of income (44%).

The most frequently mentioned shocks at the endline, in both Nepal and India, were floods, heavy rains, and illness of a household member. In terms of climate-related extreme weather events, the exposure to floods or heavy rains had increased in both Nepal and India. At the endline, 47% of TROSA participants in Nepal and 91% in India had experienced floods in the

Figure 5

During the past five years, was your household affected negatively by...



Source: TROSA Sharda-Mahakali Basin (Endline Target), N=476.

past five years (compared to respectively 14% and 55% at the baseline), and 46% of TROSA participants in Nepal and 73% in India had experienced heavy rains (compared to respectively 12% and 3% at the baseline) (Figure 5). Those respondents who experienced shocks were asked when they experienced this and how many times in the past five years. Results show that communities were affected by floods and heavy rains quite recently: 55% in Nepal and 51% in India mentioned a flood in 2021; 97% in Nepal and 47% in India mentioned heavy rains in 2021. Not only the incidence of floods and heavy rains increased since the baseline, also the frequency. Where on average 3 floods were mentioned in both Nepal and India at the baseline, the frequency of floods increased to 7 in Nepal and 12 in India at the endline. Similarly, the frequency of heavy rains increased from 2 to 15 in Nepal, and 6 to 10 in India. All in all, these findings suggest that climate related extreme weather events are increasingly posing threats to river basin communities in the Sharda-Mahakali basin. Hence, improving resilience of communities to deal with threats posed by these shocks is of utmost importance.

4.2 POVERTY AND RESILIENCE OF COMMUNITIES (IMPACT)

KPI #: Impact: Poverty reduction of marginalized and vulnerable river basin communities.		Total	Nepal		India			
		Total	Total	Women	Men	Total	Women	Men
Endline data only		Is there a significant effect for the target group at endline?						
0.1	% of targeted people (M/F) who perceived / claimed having increased income and/or savings and/or decreased loans (poverty)	Yes *** (com- pari- son)	Yes *** (com- pari- son)	Yes ** (com- pari- son)	Yes *** (com- pari- son)	=	=	=
Baseline-Endline data		Is there a significant effect for the target group over time? (Impact)						

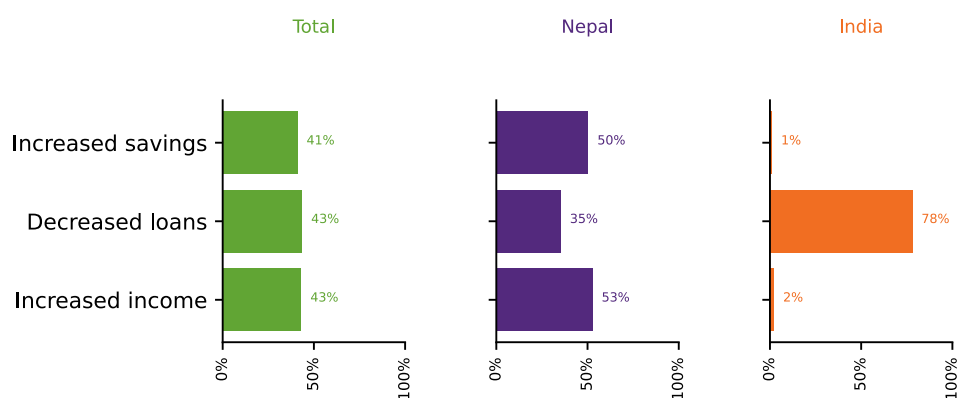
0.2	% of targeted people (M/F) who perceived / claimed being resilient towards water related shocks (adaptive capacity)	=	=	=	=	=	=	=
0.3	% of targeted people (M/F/youth) who perceived / claimed being able to cope with the incidence of, and damage by, water related events/disasters such as floods (absorptive capacity)	↑***	↑***	↑***	↑***	=	=	=
0.4	% of targeted people (M/F) with increased knowledge on dealing with floods and who recognize the importance of this knowledge for dealing with future floods	↑***	↑***	↑***	=	=	=	=

Poverty

The overall aim of the TROSA program was reduced poverty and marginalization of vulnerable river basin communities. Poverty is multi-dimensional, hence we tracked changes in income, savings, and loans. Respondents were asked to report on their change in income, savings, and loans since the baseline. The poverty situation was argued to have improved if at least two of the following conditions were met: 1) increased income, 2) increased savings, 3) decreased loans. At the endline, around half (52%) of TROSA participants in Nepal mentioned at least two of these poverty reduction indicators. Hence, poverty reduced for around half of TROSA participants in Nepal. However, percentages were higher for non-participants (69%), so we could not make strong impact claims. Although the TROSA program in Nepal did not have direct funding for poverty alleviation, achievements were made with the help of local governments and other actors. Examples of TROSA activities in Nepal aimed at reducing poverty include capacity developing in the areas of lift irrigation and mining. In India, the majority of TROSA participants mentioned decreased loans. Almost none of TROSA-participants mentioned either increased savings or increased income. In fact, for most of them savings and income decreased (for 81% and 89% of TROSA participants respectively). This latter point reflection workshop participants thought was surprising, given that TROSA in India has implemented capacity building exercises improving awareness and access to various government schemes, and learning on how to save. . Notably, especially women had a large role in connecting communities to government schemes. More on women's role in water governance can be found in section 0. It should be mentioned, however, that not all of these government schemes would necessarily be related to increased income. Further, during

Figure 6

% of targeted people (M/F) who, in the past 3 years, experienced:



Source: TROSA Sharda-Mahakali Basin (Endline Target), N=476.

the Covid-19 pandemic, most schemes were targeted at distress alleviation (not so much poverty alleviation).

It is important to mention the likely substantial influence of the Covid-19 pandemic on the financial situation of community members at the endline. Hence, in the survey we added questions that asked specifically about the influence of Covid-19 in change in income. Especially in India, Covid-19 played a huge role in decreasing community members' income. On average 93% of TROSA participants in India mentioned their income to have decreased relative to the months before the Covid-19 outbreak. In Nepal, this percentage was 22%.

Resilience

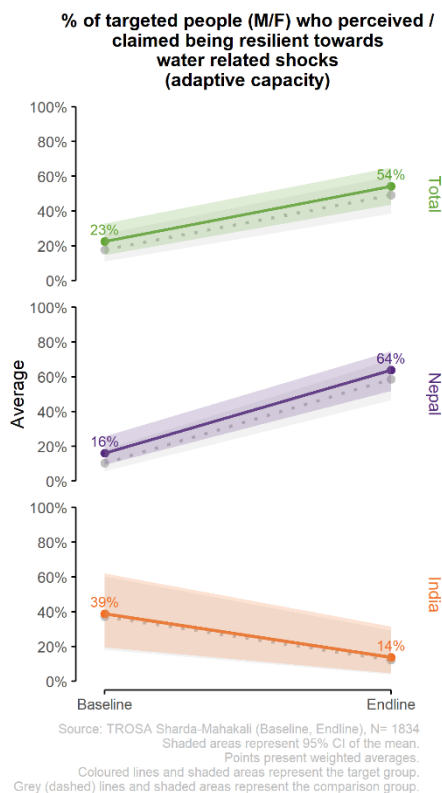
In addition to poverty reduction, an overall objective of the TROSA program was improving resilience of river basin communities to climate-related extreme events. As section 4.1 showed, river basin communities in the Sharda-Mahakali basin are increasingly exposed to floods and heavy rains. Hence, increased resilience is of utmost importance to dealing with threats posed by these shocks.

We look at two aspects of resilience: absorptive capacities and adaptive capacities. Absorptive capacity is the ability of people to deal with sudden shocks and stresses that happen occasionally. Adaptive capacity is the ability of people to make incremental changes in their lives, so they can respond to shocks better and create more flexibility for themselves (Oxfam, 2016⁸). In this study, absorptive capacity and adaptive capacity together determine communities' resilience to shocks, such as floods.

Since one of the major climate-related shocks are floods, several questions were asked related to heavy flooding and community members' ability to cope with this. Households were considered to have absorptive capacity if they would be able to cope with 1) drinking water losses, 2) erosion, 3) income losses, and 4) crop losses posed by floods. Hence, respondents were asked the extent to which coping with each of these impacts in case of flooding would be a problem. In case two or less of these four impacts would be problematic, they were considered to have absorptive capacity. In Nepal, we found positive impact of TROSA in improving communities' absorptive capacity. We found increases from 2% at the baseline to 28% at endline. In India, absorptive capacities did not change. In fact, all community members (97% at the baseline and 100% at the endline) mentioned that *all the four* losses posed by floods would be a serious problem. Hence, in India absorptive capacity was estimated to be 0% at both the baseline and the endline (since we argue at least two of the losses should not be a problem at all or only be a minor problem). The fact that absorptive capacity is very low might be related to the previous findings that many people saw their income or savings decrease. Increased poverty will likely make it more difficult to deal with sudden shocks.

⁸ Oxfam (2016). The future is a choice. The Oxfam Framework and Guidance for Resilient Development.

Figure 7



Secondly, we looked at communities’ adaptive capacity. This was estimated by whether, in the case of heavy flooding, community members would have 1) access to sufficient financial resources; 2) the ability to successfully adapt to changing threats in the future; and 3) support for recovery. Two of these conditions needed to be met in order to be resilient towards water related shocks (adaptive capacity).

A different picture emerged in Nepal and India (Figure 7). In Nepal, we saw sharp increases in community members’ adaptive capacities towards water related shocks. Where only 16% of TROSA participants were resilient at the baseline, this improved to 64% at the endline. Since this was also the case for non-participants, we could not make any strong impact claims, but it is very likely that TROSA contributed to increased adaptive capacities. In India, however, adaptive capacities of communities have decreased. At the baseline, 39% TROSA participants were estimated to have adaptive capacities to deal with floods, which was 14% at the endline. However, this finding did not

resonate with participants in the reflection workshop. In their experience, there were many examples of communities’ increased resilience towards water related shocks. One explaining factor could be the relatively recent incidence of shocks and heavy rains: in June 2021, four months before the data collection assignment, communities in Palia Kalan (India) faced heavy flooding. With this experience fresh in mind, it is likely survey respondents were more inclined to answer negatively to survey questions related to floods than in a situation where the incidence of flooding was less recent.

Lastly, related to adaptive capacity, respondents were asked whether they have learned from dealing with past floods to be able to successfully deal with future floods. We found positive impact of TROSA in improving knowledge on dealing with floods in Nepal. Knowledge levels improved from 39% at the baseline to 84% at the endline. TROSA helped to improve knowledge levels especially of women. In India, knowledge levels for both TROSA participants as well as non-participants decreased (for TROSA participants it decreased from 74% at the baseline to 37% at the endline). Again, reflection workshop participants were surprised with this result. The many activities implemented by TROSA, including capacity building and transformative leadership of women, should have led to improved knowledge levels. Furthermore, as mentioned above, it is likely that the recent incidence of flooding in Palia Kalan has influenced the negative endline results related to flooding.

4.3 PERCEPTIONS ON INSTITUTIONS (OUTCOME 1-3)

KPI #: Outcome 1-3	Total	Nepal		India			
	Total	Total	Women	Men	Total	Women	Men

Baseline-Endline data		Is there a significant effect for the target group over time? (Impact)						
Outcome 1. Government policies & practices at all levels, in water resource management are more inclusive of community concerns & meet national & international standards.								
1.6	% of targeted people (M/F) with trust in the government	=	=	=	↑**	=	=	=
1.7	% of targeted people (M/F) with external political efficacy (i.e. believing that the government cares about the community)	=	=	=	=	↓*** ⁹	↓***	=
1.8	% of targeted people (M/F) with internal political efficacy (i.e. understanding politics and governance, feeling like a full and equal citizen with rights and protections, feeling capable to change things)	=	=	=	=	↓* ¹⁰	↓***	=
Outcome 2. Practices of private sector respect community access to water resources actively contributing to reduced conflict								
2.5	% of targeted people (M/F) reporting that the private sector is responsibly dealing with river basins	=	=	=	↑**	↓***	↓**	=
Outcome 3: CSOs increasingly participate in or influence transboundary water governance, women's inclusion and resolution of water conflicts.								
3.6	% of targeted people (M/F) that trust and are supportive of civil society	=	=	=	=	na	na	na

The main focus in the endline study and corresponding survey was to measure changes in the lives of river basin communities. Other methods, like Outcome Harvesting, were used to measure progress towards outcome 1-3 (formulated at government, private sector, and civil society level). However, community members' perceptions on these institutions defines to a large extent whether the program can be successful in increasing participation in water governance. Hence, we considered trust in institutions, political efficacy, and attitudes and norms towards CSOs as key enablers or barriers to community participation in water governance.

