KANTAR PUBLIC

Impact assessment of mangrove restoration & sustainable livelihood development initiatives by JSW Foundation

Study report

April 2022

JSW Foundation

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Study background and methodology

Background

Project title: Mangrove Restoration & Development of Sustainable Livelihood

Background: Mangroves are extremely important to the coastal ecosystems they inhabit. They serve as a buffer between marine and terrestrial communities and protect shorelines from damaging winds, waves, and floods. Mangrove thickets improve water quality by filtering pollutants and trapping sediments from the land, and reduce coastal erosion. Thus, since 2016, the CSR Department of JSW, Dolvi has been working on restoration of mangrove, livelihood and study of biodiversity of Dharamtar Creek on Amba river.

Goal: The overall goal of the initiative is Mangrove restoration along the bund for protecting river erosion, to minimize upsurge wave action which generates due to routine freight haul by shipping, deposits salt on the agriculture fields, leading to loss of soil productivity and improve the livelihoods of rural poor in fragile dry land areas on a sustainable basis, through capacity – building initiatives.

Project Area:

- Amba River Coke- Dharamtar Jetty to Bhal (18 kms stretch)

Research objectives

The overall aim of the study was to understand the effectiveness of the mangrove and sustainable livelihoods program in enhancing the socio-economic well being of the community.

Specific objectives of conducting the research were to-

1	Understand and measure the economic enhancement of the communities through increase in employment opportunities and additional income from alternate livelihoods.
2	Understand the impact of the initiative in improving the environment viz. CO_2 sequestration, improvement in local bio-diversity (basis community perception) and enhancing soil quality.
3	Assess the self-sustenance of the initiatives by measuring the level of community ownership and engagement.

