

# ENDLINE REPORT BRAHMAPUTRA-SARALBHANGA-TEESTA BASIN (INDIA & BANGLADESH)

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

March 2022

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# EXECUTIVE SUMMARY

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 marginalised and vulnerable river basin communities through increased access to and control over water resources. The program works with marginalised 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 TROSAs program in the Brahmaputra-Saralbhanga-Teesta basin by comparing the results of the endline study (September 2021) with the baseline (April-May 2018). The main objective of this study was to determine to what extent the TROSAs program had an impact on reduced poverty and marginalisation 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, the most important findings were the progress made regarding women's participation in water governance (outcome 5), improved collaboration with cross-border communities and local governments (outcome 4.1), and improved timely access to early warning information (outcome 4.2). For many of the indicators, endline levels for TROSAs participants were higher than the baseline levels, indicating the likely role of TROSAs 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 TROSAs is primarily an advocacy and influencing program working at multiple administrative levels might point to potential spill-over effects of TROSAs activities beyond directly targeted areas. Hence, TROSAs may also be (partly) responsible for the progress for non-participants.

The last two implementation years of TROSAs 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 Brahmaputra-Saralbhanga-Teesta basin did not match the experience of experts in Bangladesh and in India. Hence, by taking a quantitative approach to the endline study, we have likely missed out on the many inspiring individual stories of change established because of TROSAs.

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

- **Acknowledge, account for, and aim to shift social norms to contribute to an enabling environment, especially for young women:** Society needs to accept that women can be equal partners in decision-making and start taking leadership roles to 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.
- **Enhance skill development of women:** Future programs should continue to support women in their skills and capacity development, including leadership skills. Hence, continued support of women, for instance through soft skills development, will contribute to their empowerment and meaningful participation in water governance.
- **Increase the focus on water-related livelihood development for poverty reduction:** The Covid-19 pandemic has had an adverse effect on poverty. Future programs should combine advocacy efforts with direct livelihood programming on the ground. These livelihood activities should include both women as well as men, especially since Covid-19 has triggered migration and the need for new types of livelihoods.
- **Amplify communities' voices.** It is essential that citizens have and use the power to speak up to reach out to stakeholders and find solutions to specific (water-related) issues. Around seven out of ten TROSA participants *did not* feel capable of complaining and being heard. Hence, there is room for improvements to continue working on empowering communities to raise their voices and stand up for their interest and needs.
- **Continue community participation initiatives up to higher administrative levels:** The TROSA program has effectively strengthened community participation in water governance. 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.
- **Continue the research on and implementation of the *bandaling* initiative:** The bandaling initiative, implemented under TROSA in Bangladesh, has brought success in preventing about three to four kilometers of the riverbank from erosion. This success not only helped communities to attract funding from the Upazila chairman, but also encouraged other villages to establish bandals in their own village. Because of these evident successes, future programs should continue conducting research on this initiative and encouraging its implementation.
- **Continue to strengthen working relationships with CBOs/CSOs:** Only very limited TROSA participants at endline mentioned having working relationships with CBOs. Effective collaboration with the CBOs and CSOs can improve communities' involvement in water governance, and hence their vulnerability to water-related shocks. Future programs should continue to strengthen these relationships.
- **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. Taking this basin-wise approach has

contributed considerably to increased transboundary awareness and collaboration, which is a crucial step in improving transboundary water governance.

- **Consider the sustainability of the program, even after program implementation has ended:** Future programmes should consider ways in which to continue and sustain the work and progress made. 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 the Bangladeshi districts of Kurigram and Gainamdha and the Indian districts of Dhubri, South Salmara-Mankachar, Kokrajhar, and Lakhimpur over 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 study was achieved through the extensive contributions and expertise of the entire TROSA team, including the regional partner Consumer Unity and Trust Society (CUTS International) as well as local partners North East Research and Social Work Networking (NERSWN), International Rivers and Peoples Action for Development (PAD) in India and Center for Natural Resource Studies (CNRS) and Gana Unnayan Kendra in Bangladesh, Oxfam staff in India and Bangladesh, 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 led by SRNO India and Change Initiative Bangladesh.

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
CNRS	Center for Natural Resource Studies
Covid-19	Coronavirus Disease 2019
CSO	Civil Society Organization
CUTS	Consumer Unity and Trust Society
EWS	Early Warning System
GUK	Gana Unnayan Kendra
HRVA	Hazard, Risk and Vulnerability Analysis
ICT	Information Communication Technology
IMK	Impact Measurement and Knowledge
IWRM	Integrated Water Resources Management
KPI	Key Performance Indicator
LINK	Learning, Innovation and Knowledge
NERSWN	North East Research and Social Work Networking
NGO	Non-Governmental Organisation
PAD	Peoples Action for Development
PMU	Program Management Unit
PRI	Panchayati Raj Institution
Sida	Swedish International Development Cooperation Agency
SES	Socio-Ecological Survey
ToC	Theory of Change
TROSA	Transboundary Rivers of South Asia
UNDP	United Nations Development Program
VDMC	Village Development Management Committee
WG-CAN	Water Governance Collective Action Network
WUG	Water User Groups



# 1 INTRODUCTION

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 marginalised and vulnerable river basin communities through increased access to and control over water resources. The program works with marginalised 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 of Oxfam Novib, part of the Learning, Innovation and Knowledge (LINK) unit, conducted an endline study of the TROSA program in each of these four basins. In the Brahmaputra-Saralbhanga-Teesta basin (shared by India & Bangladesh), the endline study is conducted in collaboration with Oxfam in India & Bangladesh and their regional partner Consumer Unity and Trust Society (CUTS International), as well as local partners North East Research and Social Work Networking (NERSWN), International Rivers and Peoples Action for Development (PAD) in India and Center for Natural Resource Studies (CNRS) and Gana Unnayan Kendra (GUK) in Bangladesh. This endline study compares findings of the endline situation (September 2021) to the situation at the baseline (April-May 2018).

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

- Impact: Reduced poverty and marginalisation 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 & processes.

This endline study aims to measure progress with respect to these outcomes and to what extent this progress can be attributed to TROSA 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 Brahmaputra-Saralbhanga-Teesta basin, this means analysing the awareness of opportunities and barriers (especially for women) in the cross-border business environment, and the relationship between having a transboundary outlook and satisfaction with cross-border collaboration

During program implementation, and at the time of writing this report, the world, including communities residing along the Brahmaputra-Saralbhanga-Teesta 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, the findings of this study are contextualised with respect to Covid-19 where applicable.

## 2 PROGRAM OVERVIEW

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

The Brahmaputra-Saralbhanga-Teesta basin, sharing borders with India and Bangladesh, had a specific focus on strengthening community voices and leadership for more inclusive governance and trade through transboundary waterways. This should ultimately improve access and benefits to communities in an equitable way and strengthen their resilience. Key focus areas of the basin included decentralised water resource management, river fisheries with a focus on Hilsa, inclusive trade through transboundary waterways, transboundary flood early warning system, sand mining and riverbank erosion, and sustainable riverine tourism.

In Bangladesh, TROSA activities included:

- *Nodi-Boithoks*: Nodi-Boithok follows a bottom-up approach starting with monthly meetings at the village level to listen to stories of the communities living around the TROSA working areas in targeted basins. Nodi-Boithok provides the community (men, women and youth) with a platform where they talk about their concerns and how they think of the approaches towards those concerns. These events are organized by CNRS and GUK, who use reflections from the Nodi-Boithoks to forge partnerships with other relevant CSOs and other stakeholders.
- *Basin dialogues*: Following Nodi-Boithok community mobilization, issues from the community have been taken up at the basin level. Basin dialogues were conducted with the direct participation of many government officials, like Thana Nirbahi Officers and Upazila Nirbahi Officers. Hence, in these basin dialogues, communities were connected with government representatives.
- *Citizen Science Approach*: Community engagement, training and capacity development on water sampling and testing with systemic water analysers.
- *Hilsa watch*: A process to collect information from the grassroots fisherfolks by applying the citizen science approach. This activity helps to generate evidence to carry forward the advocacy activities in fisheries management.
- *Community-led erosion management, incl. Bandal installations*: Facilitation of community-led initiatives that prevented riverbank erosion through the installation of Bandals, implemented in Teesta and Jinjiram river basins<sup>1</sup>.
- *Research and analysis*: For instance, the Socio-Ecological Survey (SES) and research on fisheries. Evidence from the research informed advocacy.

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<sup>1</sup> The bandaling initiative is a fence that protects the Kaunia village from erosion. This initiative has been a bridge to collect funds from the Upazila chairman for further community-led development, and to encourage other villages to execute this initiative in their communities.

- *Advocacy*: Influencing local government policies so that the community voice can be included and reflected, for instance, advocacy for inclusive fisheries management, sustainable sand mining, fostering and promoting nature-based erosion management etc.
- *Interface and consultation with government (different levels)*: Interface and consultation between government officials at different ministries.
- *Dialogues with the private sector and CSOs*: Facilitation of dialogues between communities and the private sector to strengthen the community voice in the decision-making process. These dialogues also help relevant private sectors and CSOs to think about the marginalized community who are solely dependent on rivers.
- *Capacity building Initiatives*: Including river camps and women leadership training.

In India, TROSA activities included:

- *Water User Groups (WUG) and Village Development Management Committee (VDMC)*: In close coordination with local governments, TROSA facilitated the formation of a community institution, namely, WUG and VDMC, for addressing community water issues and challenges.
- *Citizen Science Approach*: Community engagement, training and capacity development on water sampling and testing with systemic water analysers.
- *Community dialogues and consultations on Citizen Science data*: These dialogues and consultations were facilitated by VDMC members and citizen science volunteers. Citizen Science data informed advocacy messages for responsible water management practices from private and public stakeholders.
- *Community led transboundary Hilsa-Conservation and transboundary consultation*: Facilitation of community conservation group meetings and field survey regarding the hilsa fish; as well as transboundary consultation on the conservation of the hilsa fish.
- *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 Brahmaputra-Saralbhanga basin through volunteers, CSOs, community-based organisations (CBOs) and government stakeholders.
- *Research and analysis*: Critical analysis of the water governance system in India with a specific focus on risk-informed water governance. Research and analysis informed advocacy.
- *Advocacy*: Influencing local government policies through inclusion of Integrated Water Resources Management (IWRM) components in the Gram Panchayat Development Plan (GPDP) planning process, with support from the State Institute of Panchayat Raj Development (SIPRD); and also, to raise awareness and have access to the multiple welfare development schemes of the government.
- *Interface and consultation with government*: Interface and consultation between government officials and Panchayati Raj Institution (PRI) members on welfare schemes, especially related to water resources development.
- *Transformative leadership for women*: Facilitation for transformative leadership among women for water governance related decision-making processes.
- *Women forum*: Organization of a forum, called Mahabahu Brahmaputra Federation, which is designed for women to raise gendered voices on transboundary issues, with a special focus on water availability, accessibility and availability.



- *Hazard, Risk and Vulnerability Analysis (HRVA)*: To evaluate key vulnerabilities and capacities.

The Covid-19 pandemic made regular program implementation challenging. Due to local and national mobility restrictions, many of TROSA activities in year four and five of implementation were executed through online platforms. In Bangladesh, Nodi-Boithoks and other dialogues were conducted online, which often had hindrances because of the lack of proper digital equipment and facilities at the community level. Also, advocacy works depend on the trust-building process, which became hard during the Covid-19 pandemic because of the restrictions on having face-to-face or physical interactions. In India, similar to Bangladesh, dialogues with the stakeholders were conducted virtually due to restrictions enforced to curb the transmission of the virus. In addition to the implementation of regular activities, staff spent considerable time 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 marginalisation 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 contextualise findings with respect to Covid-19.

**Table 1: Overview of evaluation questions**

<p><b>Impact:</b> To what extent is there reduced poverty and marginalisation of river basin communities, and can these changes be attributed to the TROSA program?</p> <p><b>Outcome 4.1:</b> 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?</p> <p><b>Outcome 4.2:</b> To what extent have local communities more secure access and control over water resources, and can these changes be attributed to the TROSA program?</p> <p><b>Outcome 5:</b> 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?</p>
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In addition to answering these evaluation questions, program staff in the Brahmaputra-Saralbhanga-Teesta basin were interested in understanding the extent of awareness of opportunities, especially by women, around transboundary trade and the barriers that female traders face thriving in the cross-border business environment. Furthermore, they were interested in understanding the relationship between having a transboundary outlook and satisfaction with cross-border collaboration. Findings of the learning questions are presented in chapter 5.

**Table 2: Overview of learning questions**

- |   |
|---|
| <ul style="list-style-type: none"><li>• To what extent are people, especially women, aware of the opportunities around transboundary trade? And what are barriers for female traders to thrive in the cross-border business environment?</li><li>• 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?</li></ul> |
|---|

## 3.2 EVALUATION DESIGN

This evaluation is a quasi-experimental 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"<sup>2</sup>, in contrast to a fully randomised control trial. Still, comparing data from these two groups allows 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.