Trust – the belief that others will not deliberately or knowingly do you harm, try their best to avoid harm, and look after your interests – is important for triggering the willingness to actively engage with institutions (Fennema and Tillie, 1999)¹¹. In both Nepal and India, community members' trust in the government increased (**Error! Reference source not found.**). In Nepal, we found positive impact of T ROSA in improving male community members' trust levels in the government. T ROSA has connected communities with the (local) government, for instance through supporting communities with generating government funds in Nepal, and through linking communities to social schemes in India. Hence, these activities likely have contributed to the improved trust levels between communities and the government.

In both countries we also see increases in community members' political efficacy (Figure 9 and Figure 10). With political efficacy we refer to a citizen's *“feeling that political and social change is possible and that the individual citizen can play a part in bringing about this change”* (Campbell, Gurin and Miller,

⁹ Even though we found 'negative impact' since the change for the comparison group is larger than the change for the target group, the change over time is positive: political efficacy improved.

¹⁰ Ibid.

¹¹ Fennema, M., & Tillie, J. (1999). Political participation and political trust in Amsterdam: civic communities and ethnic networks. *Journal of ethnic and migration studies*, 25(4), 703-726.

1954, p. 187)¹². Internal political efficacy primarily refers to the individual – the concept is about the individual’s feelings on how much impact they have specifically due to their own personal knowledge and abilities. External political efficacy is defined as political responsiveness: how an individual feels his or her government responds to his or her needs, and how well the political system and government reflect on his or her needs and concerns¹³. Increases in both internal as well as external political efficacy are especially sharp in Nepal: at the endline, nine in ten TROSA participants have internal and external political efficacy. Since political efficacy of non-participants improved as well, we could not make strong impact claims, but the sharp increases for TROSA participants do suggest positive contribution. In India we found positive increases in political efficacy as well. However, although the change over time is positive, increases are stronger for non-participants, hence we found a so-called ‘negative impact’

Figure 8

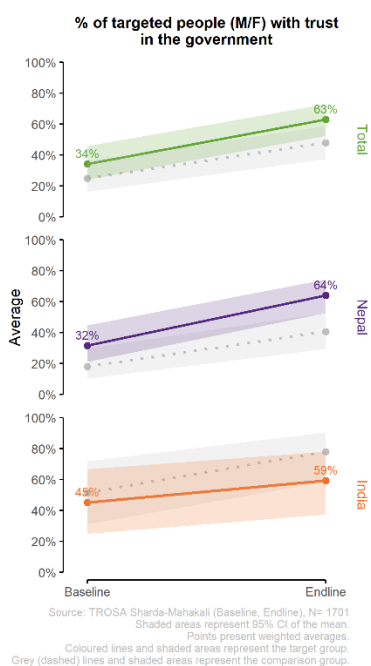


Figure 9

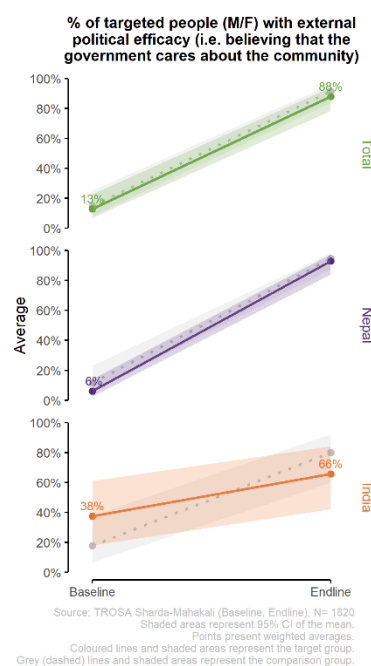
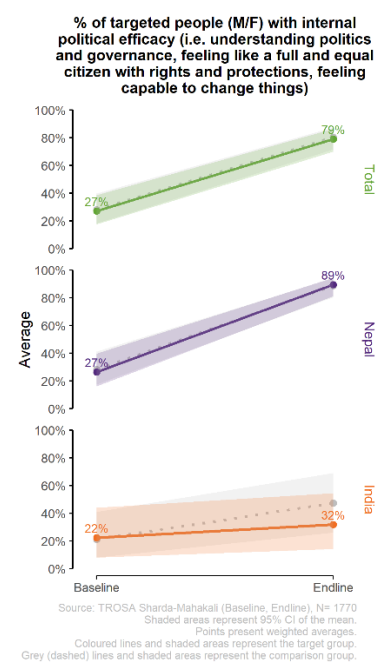


Figure 10



Related to perceptions on the private sector, respondents were asked whether the private sector is responsibly dealing with river basins. At the endline, 48% of TROSA participants in Nepal responded affirmatively (it increased from 22% at the baseline). We found positive impact of TROSA in increasing this indicator for male participants. The percentage of TROSA participants mentioning the private sector to responsibly deal with river basin is only 9% in India (it decreased from 24% at the baseline)¹⁴. For non-participants at endline the percentage is similar to the one of participants and did not change over time, hence we found so-called ‘negative impact’.

¹² Campbell, A., Gurin, G., & Miller, W. E. (1954). The voter decides.

¹³ Balch, G.I. (1974). Multiple Indicators in Survey Research: The Concept "Sense of Political Efficacy". *Political Methodology*, 1(2):1–43.

¹⁴ Note that at the baseline around half of respondents in Nepal and one in four in India answered this question with ‘I don’t know’. These responses were excluded from the analysis.

Lastly, regarding CSOs, respondents were asked whether they trust CSOs and NGOs and how they would feel if the government took measures to limit the work of NGOs that defend human rights. Both questions were combined into one indicator measuring community members' trust and support towards CSOs. In Nepal, we found positive increases in community members' trust and support towards CSOs from the baseline to the endline (it improved from 19% to 49% at the endline). Since this was also the case for non-participants, we could not make any strong impact claims, but it is very likely that TROSA – working with CSOs in its implementation – contributed to the increased levels of trust and support towards CSOs. In India the question on how community members would feel if the government took measures to limit the work of NGOs that defend human rights was excluded from the endline survey, hence we could not estimate this indicator for India. When looking at the subscale of this indicator related to trust in CSOs/NGOs, we found that trust levels have decreased (from 53% at baseline to 41% at endline).

4.4 VULNERABILITY TO WATER RELATED SHOCKS (OUTCOME 4.1)

KPI #: Outcome 4.1: local communities are better able to reduce vulnerability to water resource related shocks resulting from conflicts and disasters		Total	Nepal			India		
		Total	Total	Women	Men	Total	Women	Men
Baseline-Endline data		Is there a significant effect for the target group over time? (Impact)						
4.1.1	% of targeted people (M/F) who are aware of cross-border interdependency of having a shared base (historical, ethnical, cultural and the river), shared interests, and shared responsibilities	↑*	↑*	↑*	=	=	=	=
4.1.2	% of targeted people (M/F) taking actions to protect their key productive and physical assets to spread their risks of being affected by water shocks	↑***	↑***	↑***	↑***	↓* ¹⁵	=	↓*
4.1.3	% of targeted people (M/F) reporting to have working relationships with the government for support in water governance issues	↓**	↓*** ¹⁶	↓*	=	=	=	=
4.1.4	% of targeted people (M/F) reporting to have working relationships with CBOs for support in water governance issues	=	=	=	=	=	=	↑*
4.1.5	% of targeted people (M/F) reporting to collaborate with the local government on water governance	=	↑*	=	↑***	=	=	=
4.1.6	% of targeted people (M/F) reporting to collaborate with cross-border communities on early warning information and/or water governance	=	=	=	=	=	=	=

¹⁵ Even though we found 'negative impact' at the 10% significance level since the change for the comparison group is larger than the change for the target group, the change over time is positive: more people take preventive measures now than at the baseline.

¹⁶ Even though we found 'negative impact' since the change for the comparison group is larger than the change for the target group, the change over time is positive: working relationships with the government improved.

4.1.7	% of targeted people (M/F) who feel capable to complain about water management problems and who are confident that complaints will be heard	↓***	↓*** ¹⁷	↓***	↓**	=	↑*	=
4.1.8	% of targeted people (M/F/youth), who have conflicts with local government or cross-border communities, who regularly participate in water conflict resolution and/or governance mechanisms	=	=	=	=	=	=	↑*

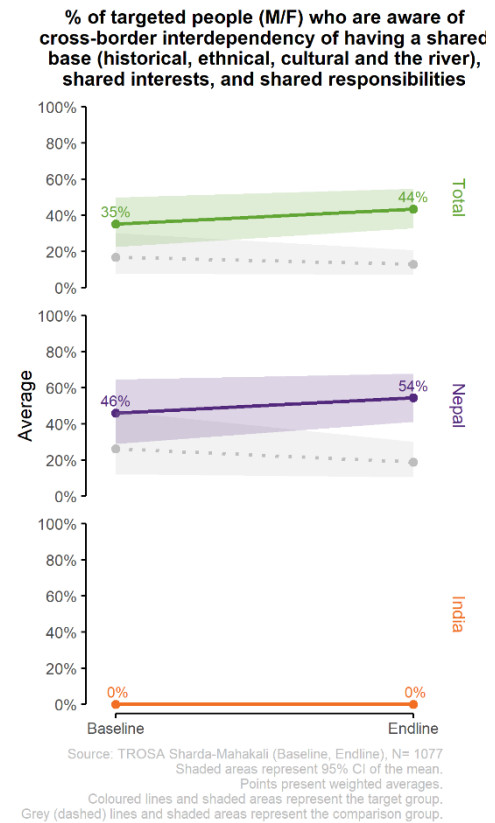
Awareness of cross-border interdependency

At the base of the TROSA's ToC lies understanding of the water related context, including that water rights are shared with cross-border communities. That is, sustainable water governance starts with the recognition by all stakeholders that rivers are shared. We analysed awareness of cross-border interdependency by asking respondents whether they feel that river basins are 1) a common interest of communities and cross-border communities; 2) a common responsibility of communities and cross-border communities; and 3) to what extent cross-border communities are responsibly dealing with river basins. Respondents were considered to be aware of cross-border interdependency if mentioning at least two of the three conditions (Figure 11). In Nepal, TROSA activities had a positive impact at the 10% significance level on communities' awareness of cross-border interdependency. Percentages improved from 46% at the baseline to 54% at the endline. In India, the indicator equalled zero at both the baseline and the endline. When

looking at each of the three sub-indicators individually, we found a similar picture. Only between 1-4% of TROSA participants at the endline mentioned a common interest between communities and cross-border communities, a common responsibility between communities and cross-border communities, and responsible behaviour of cross-border communities. Reflection workshop participants from both Nepal and India were very surprised with these results for India. It was mentioned that perhaps respondents had difficulty understanding the meaning of these questions, specifically 'cross-border', or things to have got lost in translation.

Indeed, on endline survey questions about having a 'transboundary-outlook', 95% of TROSA participants in Nepal agreed that their community is similar to cross-border communities in terms of cultural and/or religious traditions and practices; and 96% agreed that people from cross-border communities respect them. In India these percentages were also high: 90% and 92% respectively.