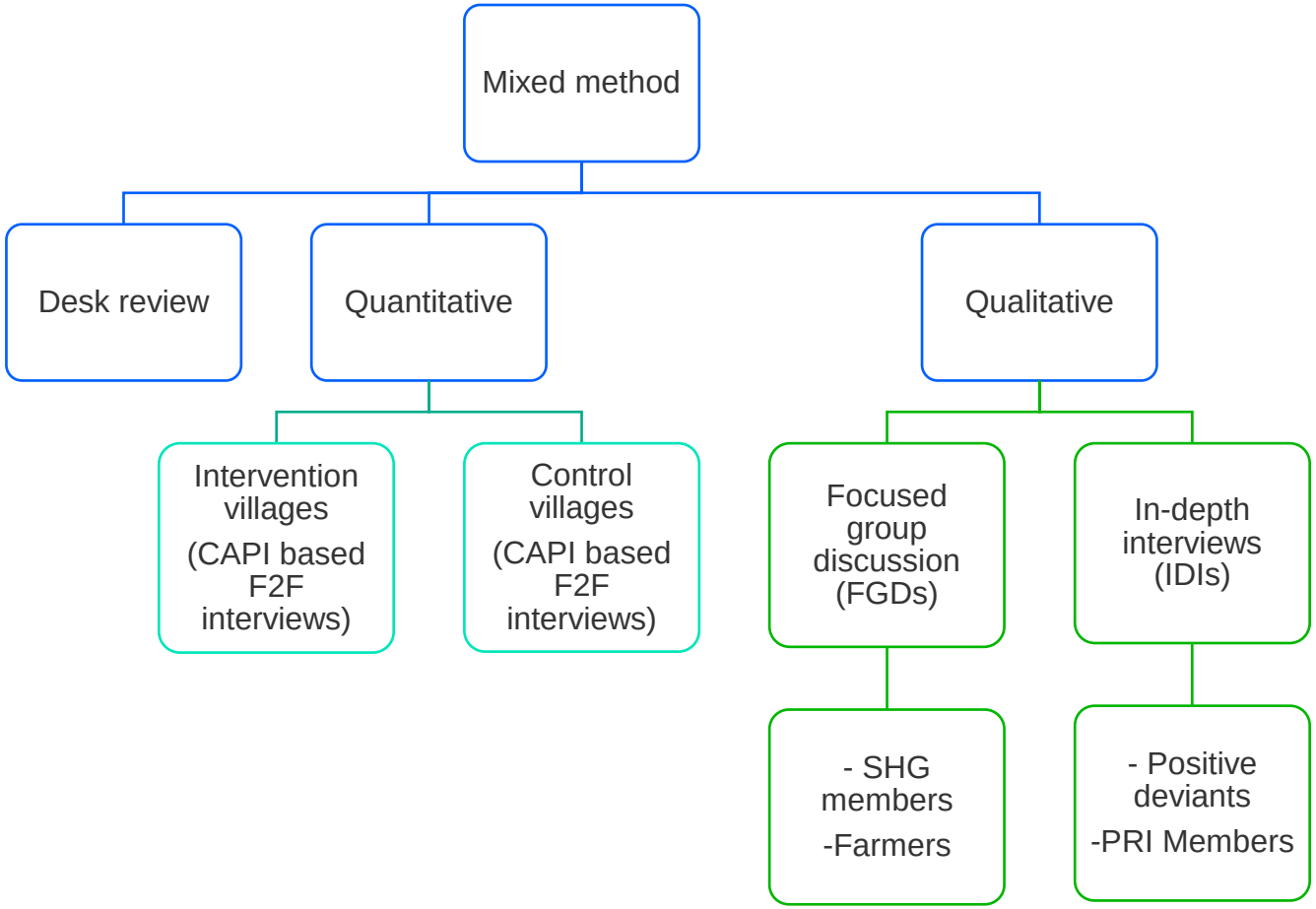
Research framework

The following framework was used to guide the overall research and match the program inputs to intended impact.

Inputs		Outputs	Outcome	Impact
Mangrove restoration and alternate livelihood	Awareness generation Training and capacity building of SHGs Plantation of saplings and bund creation Trainings and capacity building on alternate livelihood	• Number of awareness sessions conducted, and villagers covered • Number of men/women/SHGs trained on mangrove restoration • Number of mangrove saplings planted till date • Number of farmers benefitting from rise in embankment (bund creation) • Number of men/women/SHGs trained for alternate livelihood activities	• Increased awareness among community members • Increase in area under mangrove cover • Decrease in area affected by saline water ingress • Increase in income of community members	• Climate resilience • Increased well-being • Reduced vulnerability

Research design

A mixed method quasi-experimental design was followed to evaluate the program impact, which included a desk review and primary research using both quantitative and qualitative data collection tools.



Sample Distribution- Quantitative

Quantitative sample size

For quantitative aspect of the study, sample size was calculated using the following formulae:

$$n = \frac{t^2 \times p(1-p)}{m^2} \times df$$

Where,

n = required sample size;

z = confidence level at 95% (standard value of 1.96)

p = estimated level of key indicators (assumed at 50% level)

Deff = design effect (considered at 1.3)

Based on the sample size formulae, the sample size for assessment considering non-response was arrived at:

Group	Sample size
Intervention	500
Control	500

Target groups

Intervention: Households from villages benefitting from mangrove restoration program.

Control: Households with similar socio-economic profiles to that of intervention villages

Respondents were the livelihood related decision makers from the households

Sample Distribution- Qualitative

Target Group	FGD	IDI	KII
Farmers with land nearby to the project sites	3	2	-
SHG Members involved in the initiative	3	2	-
PRI Members	-	-	1
Activity-wise total	**6**	**4**	**1**
Total Activities		**11**	

Selection of geography: 6 villages which were part of the initiative for the maximum duration were selected for conducting the qualitative activities.

Study geography and sample distribution

Study area: Dharamtar creek, east banks of Amba river

Maharashtra

Intervention			Control	
Village name	Quantitative sample covered	Qualitative activities covered	Village name	Quantitative sample covered
Bahiram Kotak	37	2	Khaleshree	74
Bhal Vitthal wadi	37	-		
Borve	38	-	Kanhe	74
Div	38	-		
Janavali bedi	-	1	Rave	73
Malegharwadi	36	-		
Masad Budruk	38	-	Dadar	80
Masadbedi	39	-		
Mothe Bhal	36	2	Shahaabaaj	76
Narvel Bedi	36	-		
Shirkichal No.1	40	-	Kamalpada	85
Shirkichal No.2	38	2		
Tamshibandar	37	2	Ghaswad	78
Thakurbedi	37	2		
Wadhav	36	-		
Total	**523**	**11**		**540**