To validate the results and find possible explanations for certain results and linkages to TROSA implementation, reflection workshops were organised. In India, a series of hybrid workshops were held on 10-11 January. In total, between 25-30 people participated. They included: Oxfam staff, partner staff, program management unit (PMU), community participants (from both Brahmaputra and Saralbhanga subbasin), and external evaluators. In Bangladesh, the workshop was organised physically on 26 January. The workshop was joined by 17 participants, including Oxfam staff, partner staff, and community participants (from both Teesta and Brahmaputra subbasin). 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/subdistricts included in the baseline study were purposely selected for the endline study. Some considerations were made for Bangladesh and India, respectively.

The endline sample in Bangladesh was the same as the baseline sample (N= 453). Target locations included unions in the Rowmari subdistrict (Kurigram district); comparison locations included unions in the Char-Rajibpur subdistrict (Kurigram district) and G. Sadar subdistrict (Gaibandha district). Locations are part of the Teesta subbasin. Although TROSA had worked outside Kurigram district as well (including Gaibandha, Rangpur and Nilphamari district), we deemed it more important to have a comparable sample between the baseline and the endline than to have a perfectly representative sample at endline only. Also, Kurigram represents the majority of people reached by TROSA in terms of size (72% of all TROSA participants reside in Kurigram); hence this validated the decision to keep the baseline and the endline sample consistent and to not include additional locations for the endline sample. Not expanding the endline sample in terms of geographical scope also considerably reduced data collection costs. We collected panel data for 98% of respondents.

In India, the subbasin of Saralbhanga was added to TROSA's program intervention area halfway through implementation. Although Saralbhanga was not included in the baseline survey, we deemed it important to have all subbasins represented in the endline survey; hence the endline sample was expanded to include the Saralbhanga subbasin. Target villages in Saralbhanga sub-basin to be included in the endline sample were randomly selected from a list of TROSA intervention villages in the subbasin.

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

Appropriate comparison villages for the subbasin have been identified by Oxfam staff and partners. The other municipalities and corresponding villages included in the endline sample were similar to the ones included in the baseline sample, except for Telahi municipality, where the baseline target village Ajraguri was dropped since TROSA activities had stopped in this village. The sample size for each village was based on baseline sample size and distribution of beneficiaries at the district level. To not increase the total sample size too much relative to the baseline, we have slightly reduced the number of target respondents in Dhubri, South Salmara-Mankachar and Lakhimpur districts (Brahmaputra subbasin), while adding target respondents for Kokrajhar (Saralbhanga subbasin). We collected panel data for 91% of respondents.

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'<sup>3</sup>. 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 standardisation 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 Brahmaputra-Saralbhanga-Teesta basin. The basin-specific learning questions (see chapter 5) complemented the global indicator analysis at least to some extent. However, it is still likely we failed to capture some of the more detailed basin-specific progress.

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

Lastly, TROSA is primarily an advocacy and influencing program; hence, progress made because of advocacy efforts at higher administrative levels are likely to impact comparison communities who are also part of this administrative level. Hence, by design, there may be spill-over effects of program advocacy and influencing efforts into the comparison area, complicating the quasi-experimental design of this endline study. We tried to limit this risk by sampling the comparison group from different municipalities. However, there is an overlap between target and comparison locations at the district level (Dhubri, South Salmara-Mankachar, Kokrajhar, Lakhimpur, and Kurigram district).

### 3.5 EXPLANATORY NOTE ON THE FINDINGS, FIGURES AND

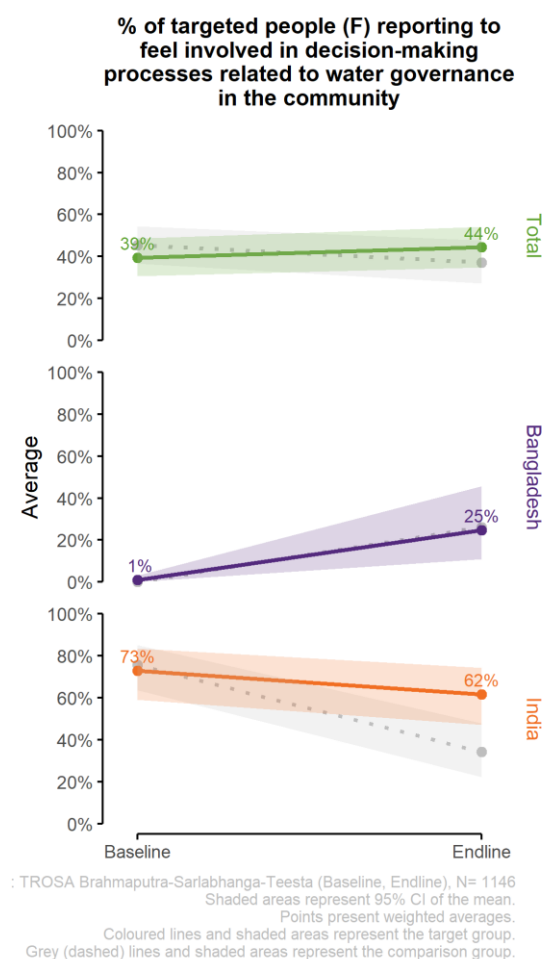
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<sup>3</sup> Random walk is a method to randomly select households for an interview. Key is that each sample point within the study area has an equal chance of being sampled each time. This is to reduce the chances of selection bias and to generate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

## TABLES

The next chapter presents the main findings<sup>4</sup> 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 1



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.**<sup>5</sup>

Most figures in this report visualise 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 1). 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 visualised with a confidence interval, representing the range of the estimate at a confidence level of 95%. In graphs such as Figure 1,

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.

<sup>4</sup> 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.

<sup>5</sup> 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.



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 evaluation 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 equal sign (=) means that there is no significant difference or result to report. An upward arrow (↑) indicates a positive impact (the change for the 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 group<sup>6</sup>). 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 indicators are not relevant for a specific subgroup; in these cases, the table says 'Not Applicable' (NA). When the table says 'No variation', it means that there is a low data variation so it was not possible to perform impact estimations. In some of those cases, we present the impact at a sub-indicator level or at the endline only.

Note that for KPIs where there is no baseline data, we cannot estimate impact or change over time. Instead, 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.

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<sup>6</sup> 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.

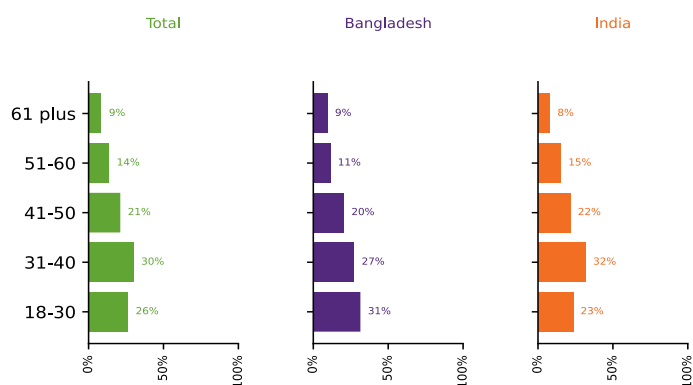
# 4 PROGRAM IMPACT

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 **Error! Reference source not found.** for an overview of how the KPIs were calculated.

## 4.1 CHARACTERISTICS OF INTERVIEWED PEOPLE

At the endline, we interviewed 440 TROSA program participants in India and 265 in Bangladesh. In India, the majority were female (63%); in Bangladesh, the gender balance was more or less equal (52% women; 48% men). 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 recognise 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 2**  
What is your age?

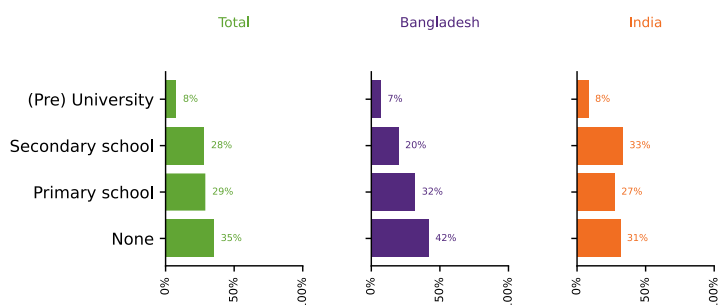


Source: TROSA Brahmaputra-Sarlabhanga-Teesta Basin (Endline Target), N=704.

We interviewed community members who were 18 years or older (see Figure 2). More than half of TROSA participants in the endline sample were younger than 40 years old (55% Bangladesh; 68% India).

Furthermore, most respondents were married or in a relationship (93% Bangladesh; 91% India).

**Figure 3**  
What is the highest level of education you completed?



Source: TROSA Brahmaputra-Sarlabhanga-Teesta Basin (Endline Target), N=704.

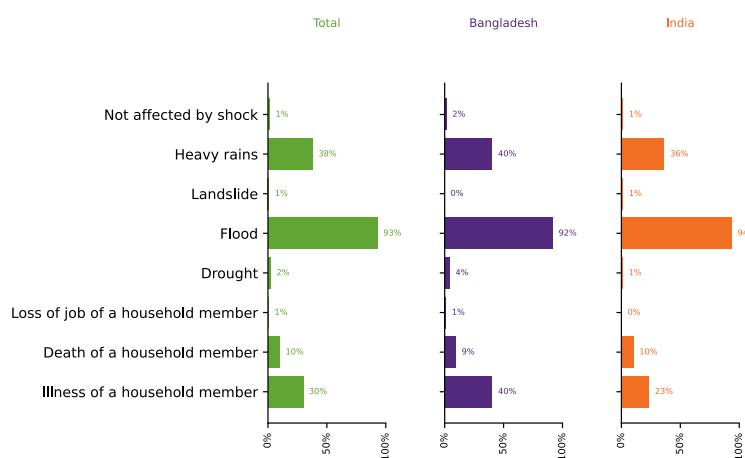
TROSA participants had different levels of education. At the endline, in Bangladesh, 58% had some level of education (primary school or higher) and 69% in India (see Figure 3). Still, around four in ten participants in Bangladesh and three in ten in India had not achieved any level of education.

Achieved levels of education were reflected in the literacy rate: around 60% of TROSA participants in India and Bangladesh were literate.

The majority of TROSA participants were engaged in agriculture as a livelihood. 77% in Bangladesh and 81% in India mentioned agriculture as a source of income, and around 48% of all TROSA participants engaged in agriculture in Bangladesh and India depended on the river for this activity. Other frequently mentioned income sources by TROSA participants in Bangladesh were livestock (27%) and business (20%). TROSA participants in India frequently mentioned livestock (60%), unskilled labour (40%) and fishing (32%).

**Figure 4**

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



Source: TROSA Brahmaputra-Sarlabhanga-Teesta Basin (Endline Target), N=705.

The most frequently mentioned shocks at the endline, in both Bangladesh and India, were floods, heavy rains, and illness of a household member, although flood clearly was the number one shock (Figure 4). In terms of climate-related extreme weather events, exposure to floods has increased in Bangladesh and India.

At the endline, 92% of TROSA participants in Bangladesh had experienced floods in the past five years (compared to 88% at the baseline). Workshop participants, especially community members in Kurigram district (Teesta basin), agreed to increased exposure to floods by claiming that there has not been such an intense flood as the one in 2021 in the last 100 years<sup>7, 8</sup>. In India, 94% had experienced floods in the past five years (compared to 82% at the baseline). Those respondents who experienced shocks were asked when and how many times in the past five years they experienced these shocks. Results show that communities were affected by floods and heavy rains quite recently: 71% in Bangladesh and 75% in India mentioned a flood in 2020-2021.

Nonetheless, even when the incidence of floods increased compared to the baseline, the frequency of this shock decreased or did not change. On average, at the baseline and endline, three floods were mentioned in Bangladesh. According to workshop participants in the Brahmaputra subbasin, the frequency and forcefulness of floods diminished. In India, on average, five floods were mentioned at

<sup>7</sup> <https://www.diplomatbd.com/teesta-basin-in-bangladesh-flooded-again-as-india-opens-gajoldoba-gates/>

<sup>8</sup> They also added that due to *Bandal* through TROSA initiative the rate of erosion has reduced.

the baseline, and it decreased to three at the endline. Workshop participants in India agreed on this point by stating that the frequency and intensiveness of floods had diminished.

All in all, these findings suggest that climate-related extreme weather events are posing threats to river basin communities in the Brahmaputra-Saralbhanga-Teesta basin. Hence, improving the 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 marginalised and vulnerable river basin communities.		Total	Bangladesh			India		
		Total	Total	Women	Men	Total	Women	Men
<b>Endline data only</b>		<b>Is there a significant effect for the target group at endline?</b>						
0.1	% of targeted people (M/F) who perceived / claimed having increased income and/or savings and/or decreased loans (poverty)	=	Yes ***	Yes *	Yes ***	=	=	=
<b>Baseline-Endline data</b>		<b>Is there a significant effect for the target group over time? (Impact)</b>						
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 recognise the importance of this knowledge for dealing with future floods	↓***	↓***	=	↓***	=	=	=

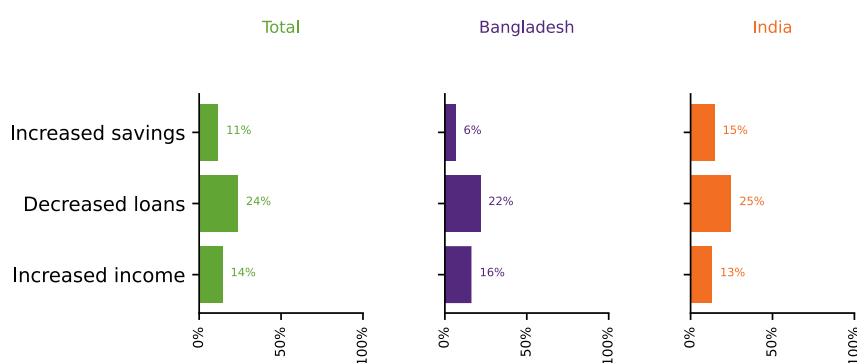
The overall aim of the TROSA program was to reduce poverty and marginalisation of vulnerable river basin communities. Poverty is multi-dimensional: hence we tracked changes in income, savings and loans. Respondents were asked to report on their change in income, savings and loans since the baseline. 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.