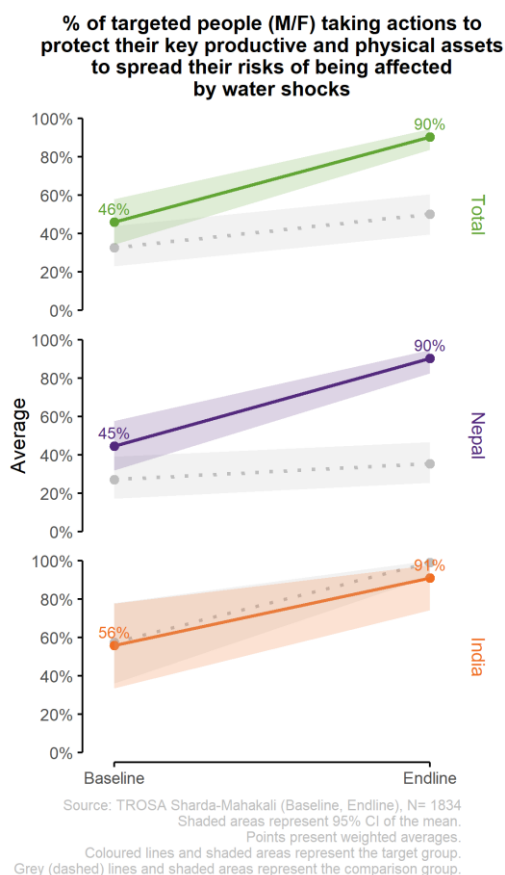
Figure 11



¹⁷ Even though we found 'negative impact' since the change for the comparison group is larger than the change for the target group, the change over time is positive: confidence to complain improved.

TROSA participants in both Nepal and India were more likely than non-participants to mention cross-border communities to respect them. The results indicate that that the results for India in Figure 11 should be interpreted with caution. More on cross-border collaboration is written below.

Figure 12



Preventive measures to spread risks of water related shocks

Households also have a role to play in mitigating water related risks. When households take preventive measures for protecting their key productive and physical assets (like land, animals, and houses), potential risks posed by water shocks can be spread. More households at the endline, compared to the situation before TROSA activities, took preventive measures to protect key productive and physical assets (Figure 12). In Nepal, we found positive impact of TROSA in mobilizing communities to take preventive measures. In India, we also found increases for non-participants, hence we could not make any strong impact claims. That said, it is very likely that in both Nepal and India the TROSA program contributed to the increase of community members that take preventive measures to protect key productive and physical assets to potential risks of water related shocks.

Collaboration on water governance

Effective collaboration with the local government, CBOs and CSOs, and cross-border communities might improve communities' involvement in water governance, and hence their vulnerability to water related shocks. Two types of indicators were constructed: 1) one representing working relationships¹⁸, and 2) representing effective collaboration¹⁹.

¹⁸ The following questions were used to estimate working relationships with the government: What are the sources your household gets information from about water issues?; Who would your household complain to if you had problems in water management?; How often is your local government consulting you about transboundary water issues?; Which sources provide your household with information through early warning systems?

The following questions were used to estimate working relationships with CBOs: What are the sources your household gets information from about water issues?; How often are CSOs consulting you about transboundary water issues?; Who would your household complain to if you had problems in water management?; Which sources provide your household with information through early warning systems?

¹⁹ The following questions were used to estimate collaboration with the government: With which statement do you agree? *My community and the local government work well together to improve the lives of households like mine*; *The local government does not understand the needs of my community*.; How often do you collaborate with your local government on the use of river basins?; How satisfied are you with the collaboration with your local government on the use of water?

In Nepal, more TROSA participants at endline mentioned to have working relationships with the government compared to the baseline (it improved from 2% to 43%). However, although working relationships with the government improved, the increase was steeper for non-participants, so we found 'negative impact'. In India, working relationships between communities and the government became less frequent. We found a downward trend from 38% at the baseline to 11% at the endline. In terms of working relationships with CBOs, many more TROSA participants in Nepal have working relationships with CBOs at the endline compared to the baseline (it improved from 10% to 80%). However, since it also improved for non-participants, we could not make strong impact claims. In India, working relationships between communities and CBOs improved as well (from 9% at the baseline to 15% at the endline). Especially with regards to women, more female TROSA participants compared to female non-participants mentioned improved working relationships with CBOs. Overall, given that working relationships between TROSA communities and CBOs improved in both Nepal and India, it is likely TROSA had a contributing role in improving these in both countries.

In terms of collaboration (Figure 13 and Figure 14), in Nepal we found positive impact of TROSA at the 10% significance level on improving effective collaboration between communities and the local government (it improved from 26% at the baseline to 89% at the endline). As was also mentioned in the previous section, TROSA in Nepal for instance supported communities in applying for government funds, implementing water governance activities, and reporting the results back to the government. These activities demonstrate improved collaboration between communities and the government. Furthermore, in Nepal TROSA contributed to improved effective collaboration between communities and cross-border communities (from 13% at the baseline to 73% at the endline) but based on the data we could not make strong impact claims for this indicator. In India, collaboration between communities and the local government became less frequent and effective (it moved from 35% at the baseline to 6% at the endline). This was a surprising result, since TROSA in India for instance successfully worked together with the local government in setting up a community institution (VWMC) for addressing community water issues and challenges. Through the VWMC, Water User Group (WUG) and Village Development Management Committee (VDMC), communities for instance collaborated with local government representatives to formulate GDPDs. Hence, according to reflection workshop participants collaboration between communities and the local government should have been improved. Collaboration between communities and cross-border communities improved from the baseline to the endline (from 15% to 44%). Since collaboration also improved for non-participants, we could not make strong impact claims, but it is likely that TROSA in India contributed to improved collaboration between communities and cross-border communities. All in all, reflection workshop participants agreed with improved collaboration between communities and cross-border communities in both Nepal and India.

The following questions were used to estimate collaboration with cross-border communities: How often do you share Early Warning Information on floods/disasters with cross-border communities?; How often do you get Early Warning Information on floods/disasters from cross-border communities?; How often do you collaborate with cross-border communities on the use of river basins?; How satisfied are you with the collaboration with cross-border communities on the use of water?

However, in their experience collaboration should even have reached 100% because of the many activities that were implemented under TROSA to improve cross-border collaboration (for instance the setting-up of cross-border committees)^{20, 21}. The fact that percentages for cross-border collaboration are higher in Nepal than India might be explained by the flow of information: generally early warning information is shared from up- to downstream. Hence, communities in Nepal are generally on the sending end of the information channel, while communities in India are on the receiving end.

Figure 13

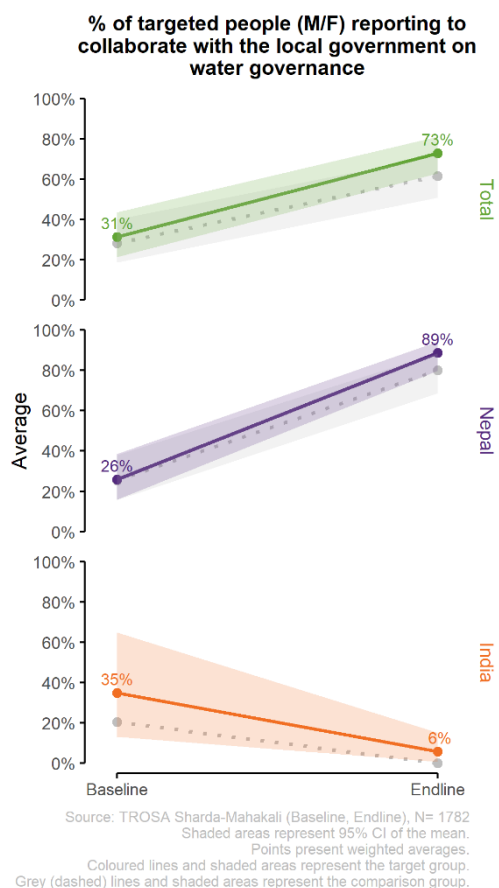
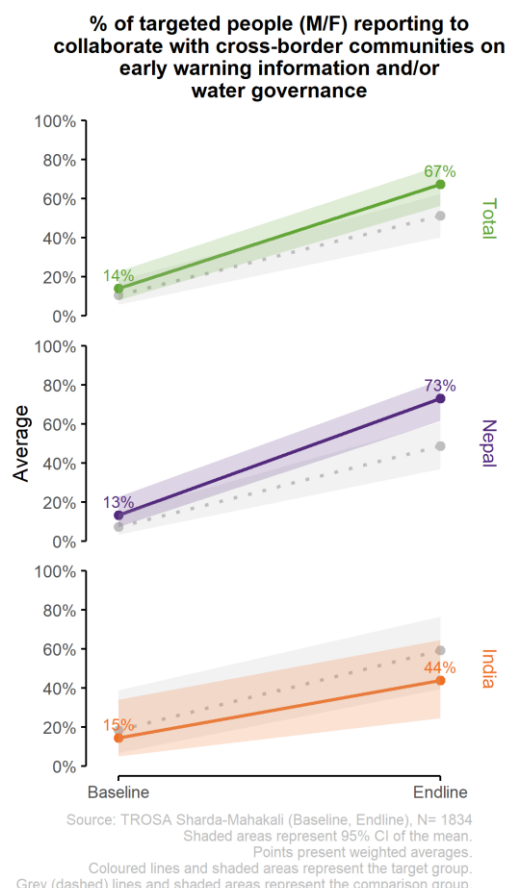


Figure 14



Feeling capable to complain

Part of active and effective involvement in water governance is standing up for one's rights related to water. Therefore, respondents were asked several questions about their ability to lodge complaints about water governance and whether they feel something was done with their input²². At the endline,

²⁰ Another indicator measured how often communities interact with cross-border communities. Significantly more TROSA participants in Nepal do compared to non-participants. In India, percentages are similar for TROSA participants and non-participants.

²¹ It should be mentioned that there is the possibility that survey respondents were not (only) referring to TROSA cross-border communities when interpreting this question.

²² The three survey questions used for this indicator include:

- To what extent does your household feel capable to complain about water management problems if you face such problems?
- Is your household confident that your complaints will be heard?
- Is your household confident that your community's concerns/proposals will be heard?

respondents most often filed complaints with the local government (59% of TROSA participants in Nepal; 63% of TROSA participants in India). In Nepal, more TROSA participants now than at the baseline felt capable to complain and were confident that complaints were heard (it improved from 29% at the baseline to 63% at the endline). However, although confidence to complain improved, increases were steeper for non-participants than for participants, hence we found 'negative impact'. In India, community members felt less capable to complain and were confident that complaints were heard now than at the baseline (it decreased from 64% at the baseline to 33% at the endline). The decrease was also found for non-participants.

Conflicts

The majority of TROSA participants in both Nepal and India indicate to *not* have regular conflicts with the local government (74% in Nepal; 85% in India; Figure 15). In Nepal, we found positive impact of TROSA in reducing the incidence of conflicts with the local government. In India, however, more TROSA participants at the endline mentioned at least sometimes have conflicts with the local government as compared to the baseline. This trend we also found for non-participants.

In terms of conflicts with cross-border communities, again most TROSA participants in both Nepal and India indicated *not* to have them (89% in Nepal; 63% in India; Figure 16). Again, in Nepal we found positive impact of TROSA in reducing the incidence of conflicts with cross-border communities. In India, the incidence of conflicts with cross-border communities increased slightly from the baseline to the endline. Reflection workshop participants were surprised with this result. In their experience, TROSA activities along both sides of the river strengthened the collaboration between cross-border communities (see also Figure 14) and hence they would have expected a reduction in the incidence of conflicts, similar as found in the results for Nepal. Since the survey question on conflicts did not explicitly refer to cross-border communities that were engaged by TROSA activities, the term 'cross-border communities' was left to own interpretation of respondents. Hence, it is possible that the territory contentions between Nepal and India about Palia Kalan district²³, which had an uplift in 2019, have influenced the results to this question. However, in this case it is still surprising the trend in the results for this question to be in a different direction in both Nepal and India.

Respondents who had at least sometimes experienced conflicts with either the local government or cross-border communities were asked whether they participated in conflict resolution and/or grievance mechanisms (Figure 17). In Nepal, more TROSA participants at the endline participated in conflict resolution and/or grievance mechanisms as compared to the baseline. In India the situation was the

²³ ANI News (2021). <https://www.aninews.in/news/world/asia/nepal-pm-oli-says-condition-of-november-elections-in-limpiyadhura-lipulekh-kalapani-junction-unfavourable20210527224312/>

The Hindu (2021). <https://www.thehindu.com/news/international/will-take-back-kalapani-limpiyadhura-lipulekh-from-india-through-dialogue-if-cpn-uml-comes-back-to-power-oli/article37715899.ece>

The Print (2019). <https://theprint.in/theprint-essential/why-kalapani-is-a-bone-of-contention-between-india-and-nepal/317926/>

Times of India (2020). <https://timesofindia.indiatimes.com/city/dehradun/how-kali-river-divides-as-well-as-unites-india-nepal/articleshow/76124338.cms>

other way around: at the endline the percentage of TROSA participants who participated in conflict resolution and/or grievance mechanisms had decreased. In both Nepal and India, we could not make strong impact claims.