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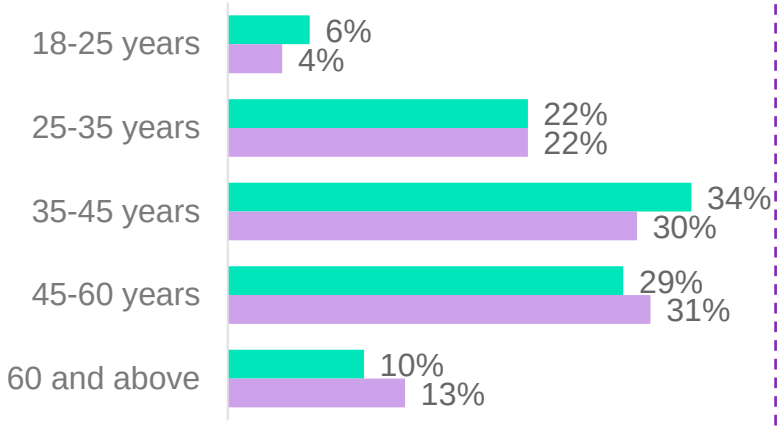
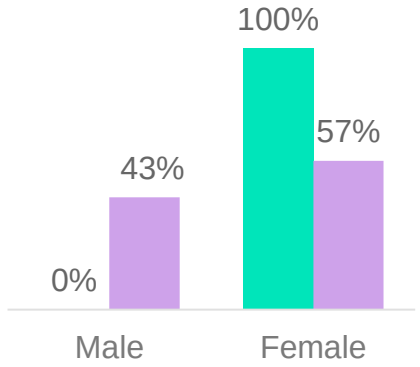
Respondent profiles