In Bangladesh, at the endline, 8% of TROSA participants mentioned at least two of these poverty reduction indicators (Figure 5). This result significantly differed from non-participants (2%), so we found a positive impact of TROSA in reducing poverty. Around one in five TROSA participants experienced a decrease in loans (22%), 16% experienced an increase in income, and a few experienced an increase in savings (6%). Participants in the workshop mentioned that TROSA did not work on poverty directly, but positive contributions to poverty reduction were made indirectly (for instance, through advocacy). Additionally, they mentioned that TROSA activities such as the *bandal* initiative have contributed to protecting communities' assets, and it has also provided employment opportunities in the locality through its construction. Furthermore, TROSA partners have facilitated online marketing systems during the Covid-19 situation, through advocacy with the government and other NGOs. This has also played a significant role in reducing poverty in the region or preventing further drops.

In India, 13% of TROSA participants experienced reduced poverty (that is, they mentioned at least two of the poverty reduction indicators). That is, 25% experienced a decrease in loans, 15% an increase in savings and 13% an increase in income. However, changes in poverty were similar for non-participants, so we could not make strong impact claims. This latter point reflection workshop participants thought was surprising, given that TROSA has provided training on how to use water optimally and how to enhance cultivation. These trainings were helpful in increasing communities' knowledge and awareness on different types of livelihoods. Hence, it was expected that this should have contributed to reduced poverty. Furthermore, the linkage of communities to different types of (social) government schemes was also expected to have positively contributed to poverty reduction.

**Figure 5**

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



Source: TROSA Brahmaputra-Saralbhanga-Teesta Basin (Endline Target), N=705.

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 on change in income. On average, 53% of TROSA participants in Bangladesh mentioned that their income decreased relative to the months before the Covid-19 outbreak. In India, this percentage was 64%.

## Resilience

In addition to poverty reduction, an overall objective of the TROSA program was improving the resilience of river basin communities to climate-related extreme events. As section **Error! Reference source not found.** showed, river basin communities in the Brahmaputra-Saralbhanga-Teesta basin are frequently exposed to floods. Hence, reducing vulnerability through resilience is of utmost importance to deal 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, 2016<sup>9</sup>). In this study, absorptive capacity and adaptive capacity together determine communities' resilience to shocks, such as floods.

<sup>9</sup> Oxfam (2016). The future is a choice. The Oxfam Framework and Guidance for Resilient Development.



Since one of the major climate-related shocks is floods, several questions were asked about 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 three or more impacts would not be problematic, they were considered to have absorptive capacity. In Bangladesh, comparing the baseline to the endline, we found a reduction in absorptive capacity (Figure 6). It decreased from 11% at the baseline to 4% at the endline. The reduction was experienced by both TROSA participants as well as non-participants. In the workshop, participants did not agree with these results. According to them, the trend should have been positive and higher for participants than for non-participants, due to the different coping mechanisms participants have access to through TROSA, such as disaster mitigation trainings, early warning systems, and the provision of water filtering taps and crop seeds. Moreover, workshop participants added that TROSA has encouraged local Community-Based Organisations (CBOs) to cover a large area for implementing disaster mitigation measures such as providing emergency shelter and early warnings from upstream. All in all, this should have contributed to improved absorptive capacities, especially for TROSA participants.

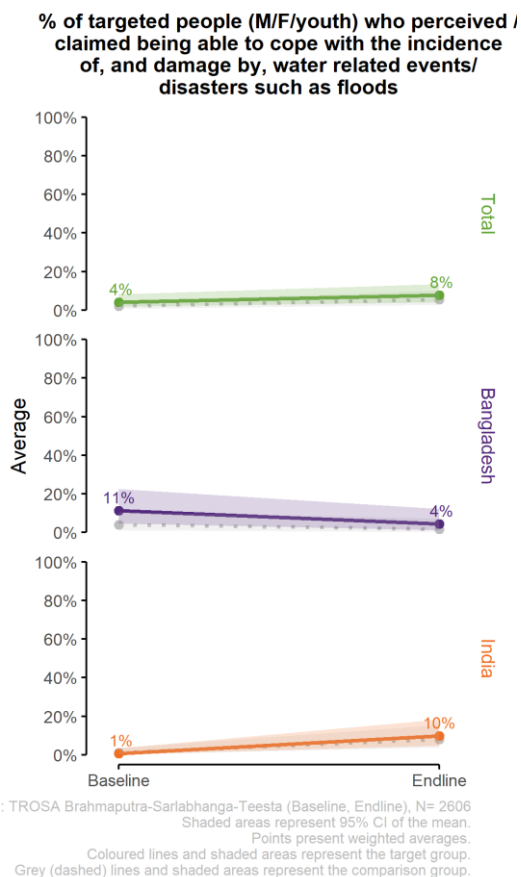
In India, absorptive capacities increased from 1% at the baseline to 10% at the endline. Non-participants followed a similar trend as participants, so we could not make strong impact claims. Nonetheless, in the reflection workshop for India, it was mentioned that likely TROSA at least positively contributed, if not attributed, to increased absorptive capacities. This was because of the many awareness-raising activities organised by TROSA on improving resilience. Furthermore, it was mentioned that likely there have been spill-over effects of TROSA into adjoining comparison areas, including activities of other actors in comparison areas. Hence, this could explain the increase in absorptive capacities for non-participants.

Secondly, we looked at communities' adaptive capacity. This indicator 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. In this case, two out of three of these conditions needed to be met in order to be resilient towards water-related shocks (adaptive capacity).

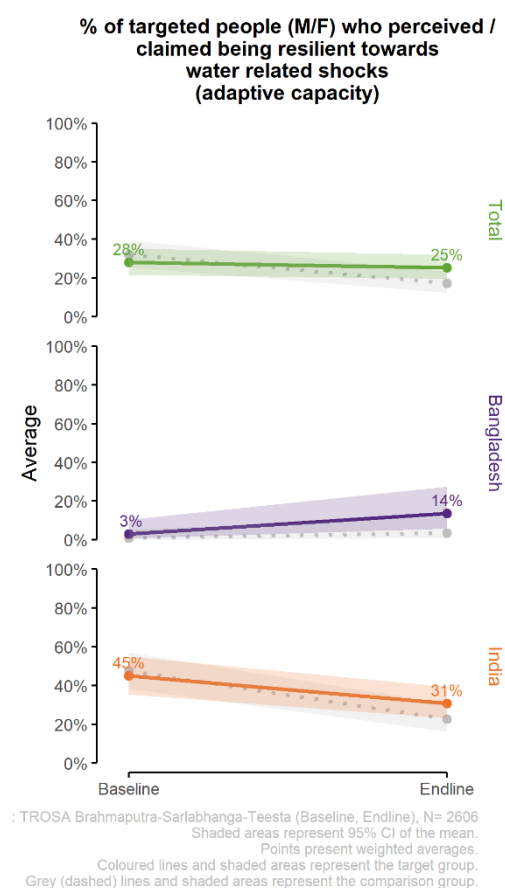
A different picture emerged in Bangladesh and India (Figure 7). In Bangladesh, we saw an increase in community members' adaptive capacities towards water-related shocks (from 3% at the baseline to 14% at the endline). In India, however, the adaptive capacities of communities decreased. At the baseline, 45% of TROSA participants were estimated to have adaptive capacities to deal with floods, which decreased to 31% at the endline. One possible explanation for decreased resilience in India might be the Covid-19 pandemic. On average, more than half of TROSA participants (58%) in India mentioned that their ability to cope with threats posed by heavy flooding has decreased relative to the months before the Covid-19 outbreak (NB: this was 32% for TROSA participants in Bangladesh). During the pandemic, challenges occurred such as sickness and death in the household, closure of job opportunities, lack of transportation and movement, increased food prices, and loss of food supply. For fisherfolk, for instance, social distancing restrictions and lockdown regulations prevented them from

going out to catch fish. Hence, Covid-19 put increased pressure on the financial and livelihood situation of the household, making it more difficult to be resilient towards floods.

**Figure 6**



**Figure 7**



Lastly, related to adaptive capacity, respondents were asked whether they have learned from dealing with past floods to be able to deal with future floods successfully. In Bangladesh, the knowledge levels of TROSA participants declined from 62% at the baseline to 54% at the endline. On the contrary, knowledge improved for non-participants. Hence, we found so-called ‘negative impact’. In India, knowledge levels for both TROSA participants as well as non-participants decreased (for TROSA participants, it fell from 61% at the baseline to 47% at the endline). According to workshop participants, it is very likely that the survey questions asking about knowledge on floods were confusing for respondents and that there might have been a misunderstanding between knowledge and action. TROSA activities should have contributed to increased *knowledge* on dealing with floods, but this does not necessarily mean that the *actual behaviour* of dealing with floods improved as well. For instance, Covid-19 has made dealing with floods more difficult (see above). Hence, the potential confusion between knowledge and action might explain the unexpected result of decreased knowledge.

### 4.3 PERCEPTIONS ON INSTITUTIONS (OUTCOME 1-3)

KPI #: Outcome 1-3	Total	Bangladesh	India
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		Total	Total	Women	Men	Total	Women	Men
<b>Baseline-Endline data</b>		<b>Is there a significant effect for the target group over time? (Impact)</b>						
<b>Outcome 1. Government policies &amp; practices at all levels, in water resource management are more inclusive of community concerns &amp; meet national &amp; international standards.</b>								
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)	NA	No comparable data <sup>10</sup>			↓**	=	↓**
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)	↓**	↓*11	↓*	=	=	↓*	=
<b>Outcome 2. Practices of private sector respect community access to water resources actively contributing to reduced conflict</b>								
2.5	% of targeted people (M/F) reporting that the private sector is responsibly dealing with river basins	↓***	↓***	↓**	↓**	=	=	=
<b>Outcome 3: CSOs increasingly participate in or influence transboundary water governance, women's inclusion and resolution of water conflicts</b>								
3.6	% of targeted people (M/F) that trust and are supportive of civil society	NA	=	=	=	NA	NA	NA
	Sub-indicator: Thinking about CBOs and NGOs, how often do you trust each of them to do the right thing?	=	↑***	↑*	↑***	↓**	=	↓*
	Sub-indicator: How would you feel if the government took measures to limit the work of NGOs that defend human rights in your community?	NA	↓***	↓***	↓***	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 outcomes 1-3 (formulated at government, private sector, and civil society level). However, community members' perceptions of these institutions define 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 civil society organisations (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)<sup>12</sup>. In Bangladesh, TROSA participants' trust in the government decreased from 22% at the baseline to 15% at the endline (Figure 8). The decrease was steeper for

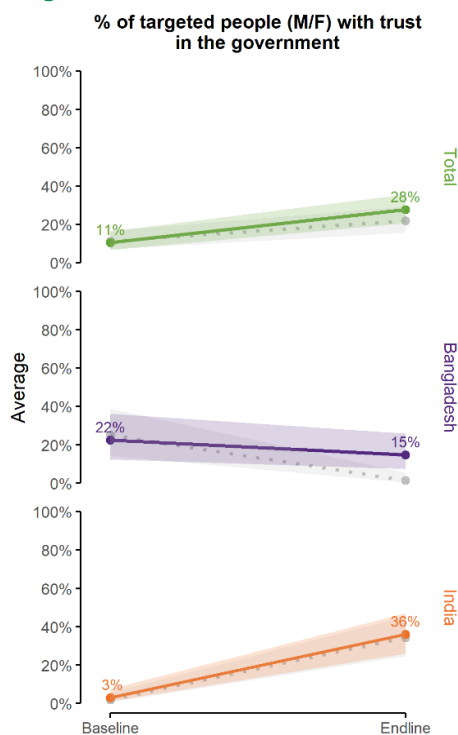
<sup>10</sup> In Bangladesh the survey question estimating external political efficacy was adapted at the endline, hence we cannot make accurate comparisons from the baseline to the endline.

<sup>11</sup> 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: internal political efficacy improved.

<sup>12</sup> 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.