Figure 15

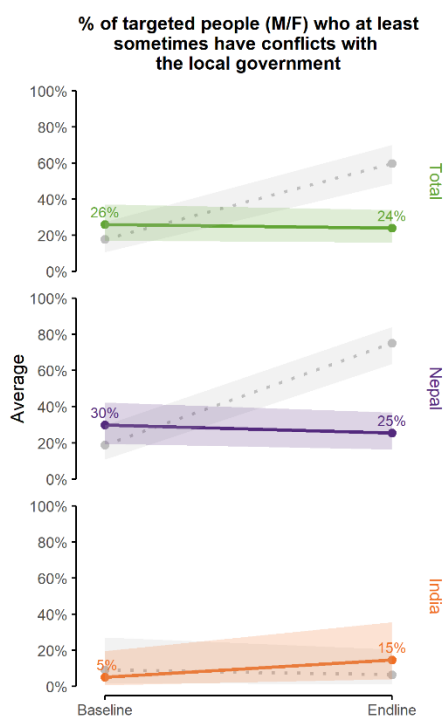


Figure 16

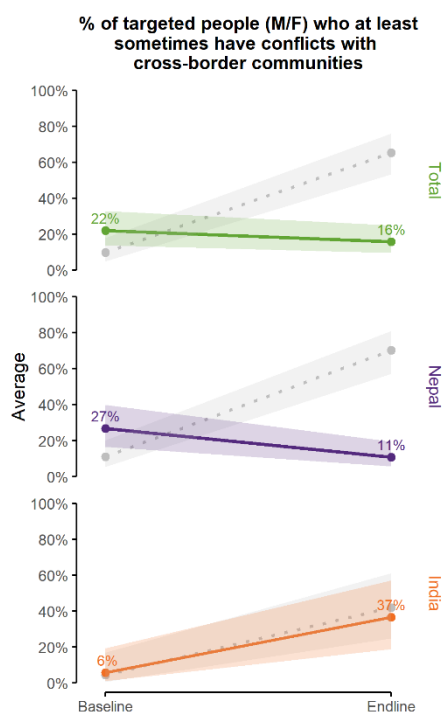
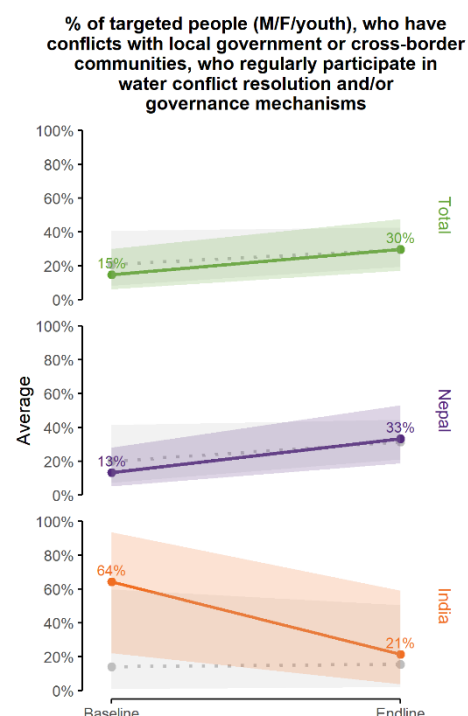


Figure 17



Source: TROSA Sharda-Mahakali (Baseline, Endline), N= 1834
Shaded areas represent 95% CI of the mean.
Points present weighted averages.
Coloured lines and shaded areas represent the target group.
Grey (dashed) lines and shaded areas represent the comparison group.

Source: TROSA Sharda-Mahakali (Baseline, Endline), N= 1834
Shaded areas represent 95% CI of the mean.
Points present weighted averages.
Coloured lines and shaded areas represent the target group.
Grey (dashed) lines and shaded areas represent the comparison group.

Source: TROSA Sharda-Mahakali (Baseline, Endline), N= 718
Shaded areas represent 95% CI of the mean.
Points present weighted averages.
Coloured lines and shaded areas represent the target group.
Grey (dashed) lines and shaded areas represent the comparison group.

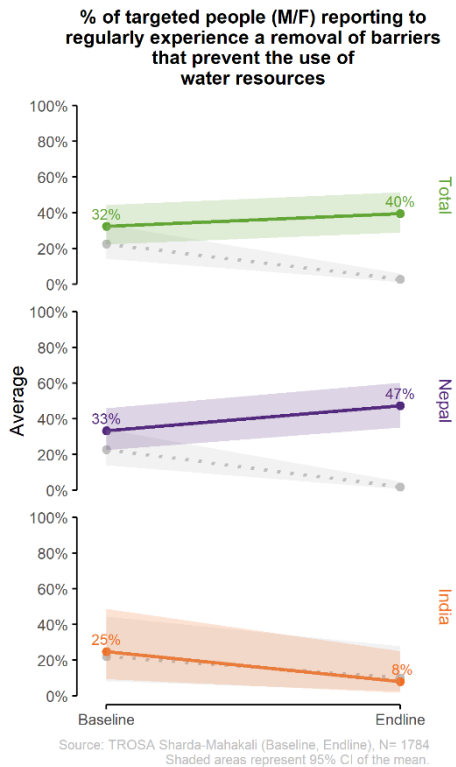
4.5 ACCESS AND CONTROL OVER WATER RESOURCES (OUTCOME 4.2)

KPI #: Outcome 4.2: Local communities have more secure access and control over their water resources		Total		Nepal		India		
		Total	Total	Women	Men	Total	Women	Men
Baseline-Endline data		Is there a significant effect for the target group over time? (Impact)						
4.2.1	% of targeted people (M/F) reporting to complain to private sector if they had problems in water management and/or to regularly experience a removal of barriers that prevent the use of water resources	↑***	↑***	↑***	↑***	=	=	=
	Sub indicator: % of targeted people (M/F) reporting to complain to the private sector if they had problems in water management	↑***	↑***	↑***	↑***	na	na	na
	Sub indicator: % of targeted people (M/F) reporting to regularly experience a removal of barriers that prevent the use of water resources	↑***	↑***	↑***	↑***	=	=	=
4.2.3	% of targeted people (M/F/youth) having timely access (via ICT or channels) to communication/information on floods and disasters (for both receiving and spreading information)	=	↑***	↑*	↑***	↓**	=	↓**

4.2.4	% of targeted people (M/F) with sufficient access of water for domestic usage	↑***	↑***	↑***	=	↑***	=	↑***
4.2.5	% of targeted people (M/F), who use the river for agricultural livelihood, with sufficient access of water for agricultural usage	↑***	↑***	↑***	↑***	↑**	↑*	=

Complaining to the private sector and experiencing a removal of barriers

Figure 18

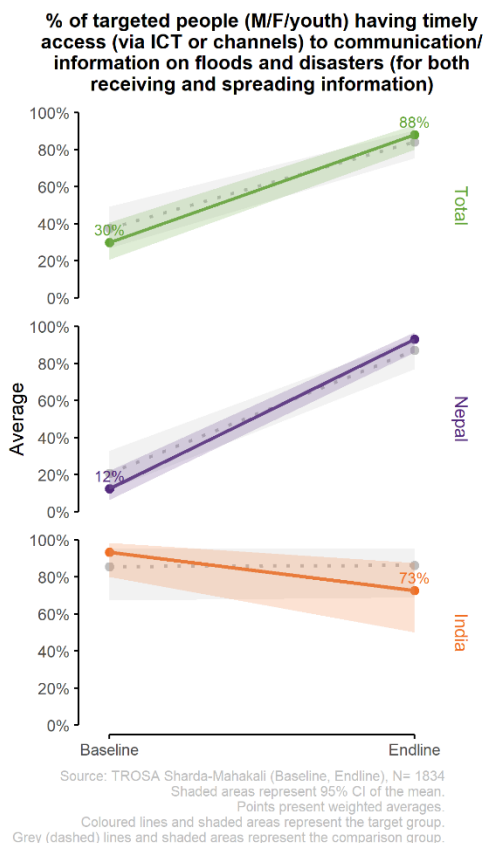


Around 25% of TROSA participants at endline in Nepal and 0% in India mentioned to complain to the private sector if they had problems in water management. TROSA significantly increased the percentage of community members in Nepal who complain to the private sector. Furthermore, in Nepal, we found positive impact of TROSA in the removal of barriers that prevent the use of water resources (Figure 18). The percentage of TROSA participants experiencing a removal of barriers improved from 33% at the baseline to 47% at the endline. In India, less people at the endline experienced a removal of barriers compared to the baseline (it decreased from 25% to 8%). This decrease was also found for non-participants.

Early warning systems

Early warning systems provide households with early warning information on risks for instance related to floods and disasters. When knowing whether floods and disasters are forecasted to occur in the near future, households can timely respond and prepare for the adverse event. This should minimize the negative impact of floods and disasters. Timely access to communication/information on floods and disasters sharply increased for river basin communities in Nepal (Figure 19). We found positive impact of TROSA in improving early warning information access in Nepal (it improved from 12% at the baseline to 93% at the endline). Examples of activities in Nepal aimed at increasing transboundary early warning information was through Early Warning Simulations. Communities, local governments, security forces, journalists, and CSOs from both Nepal and India participated in physical transboundary early warning simulations in 2019 and 2020, and virtual ones in 2021. These simulations aimed at improving early preparedness with smooth and timely flow of transboundary early warning information. In India,

Figure 19



the percentage of TROSA participants with timely access to early warning information decreased from 93% at the baseline to 73% at the endline. For non-participants it stayed stable over time, hence we found so-called 'negative impact'. However, there is some scepticism around the high baseline level: 93% of participants having access at baseline, according to program staff, seems a bit high. Also, at the endline, most TROSA participants just experienced a flood (51% in 2021 and 40% in 2020), hence people might have been a reality check on the need for timely early warning information. Since TROSA in India extensively worked on improving early warning information access, workshop participants were surprised with the result of reduced timely access. In their opinion, the EWS work ensured increased availability of early warning channels that were open for usage. For instance, the Water Governance Collective Action Network disseminated information on floods throughout the entire Sharda-Mahakali basin. The network linked volunteers, CSOs, CBOs and government stakeholders to disseminate early warning information. Also, TROSA regularly sent out hazard warnings and conducted early warning simulations to improve early preparedness of communities. Because of the many efforts of TROSA in improving early warning systems, the perceived decrease in timely access to early warning information in India could not be understood.

Availability of water for agricultural and domestic purposes

Water is essential for every form of life, for all aspects of socio-economic development, and for the maintenance of healthy ecosystems²⁴. At the endline, as also mentioned in section 4.1, three in five TROSA participants in Nepal and around half of TROSA participants in India depended on river basins for agricultural activities. In Nepal, there was an increase in the percentage of TROSA participants with sufficient access to water for agricultural use (from 2% to 54%)²⁵. In India, however, less people had sufficient access to water for agricultural usage now than at the baseline (it decreased from 44% to 20%)²⁶. In both countries, there was a decrease for communities in the comparison group, hence we found positive impact of TROSA in this indicator in both Nepal and India.

Access to water for domestic usage remained stable from the baseline to the endline (45% in Nepal; 62% in India)²⁷. Since access to water for domestic usage decreased for communities in the comparison group, we found positive impact of TROSA in this indicator in both Nepal and India. The main source of drinking water in Nepal at the endline for TROSA participants was piped water (79%); this was only 28% at the baseline. In India, at the endline, the main source of water for domestic usage was a tube

²⁴ Food and Agricultural Organization of the United Nations (2017). Water for Sustainable Food and Agriculture: A report produced for the G20 Presidency of Germany. Rome: Food and Agricultural Organization of the United Nations [FAO].

²⁵ We present percentages only for those community members who indicate their livelihood to depend on the river for agricultural purposes. Percentages represent those community members who mentioned to have sufficient water throughout the year.

²⁶ Idem.