Demographics of the respondents

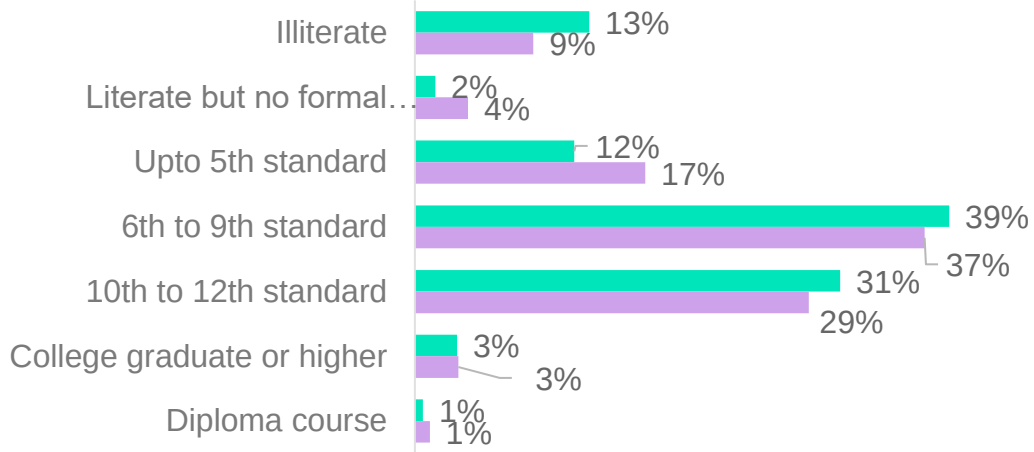
Age of respondents



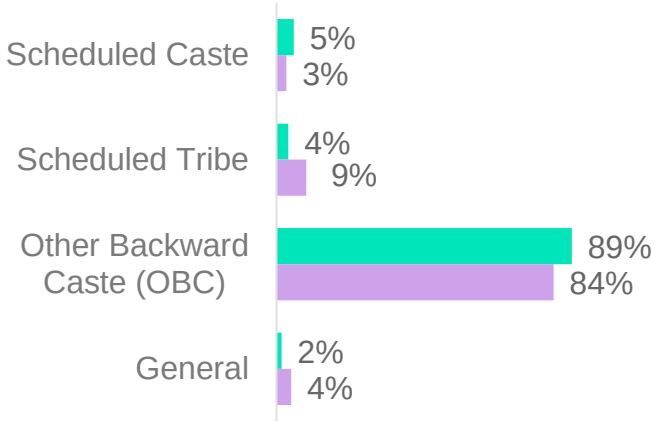
Gender



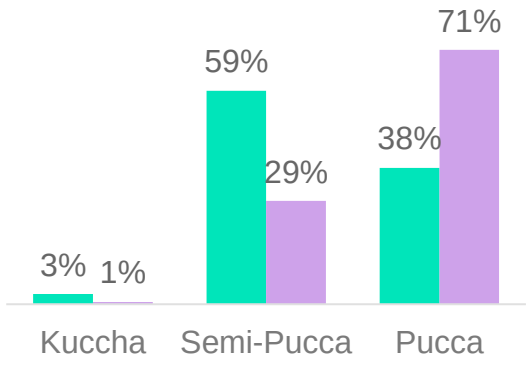
Level of education



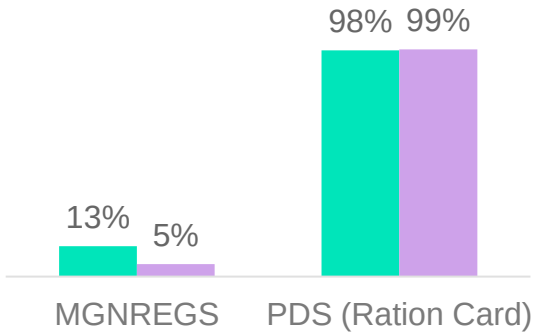
Caste



Type of accommodation



Enrolment in social benefit programs



Average land holding

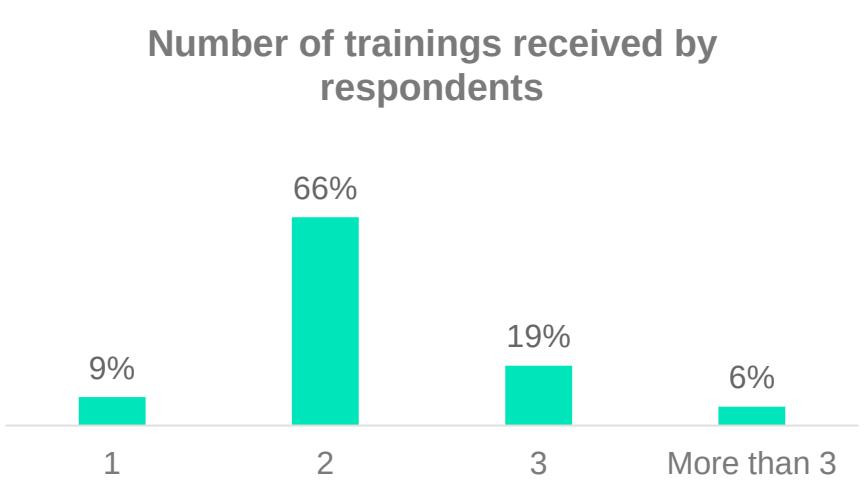
1.12 acre in intervention villages

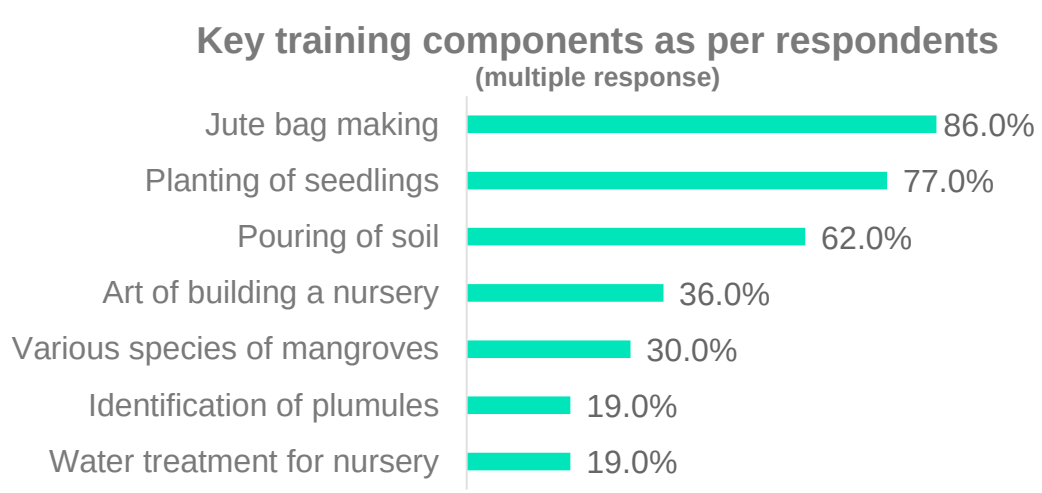
1.25 acre in control villages

3 Findings on program inputs and activities

Benefits received by the community members under the mangrove restoration program (1/2)

- Participation of beneficiaries in mangrove restoration program activities was very high, all the women part of SHGs benefiting from the program mentioned to actively engage in the plantation activities.
- SHG members mentioned to be engaged in plantation activities for around **45-50 days** in the year, during the monsoon period.
- Beneficiaries mentioned to receive adequate support and trainings from the JSW foundation to carry out the requisite activities for managing and planting the mangroves. **93%** respondents in intervention villages mentioned to receive the training, indicating a strong association to the program.