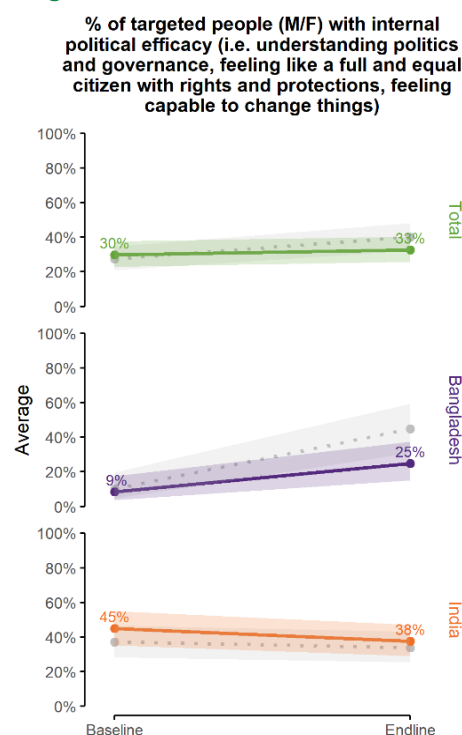
non-participants. Hence TROSA positively impacted the prevention of even further drops in trust levels. Workshop participants highlighted the positive contribution of TROSA activities, for instance, the establishment of a platform for community engagement with government officials. Via these platforms, communities can easily approach the government with their concerns and contribute to solving these. In the case of India, there was a sharp increase in trust levels from 3% at the baseline to 36% at the endline. Nonetheless, non-participants also experienced similar increases in their trust levels, so we cannot solely attribute the increased trust level to TROSA. According to workshop participants, TROSA activities, like engagements with and collective approaches to the government through the Gram Panchayat Development Plan (GPDP), have likely contributed to increased trust levels. Since more villages were reached through the GPDP than just TROSA intervention villages, it is very likely that there is a spill-over of this TROSA activity into comparison areas. Furthermore, the government has implemented Covid-19 relief in both target and comparison areas. Hence, this could also have contributed to increased trust levels in the government for both participants and non-participants.

**Figure 8**



TROSA Brahmaputra-Sarlabhanga-Teesta (Baseline, Endline), N= 2460  
 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.

**Figure 9**



TROSA Brahmaputra-Sarlabhanga-Teesta (Baseline, Endline), N= 2562  
 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.

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, 1954, p. 187)<sup>13</sup>. 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.

<sup>13</sup> Campbell, A., Gurin, G., & Miller, W. E. (1954). The voter decides.

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 concerns<sup>14</sup>.

In Bangladesh, there was an increase in internal political efficacy from the baseline to the endline (Figure 9). Similarly, for non-participants, internal political efficacy improved as well, and even steeper. Hence, although internal political efficacy improved in Bangladesh, we found the so-called 'negative impact'<sup>15</sup>. In India, a different scenario is seen: there was a slight decrease in internal political efficacy from 45% at the baseline to 38% at the endline. Non-participants experience a similar decrease.

In the case of external political efficacy in Bangladesh, the question was adapted at the endline. Hence, we cannot make accurate comparisons from the baseline to the endline. At the endline, 26% of TROSA participants were estimated to have external political efficacy. In India, there was a decrease in external political efficacy for TROSA participants from 24% at the baseline to 20% at the baseline. For non-participants, levels were unchanged. Hence, we found the so-called 'negative impact'.

Regarding the perceptions on the private sector, respondents were asked whether the private sector is responsibly dealing with river basins. At the endline, one out of three TROSA participants in Bangladesh responded affirmatively (29%) (it was similar at the baseline). However, at the endline, more non-participants responded affirmatively compared to the baseline, so we found a 'negative impact'. In India, the percentage of TROSA participants mentioning the private sector to deal with river basin responsibly was around 20% at both the baseline and the endline. This was also the case for non-participants.

Lastly, regarding CSOs, respondents were asked whether they trust CSOs and non-governmental organizations (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 Bangladesh, there was a decrease in community members' trust towards CSOs from the baseline (34%) to the endline (14%). Since the decrease of this indicator was steeper for non-participants, we found a positive impact in preventing further decrements. In India, trust towards CSOs improved from 23% at the baseline to 38%. However, the increase was steeper for non-participants. Hence, we found a 'negative impact'. In India, the question of 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. In Bangladesh, there was a sharp decrease from 66% at the baseline to 18% at the endline. However, the trend of this indicator for non-participants was more or less stable, so we found 'negative impact'.

## 4.4 VULNERABILITY TO WATER-RELATED SHOCKS (OUTCOME 4.1)

	Total	Bangladesh	India
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<sup>14</sup> Balch, G.I. (1974). Multiple Indicators in Survey Research: The Concept "Sense of Political Efficacy". *Political Methodology*, 1(2):1–43.

<sup>15</sup> This negative impact is only significant at the 10% level.

KPI #: Outcome 4.1: local communities are better able to reduce vulnerability to water resource-related-shocks resulting from conflicts and disasters;		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	↓**	↓***16	↓***	↓***	=	=	=
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	↓**	↓***17	=	↓***	=	=	=
4.1.3	% of targeted people (M/F) reporting to have working relationships with the government for support in water governance issues	↓***	↓***18	=	↓***	↓**	=	↓**
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	=	=	=	=	=	↑*	=
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	=	=	=	=	=	↑*	=
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 Theory of Change (ToC) lies an 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

<sup>16</sup> 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: cross-border awareness improved.

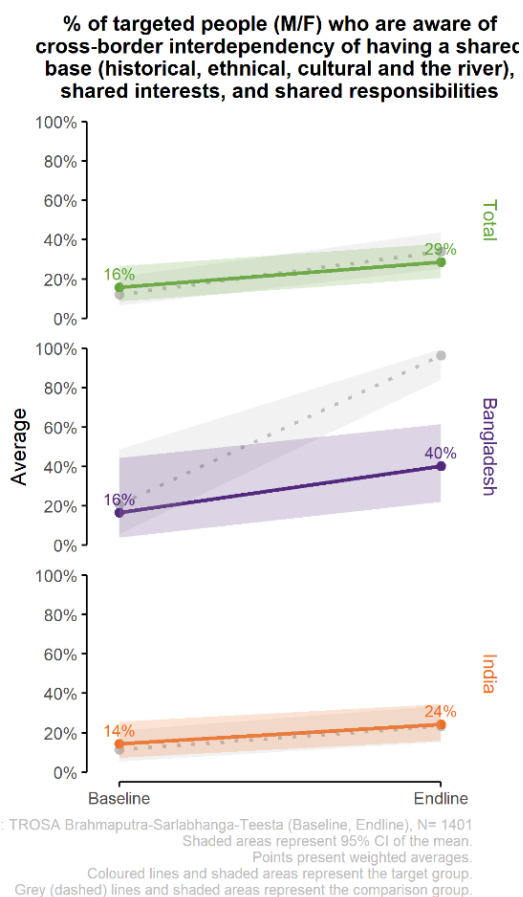
<sup>17</sup> Even though we found 'negative impact' since the change for the comparison group is larger than the change for the target group, the change over time is positive: slightly more people take preventive measures now than before.

<sup>18</sup> 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 relations with the government improved.



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 10**



In Bangladesh, more TROSA participants were aware of cross-border interdependency at the endline (40%) than at the baseline (16%). However, in the case of non-participants, this increase was even steeper, which means that, regardless of the improvements, we found a ‘negative impact’. In India, there was an increase in cross-border awareness among TROSA participants from 14% at the baseline to 24% at the endline. A similar trend was seen in the case of non-participants, so we could not claim the impact (Figure 10).

It is important to remark that, in Bangladesh, at the baseline, around 85% of TROSA participants did not know if river basins were a *common interest* of communities and cross-border communities; 82% did not know if it was *common responsibility*; and 74% did not know if cross-border communities were *responsibly dealing* river basins. In India, these percentages were 60%, 59% and 57%, respectively. These results indicate that, at the baseline, few people knew the interests and responsibilities of communities and cross-border communities. The fact that more TROSA participants

have an opinion on this now than at the baseline indicates that awareness of cross-border interdependency has increased<sup>19</sup>.

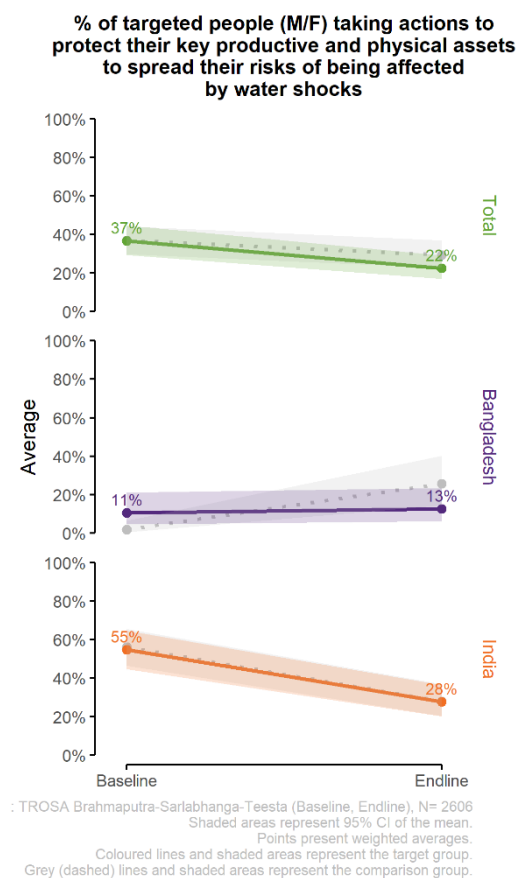
At the endline, respondents were asked about having a ‘transboundary outlook’. In Bangladesh, few people recognise similarities between communities and cross-border communities in terms of cultural and religious practices (19%), and moreover, 59% mentioned they *do not* feel that cross-border communities respect them. It is important to mention that TROSA program staff from Bangladesh mentioned that communities were not that much interconnected to decide whether the cross-border community have respect or not. Hence, the survey question might have been confusing to them. In India, 54% of TROSA participants agreed that communities and cross-border communities are similar. Furthermore, 61% of TROSA participants felt that cross-border communities respect them. Hence, the transboundary outlook is higher in India than in Bangladesh. That said, in Bangladesh, the transboundary outlook is higher for TROSA participants than for non-participants. In India, we did not

<sup>19</sup> At the endline, 53% of TROSA participants did not know if river basins were a common interest of communities and cross-border communities; 55% did not know if it was common responsibility; and 57% did not know if cross-border communities were responsibly dealing river basins. In India, they were 2%, 1% and 2%, respectively.

find a significant difference between TROSA participants and non-participants. More about the transboundary outlook is included in section 5.2.

### Preventive measures to spread risks of water-related shocks

**Figure 11**



Households 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 (see Figure 11). In Bangladesh, slightly more households at the endline, compared to the situation before TROSA activities, took preventive measures to protect key productive and physical assets (11% vs 13%). In the case of non-participants, there was a steeper increase. Hence, even though the percentage of TROSA participants who take preventive measures slightly improved, we found the so-called ‘negative impact’. Workshop participants from both subbasins in Bangladesh claimed that communities were now using various precautionary measures learned from prior disasters to protect themselves from current disasters. Hence, they would have expected a larger increase on this indicator. Furthermore, despite the fact that the TROSA program has a selection of target villages, according to them, disaster mitigation knowledge and training facilitated by TROSA was also shared with non-

participants. Hence, they suggested spill-over of these activities into the comparison group.

In India, there was a decrease in the percentage of people taking preventive measures, for both participants and non-participants. In the workshop in India, participants did not agree with the decline of people taking actions to protect physical and productive assets. According to them, various TROSA activities, such as trainings and early warning information (more on this in section 4.5), have supported communities to improve their awareness and knowledge on floods, and hence to take action to prepare themselves.

### Collaboration on water governance

Effective collaboration with the local government, CBOs and CSOs, and cross-border communities can improve communities' involvement in water governance, and hence their vulnerability to water-related

shocks. Two types of indicators were constructed: 1) working relationships<sup>20</sup>, and 2) effective collaboration<sup>21</sup>.

In Bangladesh, considerably more TROSA participants at the endline mentioned having working relationships with the government compared to the baseline (it improved from 3% to 37%). However, the increase was steeper for non-participants. Hence, although relationships improved, we found a 'negative impact'. In India, working relationships between communities and the government did not change significantly. We found a slight but insignificant drop from 27% at the baseline to 23% at the endline. However, slightly more non-participants mentioned having working relationships with the government at the endline than the baseline, so we found a 'negative impact'. Regarding working relationships with CBOs, nothing has changed much in both countries. In Bangladesh, there was a slight increase from 2% at the baseline to 4% at the endline. In India, working relationships between communities and CBOs slightly decreased (from 6% at the baseline to 4% at the endline). In both countries, non-participants followed a similar trend. All in all, especially in Bangladesh, it is promising to see improved working relationships with the government. However, in both countries, there seems to be much room for improvement to establish working relationships with CBOs.

In terms of collaboration (Figure 12 and Figure 13), in Bangladesh, more TROSA participants indicated to collaborate with the government on water governance at the endline than at the baseline. It increased from 15% at the baseline to 25% at the endline. In the reflection workshop, participants noted the participation of government officials (for example, Thanna Nirbahi and Upazila Nirbahi Officers) in basin dialogues and their financial and legal support on water-related issues. Furthermore, there was a slight increase in effective collaboration between communities and cross-border communities (from 1% at the baseline to 6% at the endline). Nevertheless, we could not make impact claims for both of these indicators based on the data.