²⁷ Percentages represent those community members who mentioned to have sufficient water throughout the year.

well or borehole (mentioned by 63% of TROSA participants)²⁸. We found positive impact of TROSA on improving drinking water quality in Nepal. In India, the quality of drinking water dropped between the baseline and the endline. That said, in both Nepal and India, there remains room for improvement in terms of drinking water quality: at the endline, 48% of TROSA participants in Nepal and 96% in India mentioned the drinking water quality to be only fair or poor. TROSA's Citizen Science approach has improving water quality through community-based water quality monitoring among its objectives²⁹.

4.6 WOMEN'S PARTICIPATION IN WATER GOVERNANCE (OUTCOME 5)

KPI #: Outcome 5: Increased participation and influence of women in transboundary water governance, policies and processes ³⁰		Total	Nepal		India			
		Total	Total	Women	Men	Total	Women	Men
Baseline-Endline data		Is there a significant effect for the target group over time? (Impact)						
5.1	% of targeted women (F) who attend meetings related to water governance in their community	=	NA	=	NA	NA	↑***	NA
5.2	% of targeted women (F) who claimed / perceived having knowledge about decision-making processes related to water governance	↑***	NA	↑***	NA	NA	↓***	NA
5.3	% of targeted women and youth (F/youth) who are willing to engage in water governance	=	NA	=	NA	NA	=	NA
5.4	% of targeted women (F) who claimed / perceived being involved and/or having influence in decision-making processes related to water governance in the community	=	NA	=	NA	NA	=	NA
	Sub indicator: % of targeted women (F) reporting to feel involved in decision-making processes related to water governance in the community	=	NA	=	NA	NA	=	NA
	Sub indicator: % of targeted women (F) reporting to have influence in community level decision-making processes related to water governance	=	NA	=	NA	NA	↓*	NA
	Sub indicator: % of targeted women (F) reporting to be involved in making important decisions in the water governance meetings they attend	=	NA	=	NA	NA	=	NA
5.5	% of targeted men (M) with attitudes that are supportive of women's leadership in water governance and/or who know how and are willing to support women's leadership	↓*** ³¹	NA	NA	=	NA	NA	↓**
Endline data only		Is there a significant effect for the target group at endline?						

²⁸ In terms of piped water, 0% of TROSA participants in India mentioned this to be their main source of water for domestic usage, compared to 11% at the endline.

²⁹ More about this can be found on these webpages: <https://asia.oxfam.org/latest/policy-paper/citizen-science-engaging-and-empowering-local-communities> and <https://wgcan.in/CitizenScience.aspx>.

³⁰ The indicators in this section are formulated for only one gender. Hence the table mentions 'Not Applicable' (NA) for the other gender.

³¹ Even though we found 'negative impact' since the change for the comparison group is larger than the change for the target group, the change over time is positive: men's attitudes towards female leadership improved.

5.6	% of targeted men (M) reporting increased time spend on childcare	Yes** (com- pari- son)	NA	NA	Yes*** (com- pari- son)	NA	NA	Yes**
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Women's participation in water governance

Access and control over water resources plays an essential role in communities living around river basins. Water access and control comes with power, and power among different community members is unevenly distributed. Especially women are not always able to benefit in the same way from water as men do. Hence, the TROSA program aimed to improve opportunities for women to meaningfully participate in decision-making around water access and control.

All female TROSA participants in Nepal and India mentioned to be willing to engage in water governance. Percentages were already high at the baseline; hence we do not see improvements in this indicator over time.

Willingness to engage in water governance translated into improved attendance rates of women in water governance meetings. In Nepal, women's attendance in meetings increased from 63% at the baseline to 94% at the endline; In India, it increased from 25% to 46% (Figure 20). In Nepal, at the endline the majority of female TROSA participants were attending CBO meetings (93%), community water management meetings (93%) and disaster risk management meetings (92%). At both the baseline and the endline, female non-participants had lower attendance rates than female TROSA participants, but they did experience a similar increase over time. Hence, we could not make strong impact claims in Nepal on women attendance in meetings, but it is very likely that TROSA contributed to these improved women's attendance rates. Workshop participants were satisfied with the results: they mentioned that the improved attendance rates of women highlight TROSA's intensive engagement on women empowerment, for instance through the Women Empowerment Centers. In India, we found positive impact of TROSA on improving women's attendance in meetings related to water governance, since for participants attendance rates increased while for non-participants they decreased. Most frequently attended types of water governance meetings by female TROSA participants at the endline were those of CBOs (32%) and community water management meetings (29%)³². All in all, the findings show that TROSA, in both Nepal and India, successfully supported women in translating their willingness to engage in water governance into action.

³² In addition, 51% of female TROSA participants at endline participated in self-help groups and 20% in Gram Sabha meetings. Since both types of meetings were not included in the baseline survey, they were not included in the construction of the participation indicators.

Figure 20

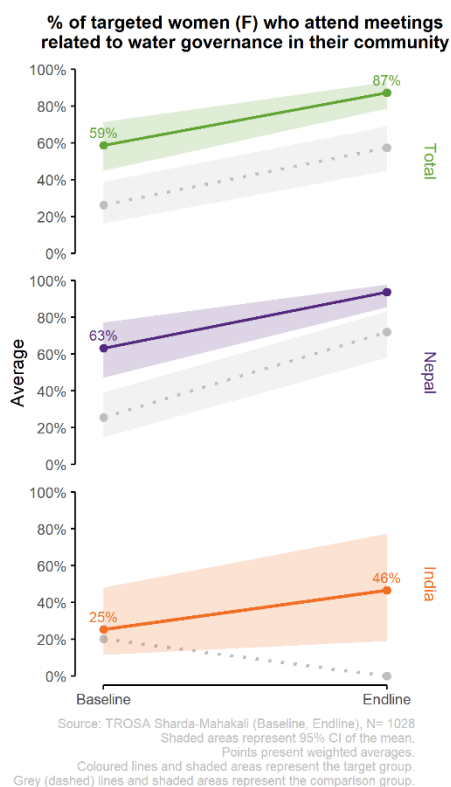
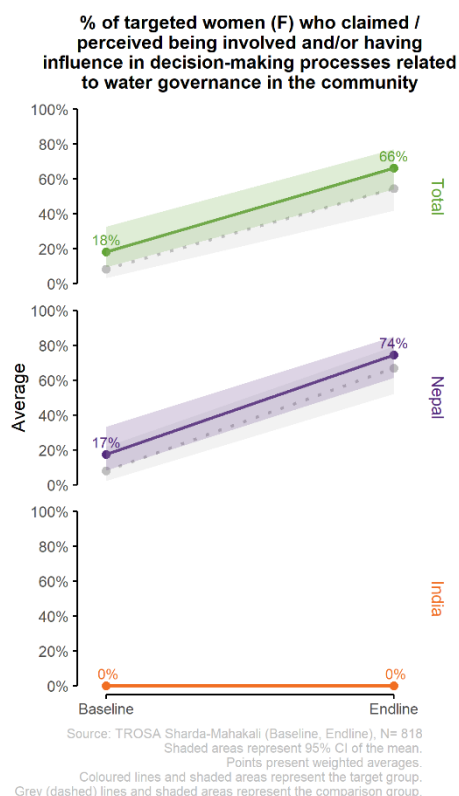


Figure 21



In Nepal, women’s perceived knowledge about decision-making processes related to water governance improved as well because of TROSA activities. Although almost no female TROSA participants at the baseline mentioned to be knowledgeable about water governance decision-making, this improved to 79% at the endline. TROSA had a key role in improving women’s knowledge on decision-making and hence we found positive impact of TROSA in this indicator in Nepal. In India, women’s knowledge on water governance decision-making decreased from 47% at the baseline to only 2% at the endline. Knowledge among non-participants decreased as well. This finding of decreased knowledge did not match with the experiences from reflection workshop participations.

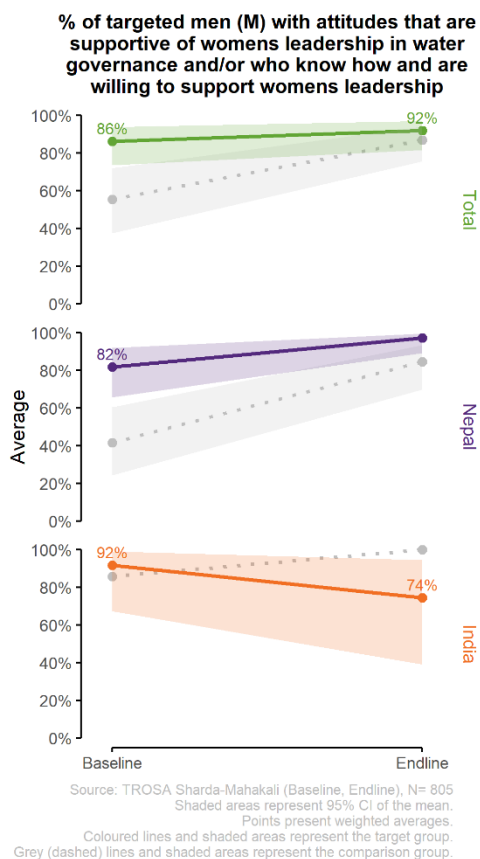
However, improved attendance and knowledge on decision-making does not necessarily translate into improved meaningful participation and decision-making power. Involvement in decision-making is estimated by 1) whether women report to feel involved in decision-making processes in the community; 2) whether women report to have influence in decision-making processes in the community; and 3) whether women report to be involved in making important decisions in the water governance meetings they attend. Where in Nepal we see increased involvement of women in decision-making (from 10% to 74%), in India female involvement in decision-making is negligible (Figure 21). When we look at the different sub indicators for India separately, we found decreased involvement (sub indicator 1) and decreased influence (sub indicator 2) for female TROSA participants from the baseline to the endline (from 37% to 5% and 51% to 7%, respectively). Women’s involvement in decision-making in the meetings they attend (sub indicator 3) was close to 0% at both the baseline and the endline. All in all, findings suggested positive contribution of TROSA on women’s involvement/influence in decision-making in Nepal, but in India women’s decision-making power was already low at the baseline and did not improve over time. It should be mentioned that the concept or understanding of ‘participation’ may

have changed from the baseline to the endline. As women were engaged in the program and improved their understanding and knowledge of certain concepts and how they can be prospective participants, they may feel as if they were participating less than they did before, even though their participation may have increased in absolute terms. Regarding the low influence levels for women in India, reflection workshop participants also mentioned the importance to interpret the findings in the context of high patriarchy. They mentioned that agency for decision-making is currently low and anecdotal in nature, hence the low influence level as estimated in the indicator was not refuted. Instead, the importance of shifting social norms was mentioned: society needs to accept that women can be equal partners in decision-making for women to start taking leadership roles and have influence in decision-making. However, changing social norms takes time and it was not a major focus of current TROSA activities – which focused more on women’s knowledge and capacity to be involved in water governance and take leadership roles. Future programs should explore a greater emphasis on social norms change and include male counterparts in women empowerment activities.

Furthermore, it was not explicitly captured in the endline survey, but reflection workshop participants in both Nepal and India mentioned the important role of women in supporting their community in many ways. For instance, through linking other (female) community members to government schemes, connecting them with CBOs, and voicing the voiceless in meetings they attend. Hence, there are many examples of improvements in terms of women’s participation in water governance (and beyond).

Men’s attitudes and behaviour towards female leadership

Figure 22



As mentioned above, positive attitudes towards women’s participation in decision-making are needed to increase participation and influence of women. The majority of male TROSA participants are supportive towards female leadership (97% in Nepal; 74% in India; Figure 22). In Nepal, attitudes were more supportive at the endline compared to the baseline. Since this was also the case for non-participants, we could not make any strong impact claims, but it is very likely that TROSA contributed to the more supportive attitudes towards female leadership in Nepal. In India, attitudes among male TROSA participants were less supportive now than at the baseline. For non-participants, on the contrary, attitudes became more supportive. Hence, we found ‘negative impact’ on this indicator for India. Reflection workshop participants did not agree with less supportive attitudes of men now as compared to the baseline. In their experience, the participation of women in activities related to water governance has increased. Given the context of India, including high patriarchy, this improved participation of women would not have been possible if men’s attitudes

about women's leadership were not supportive. That said, in both Nepal and India at the endline still the majority of male community members were supportive towards female leadership.