In India, the collaboration between communities and the local government increased (from 36% at the baseline to 51% at the endline). Since results were similar between TROSA participants and non-participants, we did not find statistical evidence to claim impact on the general analysis. However, when

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<sup>20</sup> 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?

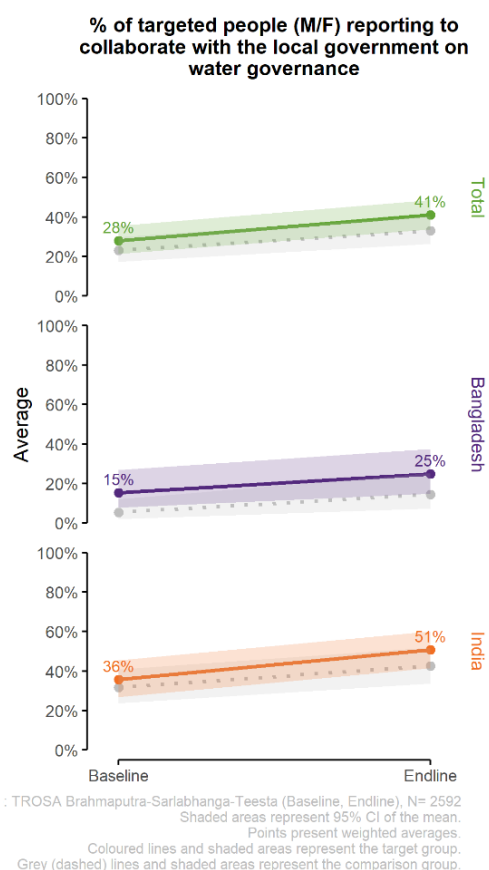
The following questions were used to estimate working relationships with CBOs: What are the sources your household gets information from about water issues?; How often are CSOs consulting you about transboundary water issues?; Who would your household complain to if you had problems in water management?;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

<sup>21</sup> 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?

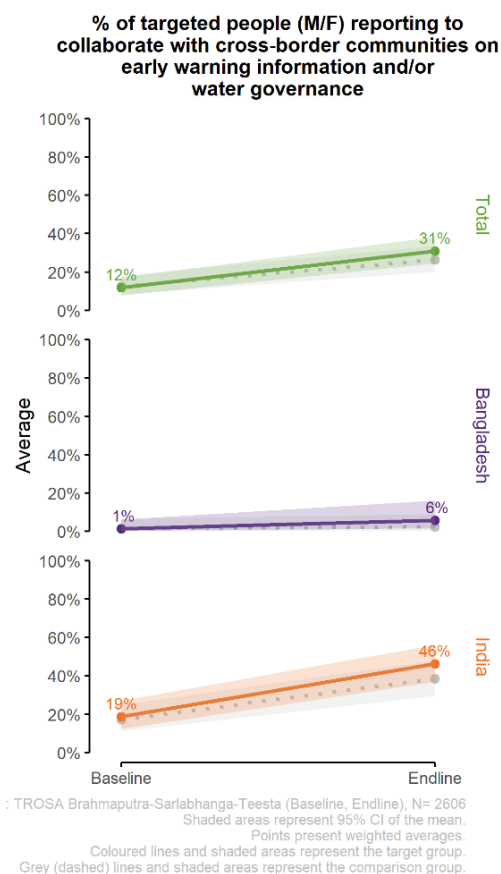
The following questions were used to estimate collaboration with cross-border communities: How often do you share Early Warning Information on floods/disasters with cross-border communities?; How often do you get Early Warning Information on floods/disasters from cross-border communities?; How often 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?

analysing by gender separately, we found strong statistical evidence that TROSA activities positively impacted the collaboration between communities and the local government for women. Regarding collaboration between communities and cross-border communities, there was a sharp increase for TROSA participants from 19% at the baseline to 46% at the endline. Again, we could not make strong impact claims in general, but we found an impact of TROSA on improving collaboration between communities and cross-border communities (at the 10% significance level) for women only. Reflection workshop participants agreed with improvements in collaboration between communities and cross-border communities in India. However, in their experience, collaboration should even have been more than 46% because of the many activities that were implemented under TROSA to improve cross-border collaboration. For instance, the establishment of cross-border committees between communities in India and Bhutan). The collaboration is even about to be formalised, with government representatives joining the committees and various early warning system groups. Another example from Lower Assam was the Indo-Bhutan-Bangladesh trade and inland water waste collaboration. Interventions focused on improving small scale trade and navigation over the Brahmaputra and enabling cross-border trade between Bhutan, India and Bangladesh through inland waterways over the Brahmaputra.

**Figure 12**



**Figure 13**



### 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 felt something was done with their input<sup>22</sup>. In Bangladesh, more TROSA participants now than at the baseline felt capable of complaining and were confident that their complaints were heard (it improved from 13% at the baseline to 27% at the endline). However, this increase was also found for non-participants. In India, there were no significant changes when comparing the endline to the baseline. At both the baseline and the endline, around 3 out of 10 community members felt capable of complaining and were confident of being heard. This situation was also the case for non-participants. That said, in both Bangladesh and India, still around seven in ten TROSA participants at the endline did not feel capable of complaining and being heard, hence there remains room for improvement in this indicator.

## Conflicts

Most TROSA participants in Bangladesh indicate *not* to have regular disagreements with the local government (84%) and with cross-border communities (93%) (Figure 14 and Figure 15). In fact, as was mentioned before, workshop participants highlighted the support received by and collaboration with the government. However, the incidence of disagreements with the local government increased compared to the baseline (from 4% to 16%) and the incidence of conflicts with cross-border communities had not changed. In India, less TROSA participants at the endline mentioned to at least sometimes have disagreements with the local government (64%) as compared to the baseline (46%). In terms of disagreements with cross-border communities, the incidence increased from the baseline (17%) to the endline (49%). Reflection workshop participants were surprised by this result. In their experience, TROSA activities along both sides of the river strengthened the collaboration between cross-border communities (see also the previous results on collaboration). Hence, they would have expected an reduction in the incidence of disagreements with cross-border communities.

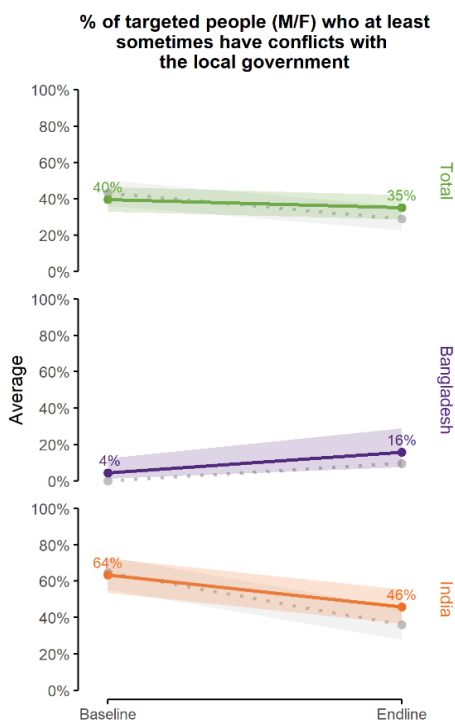
Those respondents who indicated to at least sometimes have disagreements, with either the government or cross-border communities, were asked whether they have participated in resolving them. Especially in Bangladesh, given the low incidence of disagreements, the percentage of TROSA participants and non-participants participating in grievances resolution is very low (2%), and unchanged relative to the baseline. In India, fewer TROSA participants at the endline participated in grievances resolution than the baseline (it decreased from 34% to 3%). The decrease was slightly steeper for TROSA participants than for non-participants, hence we found a 'negative impact'.

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<sup>22</sup> The three survey questions used for this indicator include:

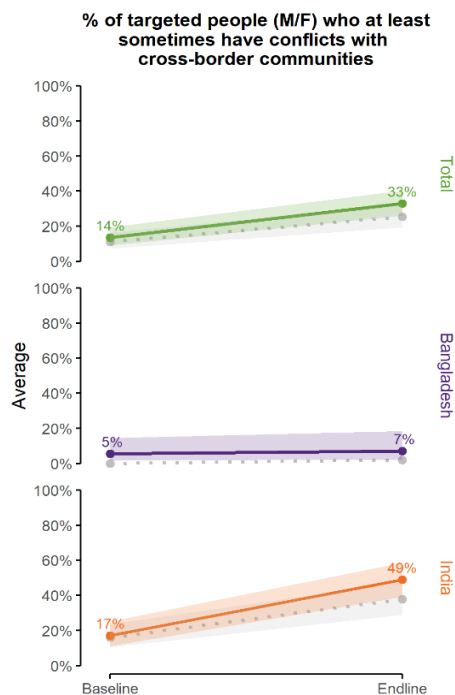
- To what extent does your household feel capable to complain about water management problems if you face such problems?
- Is your household confident that your complaints will be heard?
- Is your household confident that your community's concerns/proposals will be heard?

**Figure 14**



: TROSA Brahmaputra-Sarlahanga-Teesta (Baseline, Endline), N= 2606  
 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.

**Figure 15**



: TROSA Brahmaputra-Sarlahanga-Teesta (Baseline, Endline), N= 2606  
 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	Bangladesh		India		
		Total	Total	Women	Men	Total	Women
<b>Baseline-Endline data</b>		<b>Is there a significant effect for the target group over time? (Impact)</b>					
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: How often do you experience a removal of any barriers that prevent your use of water resources?	↓**	=	=	=	↓**	=
	Sub-indicator: Who would your household complain to if you had problems in water management?	↑**	=	=	=	↑**	↑*



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)	↓***	↓***	↓***	↓***	↓*23	=	=
4.2.4	% of targeted people (M/F) with sufficient access of water for domestic use	↓***	↓***24	↓***	↓***	=	=	↑**
4.2.5	% of targeted people (M/F), who use the river for agricultural livelihood, with sufficient access of water for agricultural use	↓***	↓***25	↓***	↓***	=	=	=

### Complaining to the private sector and experiencing a removal of barriers

Companies are key stakeholder when it comes to water governance. Hence, it is important that communities express their concerns to the private sector about the use of water and work collaboratively to ensure its optimal use. Only very few TROSA participants at the endline (and at the baseline) mentioned complaining to the private sector if they had problems in water management (0% in Bangladesh and 3% in India). In Bangladesh, non-participants followed a similar trend. In India, at the endline, fewer non-participants complained to the private sector compared to baseline, so we found a positive impact of TROSA on preventing the reduction of complaints from TROSA participants to the private sector. Furthermore, at the endline, in Bangladesh, almost all TROSA participants and non-participants mentioned *not having* experienced a removal of barriers. Again, percentages were similarly low at the baseline. In India, however, we found sharp decreases in the percentage of TROSA participants mentioning to have experienced a removal of barriers (from 37% at the baseline to 2% at the endline). The decrement for TROSA participants was steeper than for non-participants, so we found a ‘negative’ impact.

<sup>23</sup> 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: timely access to early warning information improved.

<sup>24</sup> 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: access to water for domestic usage improved.

<sup>25</sup> 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: access to water for agricultural usage improved.

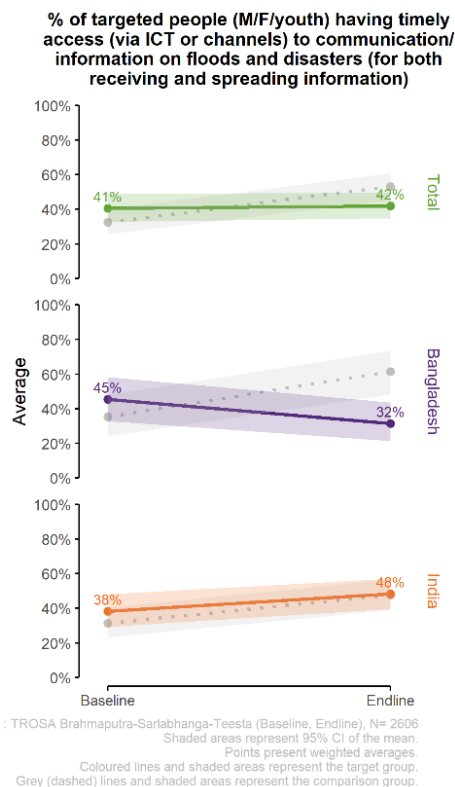
## Early warning systems

Early warning systems (EWS) 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 minimise the negative impact of floods and disasters. In Bangladesh, timely access to communication and/or information on floods and disasters decreased for TROSA river basin communities (from 45% at the baseline to 32% at the endline) (Figure 16). However, the contrary happened for non-participants, for whom timely access to information on water-related shocks increased. Hence, we found the so-called 'negative impact'. Reflection workshop participants were very surprised with these results. According to them, in the era of technology, communities are consistently provided early warning information by means including television, radio, and mobile phones. In addition, TROSA participants have been informed about weather forecasts (for instance,

high rainfall upstream indicates a flood warning downstream). This should have led to higher early warning information access for TROSA participants than for non-participants. Because of technological means and TROSA activities on early warning, according to workshop participants, access to timely early warning information should have been higher for TROSA participants than for non-participants; if not, it should at least have been the same.