Lastly, in order to participate in water governance, women often lack time as they have household responsibilities including childcare. To increase participation rates of women in water governance, it is helpful if husband and wife more equally distribute child care responsibilities. Hence, we estimated the percentage of men with increased time spend on child care as compared to the situation at the baseline³³. Around 22% of male TROSA participants in Nepal increasingly spent time on child care as compared to the baseline³⁴. This percentage was higher for non-participants (67%). In India, almost all male TROSA participants increasingly spent time on child care (98%). This percentage was higher for participants than non-participants (93%). However, responses of men on this indicator might be subject to social desirability bias.

³³ This indicator considers both the time spend on childcare as reported by male respondents, as well as the responses from female respondents on their husband's time spend on childcare.

³⁴ This indicator was estimated at the endline and measures reported change relative to the baseline.

5 LEARNING QUESTIONS

In addition to analysing TROSA's impact on its formulated outcomes, we analysed the relationship between having a transboundary outlook and satisfaction with cross-border collaboration (section 5.1), as well as whether people (especially women and youth) are confident with expressing their voice towards the local government and/or other political bodies (section 5.2).

5.1 TRANSBOUNDARY OUTLOOK AND CROSS-BORDER COLLABORATION

As also mentioned in the previous chapter, TROSA has extensively worked on improving cross-border collaboration. It was believed that having a 'transboundary outlook' positively influences cross-border collaboration. Here, transboundary outlook is estimated by perceived similarity in terms of cultural and/or religious traditions and practices between communities and cross-border communities, and perceived respect by cross-border communities. As also mentioned in section 4.4, most respondents at endline had a transboundary outlook. TROSA participants in both Nepal and India were more likely than non-participants to mention cross-border communities to respect them. We did not find a significant difference between TROSA participants and non-participants in terms of their perceived similarity between communities and cross-border communities.

Then, we looked at the relationship between transboundary outlook and frequency of collaboration with cross-border communities on the use of river basins. We found a positive and significant relationship between having a transboundary outlook and frequency of cross-border collaboration. This means that people with a transboundary outlook more often collaborate with cross-border communities, compared to people who don't have this transboundary outlook³⁵.

Lastly, we analysed the relationship between having a transboundary outlook and the level of satisfaction with collaboration with cross-border communities on the use of river basins. Again, we found a positive and significant relationship between having a transboundary outlook and being satisfied with cross-border collaboration. Hence, when people have a transboundary outlook, they are more likely to be satisfied with cross-border collaboration, then when they would have a more in-country focus³⁶.

We concluded that there is a two-way cycle in which having a transboundary outlook and satisfaction with cross-border collaboration interact. On the one hand, people with a transboundary outlook more often collaborate with cross-border communities, and this is increasing their satisfaction with cross-

³⁵ This is also true for the other way around: people who frequently collaborate with cross-border communities are more likely to have a transboundary outlook, compared to people who don't frequently collaborate with cross-border communities.

³⁶ Again, this is also true for the other way around: people who are satisfied with cross-border collaboration are more likely to have a transboundary outlook, compared to people who are not satisfied with cross-border collaboration.

border collaboration. On the other hand, increased satisfaction with cross-border collaboration is increasing the transboundary outlook of community members.

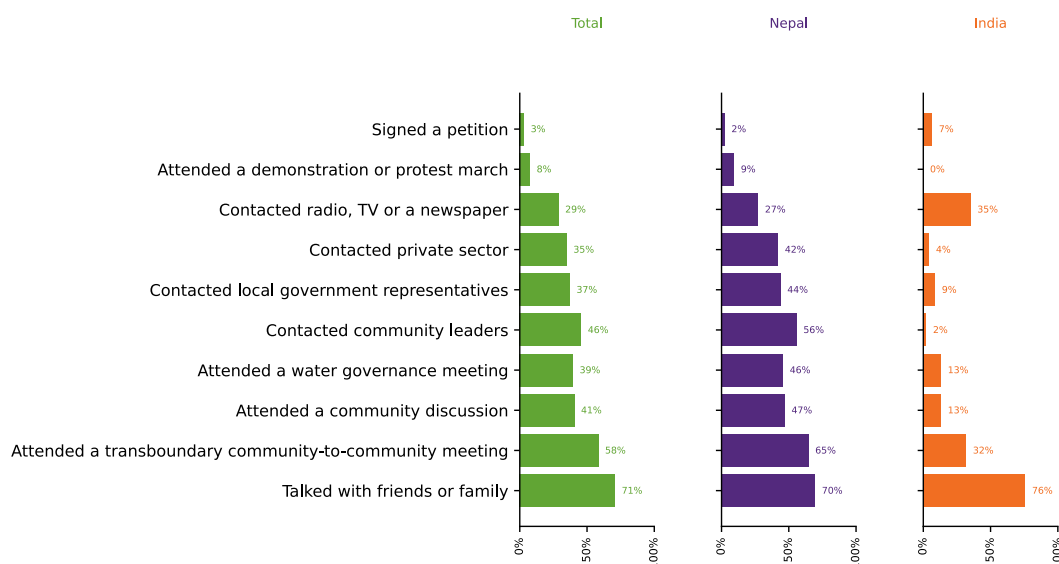
5.2 CONFIDENCE WITH EXPRESSING VOICE

Increasing citizens' voice involves citizens taking action to have their concerns heard by those who bear the duty of ensuring that human rights are respected, protected, and fulfilled (henceforth, "duty bearers"). Citizens also raise their voice when they take action to challenge the power of the state and the corporate sector to have a say in the future direction of their society. This ensures that duty bearers consult and consider the citizens to whom they are accountable.

Citizens can raise their voice in different ways and on different occasions. Hence, respondents were asked whether they, since 2018, had taken any of a wide range of civil actions to contact duty bearers and demand their rights, including online and offline actions³⁷.

Figure 23

In the past 3 years (since 2018), have you taken any of the following actions on water related issues in your community?



Source: TROSA Sharda-Mahakali Basin (Endline Target), N=476.

The most frequently mentioned form of action was talking with friends or family. The majority of TROSA participants in both Nepal and India (70% and 76% respectively) mentioned to have talked with friends and family about water related issues in the community. The next most frequently mentioned form of action was attending a transboundary community-to-community meeting (65% Nepal; 32% India). In

³⁷ The list of actions included: talking with friends or family about water related issues; attending a community discussion on water related issues; attending a transboundary community-to-community meeting on water related issues; attending a water governance meeting; contacting community leaders to raise the water related issue; contacting local government representatives to raise the water related issue; contacting private sector to raise the water related issue; contacting radio, TV or a newspaper to raise the water related issue; attending a demonstration or protest march about the water related issue; and signing a petition on the water related issue.

Nepal specially, contacting community leaders on water related issues was also a common form of action (56%). In India, a common form of action was contacting radio, television, or newspapers (35%). When it comes to expressing voice towards local government and/or other political bodies, on average 44% of TROSA participants in Nepal and 9% in India mentioned to have contacted local government representatives. In Nepal, women and men were equally likely to have contacted local government representatives (46% vs 40%). In India, women were less likely than men to have contacted local government representatives (2% vs 15%). When it comes to youth³⁸, youth and adults were equally likely to have contacted local government representatives. All in all, TROSA participants more often than non-participants have raised their voice; in general, and to local government representatives specifically³⁹. Hence, these findings suggest that TROSA successfully supported communities in speaking up about their rights and concerns.

Lastly, respondents were asked whether they feel confident to discuss water related issues with (representatives of) the local government. 91% of TROSA participants in Nepal and 58% in India responded affirmatively. In Nepal, more women indicated to be confident in expressing their voice towards the local government as compared to men (92% vs 87% respectively). In India, it was the other way around (33% vs 79% for women and men respectively). When it comes to youth, in Nepal youth and adults were equally likely to indicate to be confident to express their voice towards the local government. In India, youth were less confident to express their voice towards the local government as compared to adults (37% vs 64% respectively). All in all, in Nepal, TROSA participants were more likely than non-participants to be confident to express their voice towards the local government, indicating the likely contribution of TROSA in building the confidence of community members to express their voice.

³⁸ Someone was categorized as youth if they were 30 years or younger.

³⁹ We analyzed the relationship between treatment status and the total number of actions taken, as well as between treatment status and having contacted local government representatives.

6 CONCLUSIONS

This chapter presents the conclusions of the endline study of the TROSA program in the Sharda-Mahakali basin. The endline study has assessed to what extent the TROSA program had an impact on reduced poverty and marginalization of river basin communities (impact), communities being better able to reduce their vulnerability to water related shocks (outcome 4.1), communities having more secure access and control over water resources (outcome 4.2), and increased participation and influence of women in transboundary water governance, policies and practices (outcome 5).

In this chapter, first, each of the four evaluation questions related to TROSA's outcome areas is answered individually. Then, the two learning questions are answered. We close with an overall conclusion.

6.1 CONCLUSIONS TO EVALUATION QUESTIONS

6.1.1 TO WHAT EXTENT IS THEIR REDUCED POVERTY AND MARGINALIZATION OF RIVER BASIN COMMUNITIES, AND CAN THESE CHANGES BE ATTRIBUTED TO THE TROSA PROGRAM?

The overall aim of the TROSA program was reduced poverty and marginalization of vulnerable river basin communities. At the endline, around half (52%) of TROSA participants in Nepal mentioned at least two of these poverty reduction indicators. However, more non-participants did (69%), so we could not make strong impact claims. In India, the majority of TROSA participants mentioned decreased loans. Almost none of TROSA-participants mentioned either increased savings or increased income. This latter point reflection workshop participants thought was surprising, given that TROSA in India has implemented capacity building exercises improving awareness and access to various government schemes, and learning on how to save. It is important to mention the substantial influence of the Covid-19 pandemic on the financial situation of community members at the endline. Nine in ten TROSA participants in India, and one in five in Nepal, mentioned their income to have decreased compared to the months before the Covid-19 outbreak.

In addition to poverty reduction, an overall objective of the TROSA program was improving resilience of river basin communities to climate-related extreme events. We looked at two aspects of resilience: absorptive capacities and adaptive capacities. In Nepal, we found positive impact of TROSA in improving communities' absorptive capacity. We found increases from 1% at the baseline to 28% at endline. In India, absorptive capacities did not change. In fact, all community members mentioned that future floods would cause serious problems. Hence, in India absorptive capacity was estimated to be 0% at both the baseline and the endline. When it comes to adaptive capacities, in Nepal, we saw sharp increases in community members' adaptive capacities towards water related shocks. Where only 16% of TROSA participants were resilient at the baseline, this improved to 64% at the endline. Since this was also the case for non-participants, we could not make any strong impact claims, but it is very likely that TROSA contributed to increased adaptive capacities. In India, however, adaptive capacities of communities have decreased (from 39% at the baseline to 14% at the endline). However, this finding

did not resonate with participants in the reflection workshop. In their experience, there were many examples of communities' increased resilience towards water related shocks.

Lastly, we found positive impact of TROSA in Nepal on improving communities' knowledge on dealing with floods. TROSA helped to improve knowledge levels especially of women. In India, knowledge levels for both TROSA participants as well as non-participants decreased (a finding which did not resonate with reflection workshop participants). Again, reflection workshop participants were surprised with this result. The many activities implemented by TROSA, including capacity building and transformative leadership of women, should have led to improved knowledge levels.

6.1.2 TO WHAT EXTENT ARE LOCAL COMMUNITIES BETTER ABLE TO REDUCE THEIR VULNERABILITY TO WATER RESOURCE RELATED SHOCKS, AND CAN THESE CHANGES BE ATTRIBUTED TO THE TROSA PROGRAM?

Sustainable water governance starts with the recognition by all stakeholders that rivers are shared. In Nepal, TROSA activities positively impacted communities' awareness of cross-border interdependency. Percentages improved from 46% at the baseline to 54% at the endline. In India, the indicator equalled zero at both the baseline and the endline. Reflection workshop participants from both Nepal and India were very surprised with these results for India. When looking at a different but related indicator on having a 'transboundary outlook', we found that the majority of TROSA participants in both Nepal and India agreed that their community is similar to cross-border communities in terms of cultural and/or religious traditions and practices, and that people from cross-border communities respect them. Hence, these findings suggest that the zero level of awareness of cross-border interdependency in India should be interpreted with caution.

When households take preventive measures for protecting their key productive and physical assets (like land, animals, and houses), potential risks posed by water shocks can be spread. More households at the endline, compared to the situation before TROSA activities, took preventive measures to protect key productive and physical assets. In Nepal, we found positive impact of TROSA in mobilizing communities to take preventive measures. In India, we also found increases for non-participants, hence we could not make any strong impact claims. That said, it is very likely that in both Nepal and India the TROSA program contributed to the increase of community members that take preventive measures to protect key productive and physical assets to potential risks of water related shocks.

Effective collaboration with the local government, CBOs and CSOs, and cross-border communities might improve communities' involvement in water governance, and hence their vulnerability to water related shocks. In Nepal we found positive impact of TROSA on improving effective collaboration between communities and the local government. Furthermore, in Nepal TROSA contributed to improved effective collaboration between communities and cross-border but based on the data we could not make strong impact claims for this indicator. In India, collaboration between communities and the local government became less frequent and effective. This was a surprising result, since TROSA in India for instance successfully worked together with the local government in setting up a community institution (VWMC) for addressing community water issues and challenges. Collaboration between communities and cross-border communities improved from the baseline to the endline. Since collaboration also improved for non-participants, we could not make strong impact claims, but it is likely that TROSA in India contributed to improved collaboration between communities and cross-border communities.

Part of active and effective involvement in water governance is standing up for one's rights related to water. In Nepal, more TROSA participants now than at the baseline felt capable to complain and were confident that complaints were heard. However, although the capacity to complain improved, increases were steeper for non-participants, hence we found 'negative impact'. In India, community members felt less capable to complain and were confident that complaints were heard now than at the baseline. The decrease was also found for non-participants.

Lastly, the majority of TROSA participants in both Nepal and India indicate to *not* have regular conflicts with the local government. In Nepal, we found positive impact of TROSA in reducing the incidence of conflicts with the local government. In India, however, more TROSA participants at the endline mentioned at least sometimes have conflicts with the local government as compared to the baseline. This trend we also found for non-participants. In terms of conflicts with cross-border communities, again most TROSA participants in both Nepal and India indicated *not* to have them. Again, in Nepal we found positive impact of TROSA in reducing the incidence of conflicts with cross-border communities. In India, the incidence of conflicts with cross-border communities increased slightly from the baseline to the endline. Reflection workshop participants were surprised with this result. In their experience, TROSA activities along both sides of the river strengthened the collaboration between cross-border communities and hence they would have expected a reduction in the incidence of conflicts, similar as found in the results for Nepal. At the endline, one in three TROSA participants experiencing conflicts in Nepal and one in five in India mentioned to participate in conflict resolution and/or grievance mechanisms.

6.1.3 TO WHAT EXTENT HAVE LOCAL COMMUNITIES MORE SECURE ACCESS AND CONTROL OVER WATER RESOURCES, AND CAN THESE CHANGES BE ATTRIBUTED TO THE TROSA PROGRAM?

Early warning systems provide households with early warning information on risks for instance related to floods and disasters. When knowing whether floods and disasters are forecasted to occur in the near future, households can timely respond and prepare for the adverse event. This should minimize the negative impact of floods and disasters. Timely access to communication/information on floods and disasters sharply increased for river basin communities in Nepal; TROSA positively impacted timely early warning information access in Nepal. In India, the percentage of TROSA participants with timely access to early warning information decreased from 93% at the baseline to 73% at the endline. Since TROSA in India extensively worked on improving early warning information access, for instance through the Water Governance Collective Action Network and by implementing early warning simulations, this perceived decrease in timely access to early warning information in India could not be understood.

In terms of availability of water for agricultural and domestic purposes, in both Nepal and India TROSA positively impacted the availability of water for agricultural purposes. Access to water for domestic usage remained stable from the baseline to the endline. Since access to water for domestic usage decreased for communities in the comparison group, we found positive impact of TROSA in this indicator in both Nepal and India. Lastly, in Nepal TROSA also positively impacted the quality of drinking water. In India, the quality of drinking water dropped between the baseline and the endline. That said, in both countries, there remains room for improvement in terms of drinking water quality: at the endline,

48% of TROSA participants in Nepal and 96% in India mentioned the drinking water quality to be only fair or poor.

6.1.4 TO WHAT EXTENT IS THEIR INCREASED PARTICIPATION AND INFLUENCE OF WOMEN IN TRANSBOUNDARY WATER GOVERNANCE, POLICIES AND PRACTICES, AND CAN THESE CHANGES BE ATTRIBUTED TO THE TROSA PROGRAM?

Access and control over water resources plays an essential role in communities living around river basins. Water access and control comes with power, and power among different community members is unevenly distributed. Especially women are not always able to benefit in the same way from water as men do. Hence, the TROSA program aimed to improve opportunities for women to meaningfully participate in decision-making around water access and control. All female TROSA participants in Nepal and India mentioned to be willing to engage in water governance. Percentages were already high at the baseline; hence we do not see improvements in this indicator over time.

Willingness to engage in water governance translated into improved attendance rates of women in water governance meetings. In Nepal, at both the baseline and the endline, female non-participants had lower attendance rates than female TROSA participants, but they did experience a similar increase over time. Hence, we could not make strong impact claims in Nepal on women attendance in meetings, but it is very likely that TROSA contributed to these improved women's attendance rates. In India, we found positive impact of TROSA on improving women's attendance in meetings related to water governance.

Furthermore, in Nepal, TROSA positively impacted women's perceived knowledge about decision-making processes related to water governance. In India, women's knowledge on water governance decision-making decreased from the baseline to the endline. Knowledge among non-participants decreased as well. This finding of decreased knowledge for both participants and non-participants did not match with the experiences from reflection workshop participations.

Improved attendance and knowledge on decision-making does not necessarily translate into improved meaningful participation and decision-making power. Findings suggested positive contribution of TROSA on women's involvement/influence in decision-making in Nepal, but in India women's decision-making power was already low at the baseline and did not improve over time. Regarding the low influence levels for women in India, it should be mentioned that the concept or understanding of 'participation' may have changed from the baseline to the endline. As women were engaged in the program and improved their understanding and knowledge of certain concepts and how they can be prospective participants, they may feel as if they were participating less than they did before, even though their participation may have increased in absolute terms. Also, reflection workshop participants mentioned the importance to interpret the findings for India in the context of high patriarchy. Society first needs to accept that women can be equal partners in decision-making for women to start taking leadership roles and have influence in decision-making. However, changing social norms takes time and future programs should explore a greater emphasis on social norms change and include male counterparts in women empowerment activities.

Hence, positive attitudes towards women's participation in decision-making are needed to increase participation and influence of women. In both Nepal and India, at the endline most male community

members were supportive towards female leadership. In Nepal, male attitudes towards female leadership were more supportive at the endline compared to the baseline. Since this was also the case for non-participants, we could not make any strong impact claims, but it is very likely that TROSA contributed to these more supportive attitudes in Nepal. In India, attitudes among male TROSA participants were less supportive now than at the baseline. For non-participants, on the contrary, attitudes became more supportive. Hence, we found 'negative impact' on this indicator for India. Reflection workshop participants did not agree with less supportive attitudes of men now as compared to the baseline. In their experience, the participation of women in activities related to water governance has increased. Given the context of India, including high patriarchy, this improved participation of women would not have been possible if men's attitudes about women's leadership were not supportive.

6.2 CONCLUSIONS TO LEARNING QUESTIONS

6.2.1 TO WHAT EXTENT ARE PEOPLE WITH A TRANSBOUNDARY OUTLOOK MORE POSITIVE ABOUT CROSS-BORDER COLLABORATION COMPARED TO PEOPLE WITH A MORE IN-COUNTRY FOCUS? AND TO WHAT EXTENT IS THE LEVEL OF TRANSBOUNDARY OUTLOOK DIFFERENT FOR TROSA PARTICIPANTS COMPARED TO NON-TROSA PARTICIPANTS?

TROSA has extensively worked on improving cross-border collaboration. Most respondents at endline had a transboundary outlook. TROSA participants in both Nepal and India were more likely than non-participants to mention cross-border communities to respect them. We did not find a significant difference between TROSA participants and non-participants in terms of their perceived similarity between communities and cross-border communities.

In terms of the relationship between having a transboundary outlook and frequency of and satisfaction with cross-border collaboration, we found that people with a transboundary outlook more often collaborate with cross-border communities and more often are satisfied with cross-border collaboration, compared to people who don't have this transboundary outlook.

We concluded that there is a two-way cycle in which having a transboundary outlook and satisfaction with cross-border collaboration interact. On the one hand, people with a transboundary outlook more often collaborate with cross-border communities, and this is increasing their satisfaction with cross-border collaboration. On the other hand, increased satisfaction with cross-border collaboration is increasing the transboundary outlook of community members.

6.2.2 TO WHAT EXTENT ARE PEOPLE, ESPECIALLY WOMEN AND YOUTH, CONFIDENT WITH EXPRESSING THEIR VOICE TOWARDS LOCAL GOVERNMENT AND/OR OTHER POLITICAL BODIES?

Most community members in both Nepal and India have expressed their voice on water related issues. The most frequently mentioned form of action was talking with friends and family. The next most frequently mentioned form of action was attending a transboundary community-to-community meeting. In Nepal specially, contacting community leaders on water related issues was also a common form of action. In India, a common form of action was contacting radio, television, or newspapers.

When it comes to expressing voice towards local government and/or other political bodies, on average 44% of TROSA participants in Nepal and 9% in India responded affirmatively. In Nepal, women and

men were equally likely to have contacted local government representatives. In India, women were less likely than men to have contacted local government representatives. In both Nepal and India, youth and adults were equally likely to have contacted local government representatives.

Lastly, respondents were asked whether they feel confident to discuss water related issues with (representatives of) the local government. 91% of TROSA participants in Nepal and 58% in India responded affirmatively. In Nepal, more women indicated to be confident in expressing their voice towards the local government as compared to men. In India, it was the other way around. When it comes to youth, in Nepal youth and adults were equally likely to indicate to be confident to express their voice towards the local government. In India, youth were less confident to express their voice towards the local government as compared to adults.

All in all, TROSA participants more often than non-participants have raised their voice; in general, and to local government representatives specifically. Also, TROSA participants more often than non-participants felt confident to express their voice towards the local government. Hence, these findings suggested that TROSA successfully supported communities in (building the confidence to) speaking up about their rights and concerns towards the local government.

6.3 OVERALL CONCLUSION

We found positive changes in almost all outcome areas when comparing the baseline situation to the situation at the endline. According to reflection workshop participants, most important findings were the progress made regarding women's participation in water governance (outcome 5), improved cross-border collaboration (outcome 4.1), and improved timely access to early warning information (outcome 4.2). For many of the indicators, endline levels for TROSA participants were higher than the baseline levels, indicating the likely role of TROSA in contributing to these improvements. However, for many indicators, non-participants also experienced improvements. Consequently, it is important to acknowledge possible external factors that might also have contributed to positive changes. Furthermore, the fact that TROSA is primarily an advocacy and influencing program working at multiple administrative levels might point to potential spill-over effects of TROSA activities beyond directly targeted areas. Hence, TROSA may also be (partly) responsible for the progress for non-participants.

The last two implementation years of TROSA were amidst the Covid-19 pandemic, hence the fact that we still found improvements in many outcome areas is promising.

Lastly, it should be mentioned that many of the results for the Indian side of the Sharda-Mahakali basin did not match the experience of experts in both Nepal and India. Hence, by taking a quantitative approach to the endline evaluation we have likely missed out on some of the in-depth stories of change established because of TROSA.