In India, the percentage of TROSA participants with timely access to early warning information increased from 38% at the baseline to 48% at the endline. Since non-participants also saw their timely access increasing, we could not make strong impact claims. However, it is very likely that TROSA has contributed to improved timely access, since TROSA in India extensively worked on improving early warning information access. This was also the general perception of reflection workshop participants. According to them, TROSA has considerably contributed to improved early warning systems. For instance, TROSA has worked through volunteers who coordinated and disseminated early warning information. This is done, for example, through WhatsApp groups, which reached among others community members, local authorities and partner staff. These groups were deemed to work very effectively and might have reached communities way beyond TROSA target areas if people have forwarded the messages to their relatives. Hence, it is very likely that early warning information has also reached comparison areas through these volunteers and groups. This might explain why early warning information access for non-participants improved as well (and, according to workshop participants, it might even be claimed as an indirect impact of TROSA). The fact that early warning information is now spread through, for instance, WhatsApp and other ICT developments ensure that the information increasingly has become timely. Herein, the early warning system developed by TROSA differs from

Figure 16



the traditional warning systems, as people now get on-time information from official sources. Hence, the reduced blockages in spreading news allow people to act rapidly.

### **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 ecosystems<sup>26</sup>. At the endline, 41% of TROSA participants in Bangladesh and 38% in India depended on river basins for agricultural activities. In Bangladesh, there was an increase in the percentage of TROSA participants with sufficient access to water for agricultural use (from 47% at the baseline to 97% at the endline; Figure 17)<sup>27</sup>. However, since less non-participants had access to water for agricultural usage at the baseline and almost all of them now, at the endline, reported to have access, the trend was steepest for non-participants. This explains why we found the so-called 'negative impact' even though access to agricultural water has improved greatly. In India, we also found increases in the access to water for agricultural usage (from 5% at the baseline to 34% at the endline)<sup>28</sup>. Increases were similar for non-participants, so we cannot attribute the improved access to water solely to TROSA.

There was a slight increase in access to water for domestic usage in Bangladesh (Figure 18)<sup>29</sup>. It increased from 53% at the baseline to 61% at the endline. We found a 'negative impact' since access to water for domestic usage increased even steeper for non-participants. However, this steeper increase for non-participants was something that did not resonate with reflection workshop participants. In India, there was also an increase in water access for domestic usage (from 11% at the baseline to 32% at the endline). Again, non-participants experienced similar increases, so we could not make strong impact claims.

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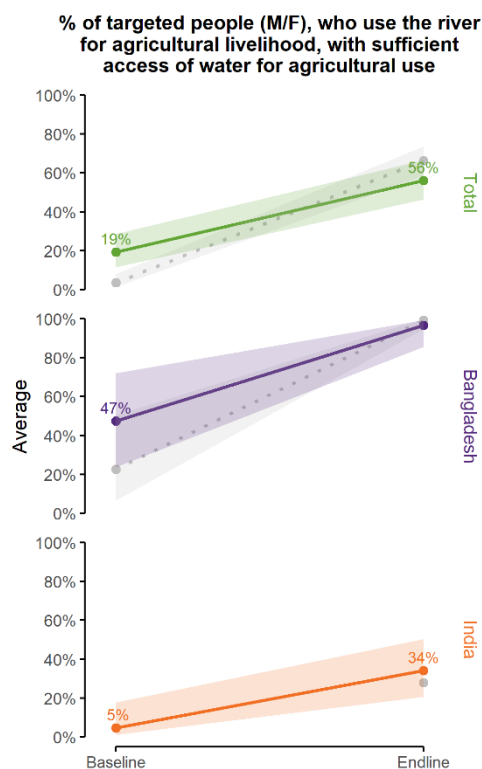
<sup>26</sup> Food and Agricultural Organization of the United Nations (2017). Water for Sustainable Food and Agriculture: A report produced for the G20 Presidency of Germany. Rome: Food and Agricultural Organization of the United Nations [FAO].

<sup>27</sup> 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.

<sup>28</sup> Idem.

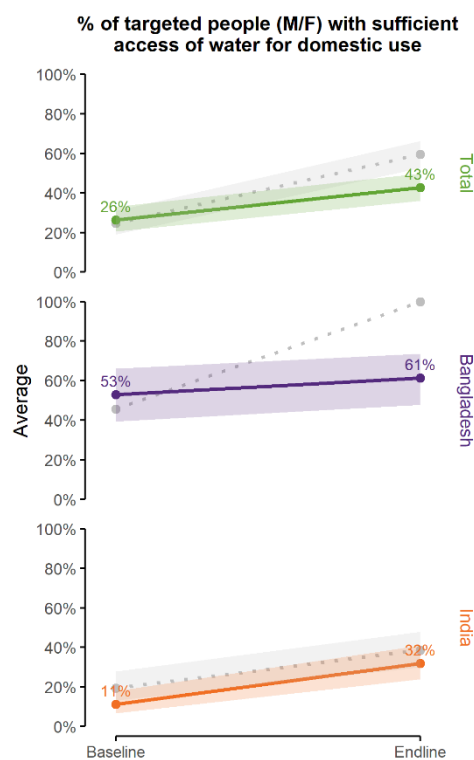
<sup>29</sup> Percentages represent those community members who mentioned to have sufficient water throughout the year.

Figure 17



e. TROSA Brahmaputra-Sarabhangha-Teesta (Baseline, Endline), N= 970  
 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.

Figure 18



f. TROSA Brahmaputra-Sarabhangha-Teesta (Baseline, Endline), N= 2606  
 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.

Lastly, at the endline, the main source of drinking water for TROSA participants in both Bangladesh and India was a tube well/ borehole (99% and 82%, for Bangladesh and India, respectively)<sup>30</sup>. In Bangladesh, perceived water quality decreased. At the baseline, 77% of TROSA participants mentioned the quality of drinking water to be good, very good or excellent, which decreased to 69% at the endline. In India, the percentage of TROSA participants perceiving the drinking water quality to be good increased from 31% at the baseline to 51% at the endline. In both countries, participants and non-participants saw similar changes in their perception on drinking water quality.

## 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 <sup>31</sup>	Total	Bangladesh		India		
	Total	Women	Men	Total	Women	Men

<sup>30</sup> In India, the percentage of TROSA participants using surface water as main source for domestic water increased sharply: from 1% at the baseline to 15% at the endline. In Bangladesh, the main water source for domestic water was more or less the same between the baseline and the endline.

<sup>31</sup> The indicators in this section are formulated for only one gender. Hence the table mentions 'Not Applicable' (NA) for the other gender.

<b>Baseline-Endline data</b>		<b>Is there a significant effect for the target group over time? (Impact)</b>						
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
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	=	NA	NA	=	NA	NA	=
<b>Endline data only</b>		<b>Is there a significant effect for the target group at endline?</b>						
5.6	% of targeted men (M) reporting increased time spend on child care	=	NA	NA	=	NA	NA	=

### Women's participation in water governance

Access and control over water resources play 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 participate in decision-making around water access and control meaningfully.

In Bangladesh, around two in three women wanted to be engaged in water governance at both the baseline and endline. Hence, willingness to engage is quite high and did not change over time (also for non-participants). In India, most women indicated to be willing to engage in water governance at the endline (84%). There was a slight decrease compared to the baseline (95%) (for both participants and non-participants).

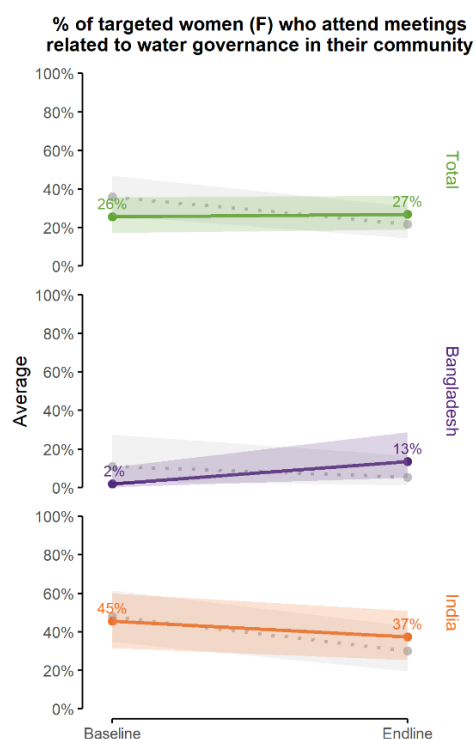
Higher levels of engagement are expected to translate into attendance and participation. In Bangladesh, in terms of attendance in meetings related to water governance, there was an increase for TROSA participants from 2% at the baseline to 13% at the endline (Figure 19). For non-participants, attendance rates slightly dropped, hence we found a positive impact of TROSA in improving women's attendance rate in water governance meetings. In the reflection workshop, participants mentioned that the Nodi-Boithoks, provided through TROSA, have established a community platform for resolving water-related issues. This platform facilitated increased opportunities for women to express their opinions against local inconsistencies. According to workshop participants, these types of opportunities were not there yet before the program.

A different scenario in terms of women's attendance rate in water governance meetings is seen in India. At the baseline, on average, 45% of female TROSA participants attended water governance meetings, which slightly decreased to 37% at the endline. Workshop participants disagreed on this result. They mentioned that, on the contrary, more women are attending meetings now than before. For instance,

women participated in meetings such as in the VDMC and WUG and in meetings related to GPDP to discuss and find solutions to water-related issues.

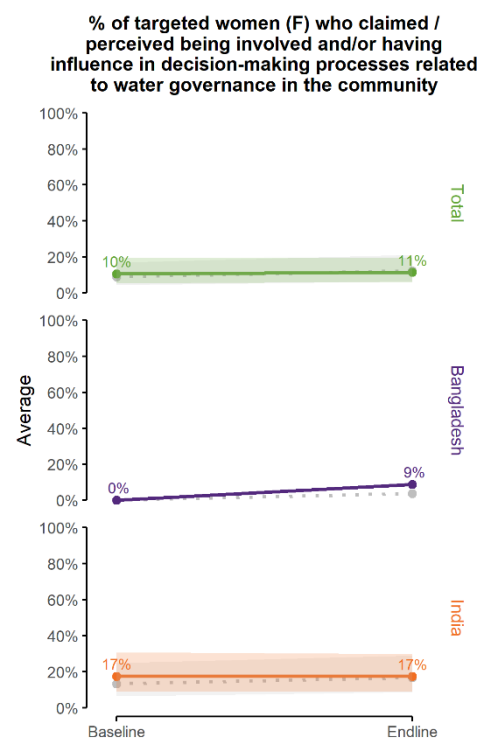
In Bangladesh, women’s perceived knowledge about decision-making processes related to water governance improved. At the baseline, almost no female TROSA participants mentioned being knowledgeable about water governance decision-making. This improved to 32% at the endline and it was also the case for non-participants. In India, women’s knowledge on water governance decision-making decreased from 47% at the baseline to 32% at the endline. Knowledge among non-participants decreased as well.

**Figure 19**



: TROSA Brahmaputra-Sarlahanga-Teesta (Baseline, Endline), N= 1146  
 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.

**Figure 20**



: TROSA Brahmaputra-Sarlahanga-Teesta (Baseline, Endline), N= 1040  
 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.

However, 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 feeling involved in decision-making processes in the community; 2) whether women report having influence in decision-making processes in the community; and 3) whether women report being involved in making important decisions in the water governance meetings they attend (Figure 20). Overall, the involvement of female TROSA participants in decision-making improved in Bangladesh (from 0% at the baseline to 9% at the endline), while it stayed the same in India (17% at both the baseline and the endline). Workshop participants in Bangladesh mentioned that empowerment activities for women were implemented for the first time under TROSA. Hence, this explains why involvement in decision-making improved but is still minimal. However, workshop participants also highlighted women’s progress in expressing their concerns and negotiating with the local government to solve issues. For instance, the women groups from Kurigram raised their voice against illegal sandmining activities in their community and, with the government’s support, it was stopped. In the case of India, TROSA activities boosted women’s leadership capacities. For example, workshop participants



mentioned that TROSA has implemented many activities, including "women champions". In this activity, TROSA, jointly with United Nations Development Program (UNDP), selected 42 women and provided water-related and leadership trainings. Moreover, workshop participants also mentioned that women are now taking leadership positions, for instance, as village representatives.

These percentages show that, even though attendance may have improved or stayed more or less the same, this does not necessarily mean that women get the opportunity to meaningfully participate in meetings. Hence, it is important to interpret the findings in the context of high patriarchy. This points to the importance of shifting social norms: 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.

### **Men's attitudes and behaviour towards female leadership**

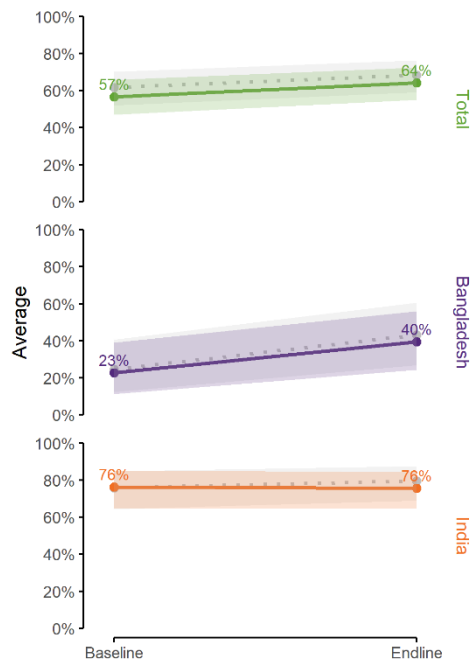
As mentioned above, positive attitudes towards women's participation in decision-making are needed to increase the participation and influence of women. In Bangladesh, male TROSA participants were more supportive of female leadership now than at the baseline (it improved from 23% at the baseline to 40% at the endline; Figure 21). However, the attitudes of non-participants improved at the same pace, and we cannot attribute the change in attitudes solely to TROSA, but it is very likely that at least there is a positive contribution of TROSA. All the participants in the reflection workshop in Bangladesh agreed that men are now more supportive of women's leadership than before. However, they did add a note of caution, namely that it is still questionable whether the male respondents were truly supportive or simply have provided a positive impression.

In the case of India, almost eight out of ten male TROSA participants mentioned being supportive of women's leadership. This was the case at both the baseline and the endline, hence attitudes did not change over time. Similar results were found for non-participants.

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 childcare responsibilities. Hence, we estimated the percentage of men with increased time spent on child care as compared to the situation at the baseline<sup>32</sup>. Only few male TROSA participants at the endline mentioned increased time spent on childcare (8% in Bangladesh and 15% in India). Percentages for participants and non-participants were more or less similar.

**Figure 21**

**% of targeted men (M) with attitudes that are supportive of womens leadership in water governance and/or who know how and are willing to support womens leadership**



TROSA Brahmaputra-Sarlabhanga-Teesta (Baseline, Endline), N= 1457  
 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.

<sup>32</sup> 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.

# 5 LEARNING QUESTIONS

In addition to analysing TROSA's impact on its formulated outcomes, we analysed the extent to which TROSA participants are aware of opportunities around transboundary trade and related barriers (section 5.1), as well as the relationship between having a transboundary outlook and satisfaction with cross-border collaboration (section 5.2).

## 5.1 TRANSBOUNDARY TRADE

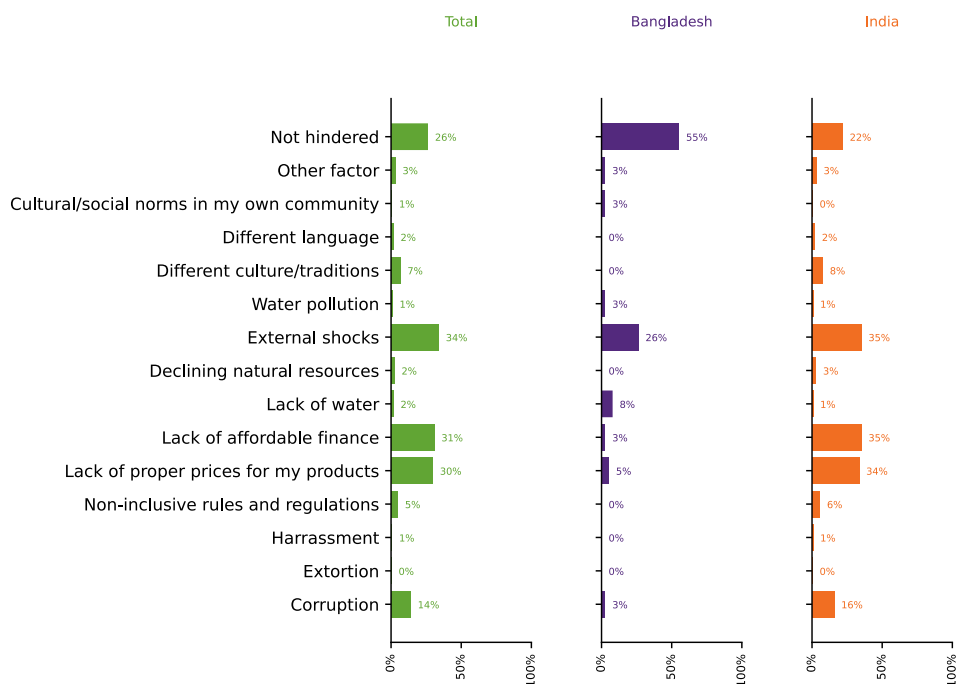
Around 14% of TROSA participants in Bangladesh and 56% in India were involved in trading (agriculture allied products and/or fisheries). In India, percentages were higher for male TROSA participants compared to female (63% vs 45%). In Bangladesh, similar percentages of men and women were involved in trading.

In Bangladesh, the majority of TROSA participants involved in trading did so in-country: only 14% of traders mentioned interacting with cross-border communities for trade and/or income-generating activity reasons. In India, transboundary trade was more common: 70% of the traders mentioned interacting with cross-border communities for trade and/or income-generating activity reasons on a daily or weekly basis. Only 10% were not involved in transboundary trade.

Respondents involved in trading were asked what factors, if any, were hindering them to trade with cross-border communities (Figure 22). In Bangladesh, more than half of TROSA participants (55%) mentioned not being hindered in transboundary trade. This was 22% for India. In Bangladesh, the biggest hindering factor was external shocks, like floods and erosion. In India, in addition to external shocks (35%), other hindering factors included lack of affordable finance (35%), lack of proper prices (34%), and corruption (16%). Figures were similar for male and female traders.

Figure 22

Which factors hinder you most in trading with cross-border communities?



Source: TROSA Brahmaputra-Sarlabhanga-Teesta Basin (Endline Target), N=285.

## 5.2 TRANSBOUNDARY OUTLOOK AND CROSS-BORDER COLLABORATION

TROSA has extensively worked on improving cross-border collaboration. In Bangladesh, few TROSA participants at the endline had a transboundary outlook: 24% mentioned cross-border communities to respect them and 19% mentioned having similar traditions as cross-border communities. In India, slightly over half of TROSA participants mentioned cross-border communities to respect them (61%) and to be similar to cross-border communities in terms of traditions (54%). TROSA participants in Bangladesh had a more positive transboundary outlook compared to non-participants. We did not find a significant difference between TROSA participants and non-participants in India in terms of their transboundary outlook.

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 the 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 outlook<sup>33</sup>.

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 the cross-border collaboration. Hence, when people have a transboundary outlook, they are more likely to be satisfied with the cross-border collaboration, than when they would have a more in-country focus<sup>34</sup>.

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 increases their satisfaction with cross-border collaboration. On the other hand, increased satisfaction with cross-border collaboration augments the transboundary outlook of community members.

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<sup>33</sup> 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.

<sup>34</sup> 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.

# 6 CONCLUSIONS

This chapter presents the conclusions of the endline study of the TROSA program in the Brahmaputra-Saralbhanga-Teesta basin. The endline study has assessed to what extent the TROSA program had an impact on reduced poverty and marginalisation 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 MARGINALISATION OF RIVER BASIN COMMUNITIES, AND CAN THESE CHANGES BE ATTRIBUTED TO THE TROSA PROGRAM?

The overall aim of the TROSA program was to reduce poverty and marginalisation of vulnerable river basin communities. In Bangladesh, at the endline, 8% of TROSA participants mentioned at least two of poverty reduction indicators (decreased loans, increased income, increased savings). We found positive impact of TROSA in reducing poverty. TROSA activities such as the *bandal* initiative contributed to protecting communities' assets, and it has also provided employment opportunities through its construction. Furthermore, online marketing systems were facilitated during the pandemic, which significantly reduced poverty in the region or prevented deterioration. In India, 13% of TROSA participants experienced reduced poverty. However, changes in poverty were similar for non-participants, so we could not make strong impact claims. Since TROSA has provided trainings on how to use water optimally and how to enhance cultivation, reflection workshop participants had expected more poverty reduction for participants than for non-participants.

In addition to poverty reduction, an overall objective of the TROSA program was improving the resilience of river basin communities to climate-related extreme events. We evaluated two aspects of resilience: absorptive capacities and adaptive capacities. In Bangladesh, we found a reduction in absorptive capacity for both TROSA participants and non-participants (from 11% to 4% for participants). This negative trend did not resonate with reflection workshop participants, since TROSA facilitated access to different coping mechanisms, such as disaster mitigation trainings, early warning systems, and the provision of water filtering taps and crop seeds. In India, absorptive capacities increased from 1% at the baseline to 10% at the endline. We could not make strong impact claims, since non-participants followed a similar trend. Nonetheless, reflection workshop participants mentioned that likely TROSA at least positively contributed, if not attributed, to increased absorptive capacities, since TROSA organised many awareness-raising activities on improving resilience. Furthermore, likely there have been spill-over effects of TROSA into adjoining comparison areas, including activities of other actors in



comparison areas. Hence, this could explain the increase in absorptive capacities for non-participants and point to indirect impacts of TROSA.

Adaptive capacities improved in Bangladesh (from 3% at the baseline to 14% at the endline). In India, however, the adaptive capacities of communities decreased from 45% at the baseline to 31% at the endline.

Lastly, in Bangladesh, the knowledge on dealing with floods of TROSA participants declined from 62% at the baseline to 54% at the endline. Since it improved for non-participants, we found a so-called 'negative impact'. In India, TROSA participants' and non-participants' knowledge decreased (for TROSA participants, it fell from 61% at the baseline to 47% at the endline). According to workshop participants, it is very likely that the survey questions asking about knowledge on floods were confusing for respondents and that there might have been a misunderstanding between knowledge and action. TROSA activities should have contributed to increased knowledge on dealing with floods, but this does not necessarily mean that the actual behaviour of dealing with floods also improved.

### **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 stakeholders that rivers are shared. In both Bangladesh and India, more TROSA participants were aware of cross-border interdependency at the endline than at the baseline (in Bangladesh, it improved from 16% to 40%; in India, it improved from 14% to 24%). Positive changes could not be claimed by TROSA alone, although it is likely that TROSA contributed to improved cross-border awareness.

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. In Bangladesh, slightly more households at the endline compared to the baseline took preventive measures to protect key productive and physical assets (11% vs 13%). The positive change was steeper for non-participants. Workshop participants in Bangladesh mentioned that communities were now using various precautionary measures learned from prior disasters. Furthermore, disaster mitigation knowledge and training facilitated by TROSA also reached non-participants, suggesting spill-over effects of TROSA. In India, there was a decrease in the percentage of people taking preventive measures for both participants and non-participants (from 55% to 28%). Workshop participants did not agree with the decline. According to them, various TROSA activities, such as trainings and early warning information, have improved communities' awareness and knowledge of floods to take action to prepare themselves.

Effective collaboration with the local government, CBOs and CSOs, and cross-border communities might improve communities' involvement in water governance, and subsequently their vulnerability to water-related shocks. In Bangladesh, more TROSA participants indicated collaborating with the government on water governance at the endline than at the baseline. For instance, government officials participated in basin dialogues facilitated by TROSA and provided financial and legal support on water-related issues. Furthermore, there was a slight increase in effective collaboration between communities and cross-border communities, but we could not strongly make impact claims. In India, the collaboration between communities and the local government increased. TROSA positively impacted the

collaboration between communities and the local government for women. Regarding collaboration between communities and cross-border communities, there was a sharp increase for TROSA participants (from 19% to 46%). Again, we found a positive impact for women. Reflection workshop participants agreed with the improvements. However, in their experience, collaboration levels should have even been higher, because of the many activities implemented under TROSA. For instance, the establishment of cross-border committees between communities in India and Bhutan, and Indo-Bhutan-Bangladesh cross-border trade through inland waterways.

Part of active and effective involvement in water governance is standing up for one's rights related to water. In Bangladesh, more TROSA participants now than at the baseline felt capable of complaining and were confident that their complaints were heard. However, this increase was also found for non-participants. In India, there were no significant changes when comparing the endline to the baseline. In both Bangladesh and India, still around seven in ten TROSA participants at the endline did not feel capable of complaining and being heard, hence there remains room for improvement in this indicator.

Lastly, the majority of TROSA participants in Bangladesh indicate *not to have* regular disagreements with the local government (84%) and with cross-border communities (93%). However, the incidence of disagreements with the local government increased compared to the baseline (from 4% to 16%). In India, less TROSA participants at the endline had disagreements with the local government (64%) as compared to the baseline (46%). On the contrary, the incidence of disagreements with cross-border communities increased (from 17% to 49%). Reflection workshop participants were surprised by this result. In their experience, TROSA activities along both sides of the river strengthened the collaboration between cross-border communities. Hence, they would have expected a reduction in the incidence of disagreements with cross-border communities.

### **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. This should minimize the negative impact of floods and disasters. In Bangladesh, timely access to communication and/or information on floods and disasters decreased for TROSA river basin communities (from 45% to 32%). However, the contrary happened for non-participants; hence, we found a 'negative impact'. Reflection workshop participants were very surprised with these results. According to them, in the era of technology, communities consistently have access to information. Hence, TROSA communities' access should have at least have been the same to that of non-participants. In India, the percentage of TROSA participants with timely access to early warning information increased from 38% at the baseline to 48% at the endline. Although we could not make strong impact claims, it is very likely that TROSA has contributed to improved timely access. For instance, TROSA has worked through volunteers who coordinated and disseminated early warning information, which reached among others community members, local authorities, partner staff, and moreover this might have reached communities way beyond the TROSA target area. This might explain why early warning information access for non-participants improved as well, and point to an indirect impact of TROSA.