7 RECOMMENDATIONS FOR FUTURE PROGRAMS

Based on the insights, experiences and results presented in this report and discussed with program staff and partners, the following recommendations for future programs have been formulated. These recommendations specifically apply to the river basin communities in Nepal and India residing along the Sharda-Mahakali basin but could also be relevant for other river basin communities and for civil society sector and future programs working on water governance:

- **Acknowledge, account for, and aim to shift social norms to contribute to an enabling environment, especially for young women:** Social norms have a direct bearing on the possibilities for female leadership. Society needs to accept that women can be equal partners in decision-making for women to start taking leadership roles and have influence in decision-making. Hence, future programs should explore a greater emphasis on social norms change and should include male counterparts in women empowerment activities.
- **Include activities, like Citizen Science, to improve drinking water quality:** Around half of TROSA participants in Nepal and almost all in India mentioned the drinking water quality from the principal source to be only fair or poor. Hence, future programs should consider a component on improving drinking water quality, for instance through Citizen Science.
- **Continue community participation initiatives, up to higher administrative levels:** The TROSA program has effectively strengthened community participation in water governance. Right now, in India, community participation has mainly been taken up at the GPDP and ward level. However, future programs should continue to strengthen this participation, up to higher administrative levels like block and district. In this way, community participation is more likely to become part and parcel of water governance.
- **When working on water governance involving multiple countries, adopt a transboundary approach:** A best practice from TROSA worth sharing is the focus on basins, which are transboundary, rather than on separate countries. This basin-wise approach was adopted after two years of program implementation. By taking this basin-wise approach, an opportunity was created for different actors in different countries to learn from and inspire each other, and not the least to diminish prejudices. Findings in this endline study indicated that indeed collaborating with cross-border peers improves one's transboundary outlook. Also, activities like setting up Early Warning Systems which should ensure that messages from one community reach the (cross-border) other, are more efficiently implemented when in the design actors from both countries work together.
- **To conserve, utilize, and develop river resources, consider establishing a Transboundary Mahakali River Commission as provisioned in the Mahakali Treaty:**

Future programs should support federal and provincial levels of the government to implement a Mahakali River basin program, in consultation with concerned stakeholders (including communities). The objective is to increase communities' ownership of the river basin, and together with the government to conserve the Mahakali River.

- **Consider the sustainability of the program, even after program implementation has ended:** Future programs should consider ways in which to continue and sustain the work and progress made by TROSA. A best practice by TROSA worth sharing is the setting-up of networks, community institutions, and (cross-border) water committees, which should facilitate (cross-border) collaboration on water governance even after the program has ended.

8 ANNEX

8.1 STATISTICAL APPROACH

Assessing the impact of the TROSA program: a counterfactual approach

To assess the program's effects on each of the KPIs, we investigated to what extent the KPIs changed over time. We compared the values of the outcomes at the baseline (2018, the start of the program) with those at the endline (2021, the end of the program).

Assessing change in a KPI over time for those who participated in the program is not a robust method for assessing the impact of the program, as we are only looking at those who actually participated. The outcomes can be affected by a myriad of factors that are not in the program's sphere of influence. So, it would be inaccurate and 'unfair' to claim all changes that occurred between the baseline and the endline as evidence of the impact of the program.

A more reasonable and accurate method would be to ask ourselves the question, "What would have happened in the absence of the program?" in addition to describing what has happened to the program participants. In order to arrive at a reasonable estimate of the effects of the program on a KPI, one would need to compare the change over time for a group of people who participated in the program's activities with the change over time in a situation where the program was not implemented. Both groups operate in the same context, but the only difference between them is whether they participated in the program's activities. This is a so-called counterfactual approach – comparing changes over time among a group of people who participated in the program with changes over time in a similar group of people who have not participated in the program. This comparison group consisted of people living in areas where TROSA did not work.

We then compare the changes over time for a KPI in the target group with the change over time for the same KPI in the comparison group. We can then assess the program's impact as we have a decent understanding of what would have happened when the program was not implemented.

Estimating attributable impact: analysing differences over time

Our analyses estimate the value of each outcome indicator, for instance, timely access to early warning information (measured through a set of survey questions). The average level of timely access to early warning information is then estimated at the baseline and the endline for both the comparison and target groups. We can determine the trend or change over time for the target and comparison groups with these four estimates. We can then see whether people's level of timely access to early warning information increased or decreased over time for the target group. Similarly, for the comparison group, we can see how people's level of timely access to early warning information has developed over time, without any program activities being implemented.

The expectation is that people's level of timely access to early warning information would improve over the program duration for the target group. The supposed increase in timely access to early warning

information, or 'growth', for the target group is calculated by taking the baseline values of this and subtracting them from the corresponding endline values. This is called the first-order difference.

Similarly, we assess the change among non-participants. Indeed, there might have been changes in the level of timely access to early warning information unrelated to the program. If we also find an increase in the level of timely access to early warning information in this comparison group, the changes cannot be attributed to the program as there have not been any program activities with people in the comparison group.

For an accurate judgement of the program's impact, we need to compare the change over time in the comparison group with the change over time in the target group. If the change over time in the target group is bigger than the change over time in the comparison group, the program has had an attributable impact. So, in this example, if the increase in people's level of timely access to early warning information in the target group is bigger than the increase in timely access to early warning information observed in the comparison group, one may speak of positive, attributable impact. This technique is called a difference-in-difference estimation⁴⁰. An important assumption of difference-in-difference estimation is that program participants and non-program participants are exposed to similar external shocks. This is the so-called parallel trends assumption.

To assess changes over time in any outcome indicator, one would ideally want to interview the same people at each survey round to accurately assess changes over time (collect panel data). For Nepal, we interviewed the same person in the baseline and the endline for 71% of respondents. For India, this was 82%. However, although we have panel data for most respondents, we would have to drop the data of 530 respondents if moving ahead with the panel. Hence, we decided to implement a repeated cross-sections model as primary estimation model and implement the panel model as robustness check. Both models yielded more or less similar results, confirming our decision to move ahead with the repeated cross-sections model using all respondents.

Matching: ensuring the comparability of the target and comparison group

As well as incorporating a comparison group in our design and using a difference-in-difference technique, we also know that it is likely that the target and comparison groups are not directly comparable. They may differ systematically for a range of characteristics at the baseline. For instance, the targeted communities might be more impoverished or be less well educated than those in the comparison group as programs choose to implement their activities among marginalized groups. Thus, it is likely that some socio-demographic characteristics influence whether the program targets a household or community.

Moreover, socio-demographic characteristics, such as age, might also influence our KPIs. In econometric terms, this means that both the probability of participating in the program's activities and the outcomes may be affected by pre-existing differences between the target and comparison groups.

⁴⁰ Athey, S., & Imbens, G. W. (2017). The state of applied econometrics: Causality and policy evaluation. *Journal of Economic Perspectives*, 31(2), p. 3-32.

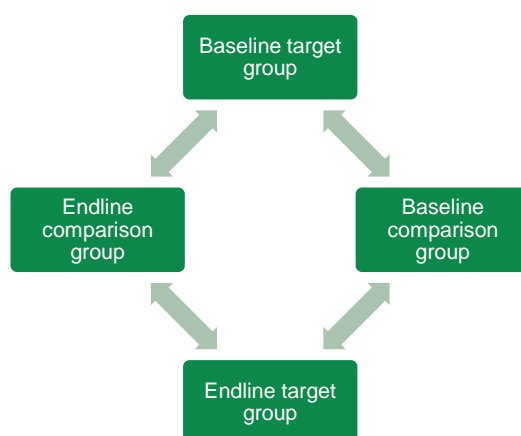
The probability of participating in the program activities is called the propensity score. This probability is not equal for all young people and is unknown⁴¹.

We use this propensity score to reduce incomparability between the target and comparison groups in two stages. This technique is called propensity score matching. In the first stage, we calculate the propensity score to select or match a comparison group similar to the target group based on a set of mostly demographic determinants. In the second stage, we estimate our impacts using these matched target and comparison groups.

Calculating propensity scores

We have implemented propensity score matching using a multinomial logistic regression, where each person is given a weighting based on the characteristics used in the matching model⁴². This weighting is expressed as a proportion of closeness between a subject in the baseline target group, baseline comparison group, endline comparison group, and the endline target group. By estimating a propensity score weight using multinomial logistic regression, we ensured that the target and comparison groups of the baseline and the endline were comparable and balanced while still employing a large share of the sample that we had collected. This is illustrated in the diagram below.

Figure 24



A range of characteristics was considered to be included in this multinomial logistic regression. Covariates include gender, literacy, and education. Subsequently, when calculating the average values for the outcome indicator, each person was given a weighting, so that closer and better matches, thus more comparable people, had a greater influence on this average compared to worse matches.

Matched differences over time

⁴¹ Compare this to a situation where participation in the program would be determined by a coin toss (a randomized experiment). In this case, participation in the program would be solely determined by chance, not by any pre-existing characteristics of the people that (intend to) participate in the program. In this case the propensity score (the probability of being in the target group) would be known and equal to 0.5

⁴² Stuart, E.A., Huskamp, H.A., Duckworth, K. et al. (2014). Using propensity scores in difference-in-differences models to estimate the effects of a policy change. *Health Services and Outcomes Research Methodology*, 14(4), p. 166–182.

In the analyses, we combined the weights from the multinomial logistic regression with the difference-in-difference-approach as outlined in the previous section. In the difference-in-difference model, we controlled for age, gender, literacy, education, marital status and the interaction between education and time, and literacy and time. This is to further reduce any potential influence of factors other than participation in the TROSA program.

We used the statistical software STATA for data cleaning and analysis. We have used STATA's STATA's MLOGIT package to estimate the weights and STATA's REGRESS and PROBIT packages to estimate the weighted-difference-in-difference analyses. STATA's PREDICT command was used to estimate predicted values of the estimation sample. We also used various Python and R packages to visualize these parameters.

8.2 DETAILS OF THE SAMPLE

Administrative						Baseline			Endline					
Country	State	District	Municipality	Village	Treatment status	Total	Men	Women	Total	Men	Women			
Nepal	-	Kanchanpur	Bheemdatta	<i>Not available</i>	Target	66	32	34	68	27	41			
			Mahakali Kanchanpur		Target	16	8	8	16	7	9			
		Baitadi	Pancheshor		Target	61	37	24	61	18	43			
			Shivanaath		Target	30	0	30	32	0	32			
			Dashrathchand		Target	98	24	74	99	25	74			
		Darchula	Mahakali Daarchulaa		Target	27	11	16	29	13	16			
			Maalikarjun		Target	15	7	8	12	6	6			
			Lekam		Target	8	3	5	10	3	7			
			Duhun		Target	7	3	4	7	4	3			
			Byans		Target	18	8	10	18	6	12			
		Dadeldhura	Parshuraam		Target	28	12	16	29	11	18			
			Bhaageshwor		Target	4	2	2	4	2	2			
		Saptari	Saptakoshi		Comparison	52	26	26	43	25	18			
			Kanchanrup		Comparison	123	62	61	109	57	52			
			Hanumannagar Kankalini		Comparison	127	54	73	115	60	55			
			Tilahi Koiladi		Comparison	66	31	35	54	23	31			
		India	Uttar Pradesh		Lakhimpur Khiri	Palia Kalan	Trikoliya	Target	25	13	12	25	13	12
						Atariya	Target	22	13	9	22	14	8	
						Patwara	Target	21	10	11	22	10	12	
						Sarkhana Purab	Target	23	11	12	22	11	11	
Mujaha	Comparison			25		13	12	23	12	11				
Maraucha	Comparison			27		15	12	27	15	12				
Basantapur Khurd	Comparison			24		12	12	26	13	13				
Maleneya	Comparison			22		12	10	21	12	9				
Total						935	419	516	894	387	507			
							45%	55%		43%	57%			

Note that at the endline stage, we have discovered a mistake in the baseline dataset. That is, the label for the variable 'gender' was reversed in Nepali, meaning all male responses were labelled as 'female', and all female responses were labelled as 'male'. Since this was a mistake in the raw data, we did not discover this during the baseline analysis. Instead, we found out and corrected at endline analysis stage when matching baseline and endline respondents in the panel dataset. Because of this mistake, the

Nepal baseline report as published in 2018 is inaccurate. Note that at the time of writing this endline report for Sharda-Mahakali basin we are rectifying the Nepal baseline report simultaneously. Since endline respondents were selected from the baseline respondent list, the mistake does not have major implications for the collected endline sample.

8.3 KEY PERFORMANCE INDICATOR CALCULATION AND VALUES

Please click [here](#) to be directed to the KPI table. This table presents 1) how the KPIs are calculated, and 2) the values for the target group at the baseline and the endline.

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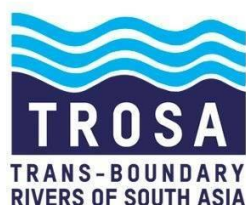
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