In Bangladesh, access to water for agricultural use greatly improved (from 47% to 97%). However, the increase was even steeper for non-participants. In India, we also found increases for both participants and non-participants (for participants, from 5% at the baseline to 34% at the endline). In terms of water access for domestic usage, in Bangladesh there was a slight increase from 53% at the baseline to 61% at the endline. Again, the increase was steeper for non-participants. In India, we found increases for both participants and non-participants (for participants, from 11% at the baseline to 32% at the endline).

Lastly, at the endline, the main source of drinking water for TROSA participants in both Bangladesh and India was a tube well/ borehole (99% and 82%, for Bangladesh and India, respectively). Whereas in Bangladesh the perceived water quality decreased, in India it improved.

#### **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?**

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 participate in decision-making around water access and control. In Bangladesh, at both the baseline and the endline, around two in three female TROSA participants and non-participants wanted to be engaged in water governance. In India, eight in ten female TROSA participants and non-participants indicated to be willing to engage in water governance at the endline. There was a slight decrease compared to the baseline (95% for female TROSA participants).

In terms of attendance in meetings related to water governance, in Bangladesh, there was an increase for female TROSA participants from 2% at the baseline to 13% at the endline. We found a positive impact of TROSA in improving women's attendance rate in water governance meetings. For instance, Nodi-Boithoks, provided through TROSA, have established a community platform for resolving water-related issues and expressing women's opinions. In India. At the baseline, on average, 45% of female TROSA participants attended water governance meetings, which slightly decreased to 37% at the endline. Workshop participants disagreed on this result. In their opinion, more women were attending meetings now than before (for instance in meetings such as in VDMC and WUG).

Women's perceived knowledge about decision-making processes related to water governance improved in Bangladesh (for participants, 1% to 32%). However, knowledge also improved for non-participants. In India, women's knowledge on water governance decision-making decreased from 47% at the baseline to 32% at the endline. Knowledge among non-participants decreased as well.

Overall, the involvement of female TROSA participants in decision-making improved in Bangladesh (from 0% at the baseline to 9% at the endline). Empowerment activities for women were implemented for the first time under TROSA; hence, this explains why involvement in decision-making improved but is still minimal. In India the involvement of female TROSA participants in decision-making did not change (17% at both the baseline and the endline). However, according to workshop participants workshop, TROSA activities boosted women's leadership capacities (for example, through selecting and working with "women champions").

Lastly, positive attitudes towards women's participation in decision-making are needed to increase the participation and influence of women. In Bangladesh, male TROSA participants were more supportive of female leadership now than at the baseline (it improved from 23% to 40%). However, the attitudes of non-participants improved at the same pace. Hence, we cannot attribute the change in attitudes solely to TROSA, but it is very likely that at least there is a positive contribution of TROSA. All the participants in the reflection workshop in Bangladesh agreed that men are now more supportive of women's leadership than before. However, they did add a note of caution, namely that it is still questionable whether the male respondents were truly supportive or simply have provided a positive impression. In the case of India, there is no significant change over time; almost eight out of ten male TROSA participants mentioned being supportive of women's leadership. Similar results were found for non-participants.

## 6.2 CONCLUSIONS TO LEARNING QUESTIONS

### 6.2.1 TO WHAT EXTENT ARE PEOPLE, ESPECIALLY WOMEN, AWARE OF THE OPPORTUNITIES AROUND TRANSBOUNDARY TRADE? AND WHAT ARE BARRIERS FOR FEMALE TRADERS TO THRIVE IN THE CROSS-BORDER BUSINESS ENVIRONMENT?

TROSA activities in the Brahmaputra-Saralbhanga-Teesta basin included a focus on inclusive trade through transboundary waterways. Around 14% of TROSA participants in Bangladesh and 56% in India were involved in trading (agriculture allied products and/or fisheries). In India, percentages were higher for male TROSA participants, and in Bangladesh, they were similar for men and women.

In Bangladesh, most TROSA participants involved in trading did so in-country: only 14% of traders mentioned interacting with cross-border communities for trade and/or income-generating activity reasons. In India, cross-border trade was more common (70%).

Factors hindering transboundary trade in Bangladesh include external shocks, like floods and erosion. In India, in addition to external shocks, other hindering factors included lack of affordable finance, lack of proper prices, and corruption. In both countries, barriers were similar for male and female traders.

### 6.2.2 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. In Bangladesh, few TROSA participants at the endline had a transboundary outlook: 24% mentioned cross-border communities to respect them and 19% mentioned having similar traditions as cross-border communities. In India, these percentages were 61% and 54%, respectively. TROSA participants in Bangladesh had a more positive transboundary outlook compared to non-participants. We did not find a significant difference between TROSA participants and non-participants in India.

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, compared to people who don't have this transboundary

outlook. Furthermore, we found that people with a transboundary outlook are more likely to be satisfied with cross-border collaboration than when they would have a more in-country focus.

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 increases their satisfaction with cross-border collaboration. On the other hand, increased satisfaction with cross-border collaboration augments the transboundary outlook of community members.

### 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, the most important findings were the progress made regarding women's participation in water governance (outcome 5), improved collaboration with cross-border communities and local governments (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 did not match the experience of experts in Bangladesh. Hence, by taking a quantitative approach to the endline study, we have likely missed out on the many inspiring individual stories of change 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 India and Bangladesh residing along the Brahmaputra-Saralbhanga-Teesta basin, but could also be relevant for other river basin communities and for the 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.
- **Enhance skill development of women:** Linked to the recommendation above, future programs should continue to support women in their skills and capacity development, including leadership skills. TROSA has successfully boosted women's confidence in taking up leadership roles. Hence, continued support of women, for instance through soft skills development, will contribute to their empowerment and meaningful participation in water governance.
- **Increase the focus on water-related livelihood development for poverty reduction:** The results show that poverty reduction has not seen big jumps in the past five years. The Covid-19 pandemic has had an adverse effect on poverty. TROSA has worked, on the side, on water-related livelihoods, mainly through advocacy and influencing work. However, program staff believe that future programs should include a greater emphasis on direct livelihood support to decrease poverty numbers, as well as to ensure continued buy-in from the community. In short, future programs should combine advocacy efforts with direct livelihood programming on the ground. These livelihood activities should include both women as well as men, especially since Covid-19 has triggered migration and the need for new types of livelihoods.
- **Amplify communities' voices.** It is essential that citizens have and use the power to speak up to reach out to stakeholders and find solutions to specific (water-related) issues. Around seven out of ten TROSA participants *did not* feel capable of complaining and being heard. Hence, there is room for improvements to continue working on empowering communities to raise their voices and stand up for their interest and needs.
- **Continue community participation initiatives up to higher administrative levels:** The TROSA program has effectively strengthened community participation in water governance (for instance, through Nodi-Boithoks and cross-border committees). 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.

- **Continue the research on and implementation of the *bandaling* initiative:** The bandaling initiative, implemented under TROSA in Bangladesh, has brought success in preventing about three to four kilometers of the riverbank from erosion in Kaunia village, Kurigram district. This success not only helped communities to attract funding from the Upazila chairman, but also encouraged other villages to establish bandals in their own village. Because of these evident successes, future programs should continue conducting research on this initiative and encouraging its implementation.
- **Continue to strengthen working relationships with CBOs/CSOs:** Only very limited TROSA participants at the endline mentioned having working relationships with CBOs. Effective collaboration with the CBOs and CSOs can improve communities' involvement in water governance, and hence their vulnerability to water-related shocks. Future programs should continue to strengthen these relationships.
- **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. Taking this basin-wise approach has contributed considerably to increased transboundary awareness and collaboration, which is a crucial step in improving transboundary water governance.
- **Consider the sustainability of the program, even after program implementation has ended:** Future programmes should consider ways in which to continue and sustain the work and progress made. 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 programme: 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 estimation<sup>35</sup>. 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 Bangladesh, we interviewed the same person in the baseline and the endline for 98% of respondents. For India, this was 91%. However, although we have panel data for most respondents, we decided to implement a repeated cross-sections model as primary estimation model instead of a panel model. This was a pragmatic decision: the former model is more efficient to implement, and going with the panel model would mean we would have to run two separate models in the same analysis (panel model for the matched respondents, and repeated cross-section model for respondents from Saralbhanga subbasin which was only included in the endline sample).

### **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 marginalised 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.

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<sup>35</sup> Athey, S., & Imbens, G. W. (2017). The state of applied econometrics: Causality and policy evaluation. *Journal of Economic Perspectives*, 31(2), p. 3-32.

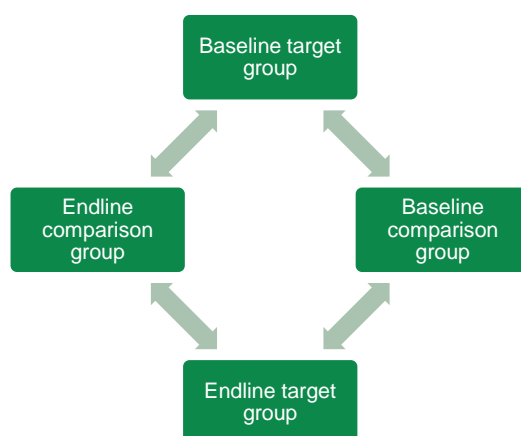
The probability of participating in the program activities is called the propensity score. This probability is not equal for all young people and is unknown<sup>36</sup>.

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 model<sup>37</sup>. 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 23



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

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<sup>36</sup> 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

<sup>37</sup> 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 visualise these parameters.

## 8.2 DETAILS OF THE SAMPLE

Administrative							Baseline			Endline				
Country	State	Sub-basin	District	Municipality/ Subdistrict	Village/ Union	Treatment status	Total	Men	Women	Total	Men	Women		
Bangladesh	-	Teesta	Kurigram	Rowmari	Bandaber	Target	139	70	69	151	72	79		
					Jadurchar	Target	121	62	59	114	56	58		
				Char-Rajibpur	Rajibpur	Comparison	86	43	43	81	41	40		
			Gaibandha	G. Sadar	Mollarchar	Comparison	107	53	54	107	53	54		
India	Lower Assam	Brahmaputra	Dhubri	Bilasipara	Bamuneralga	Target	31	16	15	28	15	13		
					Dwikowa	Target	26	15	11	23	17	6		
					Kataldi Pt 3	Target	31	20	11	28	19	9		
					Fakirpara	Target	26	20	6	23	17	6		
					Hatipota Pt 2	Target	29	19	10	26	17	9		
					Kazaikhata Pt 1	Comparison	27	15	12	25	13	12		
					Suwapata Pt 2	Comparison	32	25	7	0	0	0		
					Suwapata Pt3	Comparison	29	22	7	29	22	7		
					Suwapata Pt5 (Block 2)	Comparison	28	17	11	28	17	11		
					South Salmara-Mankachar	South Salmara	Char Bashir Char	Target	31	20	11	22	15	7
							Manirchar	Target	28	13	15	46	27	19
							Boidergaon	Target	29	21	8	20	13	7
							Maderchar	Target	26	23	3	17	16	1
							Niz Manirchar	Target	30	20	10	21	13	8
			Soto Patakat	Comparison			27	16	11	0	0	0		
			Baladova	Comparison			32	18	14	32	19	13		
			Dhenarkuti	Comparison			29	13	16	29	14	15		
			Tumni Laokuwa	Comparison			30	19	11	30	19	11		
			Katdanga Satdubi Pt 1	Comparison	30	21	9	29	21	8				
			Saralbhanga	Kokrajhar	Saralpara	Mainaoguri Pt.I	Target	0	0	0	27	15	12	
						Sonapur Pt 1	Target	0	0	0	8	0	8	
						Sonapur Pt 2	Target	0	0	0	7	1	6	
						Sonapur Pt 5	Target	0	0	0	7	4	3	
South Saralpara	Target	0				0	0	27	23	4				
Dotma	East Tengaigaon	Comparison			0	0	0	27	11	16				
	Atiabari (Forst Village)	Comparison			0	0	0	27	20	7				
	Lakhimpur	Bipuriah			Gondkoraiti	Comparison	26	7	19	26	9	17		
					Puroni Bahgorah	Comparison	28	15	13	28	17	11		
		Nowboicha			Bhorolua	Target	27	17	10	27	15	12		
Gukanibari			Target	24	10	14	24	12	12					
Phulbari	Target		28	18	10	28	17	11						
Ronabari	Comparison		25	16	9	25	15	10						

				Borosola	Comparison	28	13	15	28	13	15
			Koruna	Gormur Sonapur	Target	26	12	14	0	0	0
			Telahi	Joinpur	Target	31	22	9	31	23	8
				Ajraguri	Target	27	13	14	0	0	0
				Amtola Jamuguri	Comparison	12	3	9	12	3	9
				Mazgaon	Comparison	27	9	18	27	11	16
<b>Total</b>						<b>1313</b>	<b>736</b>	<b>577</b>	<b>1295</b>	<b>725</b>	<b>570</b>
							56%	44%		56%	44%

### 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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