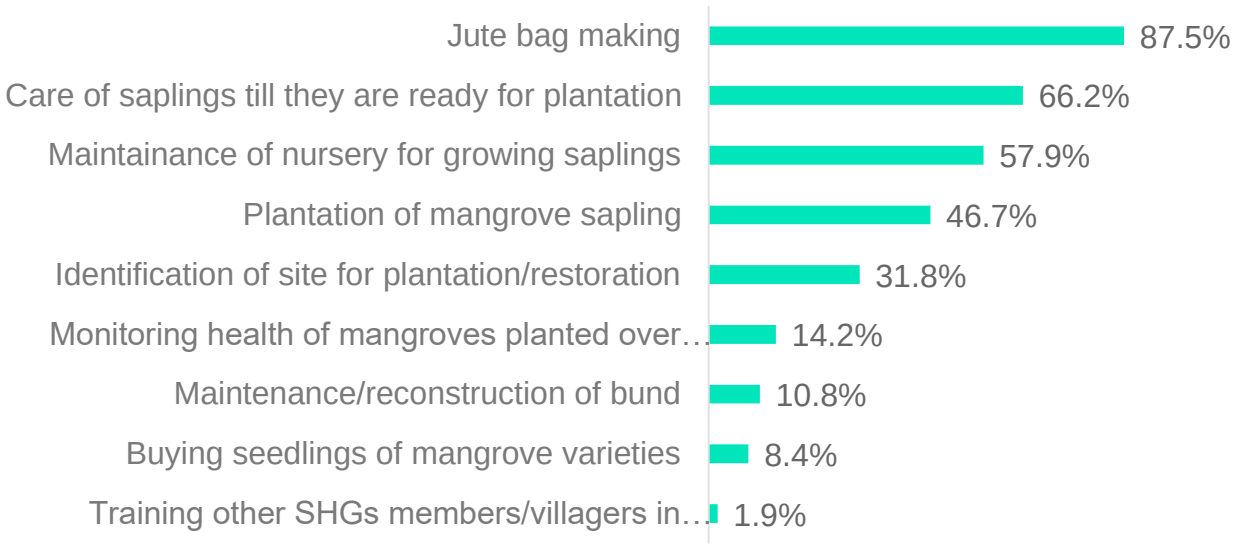
Benefits received by the community members under the mangrove restoration program (2/2)

- SHG members further expressed that during the last few years, more and more SHGs in the villages have started to participate in the program. The mangrove restoration program led to **creation of some of the new SHGs** in the intervention villages.
- However, the amount of plantation work for beneficiaries has reduced as the total work (that is number of saplings to be planted) gets divided equally between all participating SHGs, hence the overall quantum of work has reduced in the last 3-4 years.
- For majority of the SHGs involved in the program, mangrove plantation was their key economic activity. **98%** respondents mentioned that mangrove restoration was the primary economic activity undertaken by their SHG.
- Other than trainings on mangrove plantation, beneficiaries also mentioned to receive **free of cost trainings on tailoring and fish product making**.
- A few farmers also mentioned to set up prawn farming business with the support from JSW foundation.

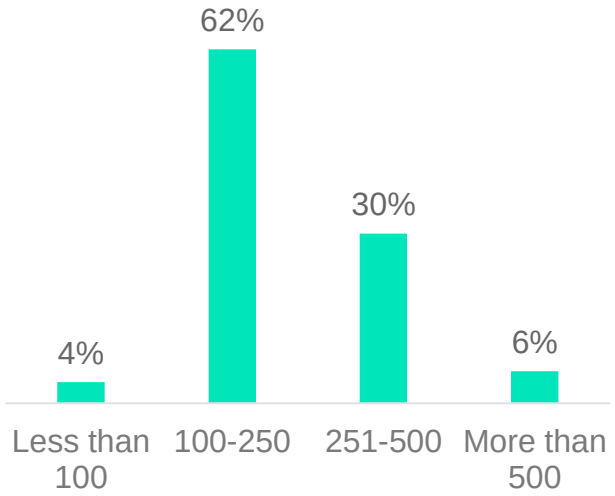
> ***They taught us free of cost so many ladies learned that. Those who were not educated they also learned tailoring work.***
>
> ***- SHG member, FGD, Thakurbedi***

Activities around mangrove restoration undertaken by SHG members (1/2)

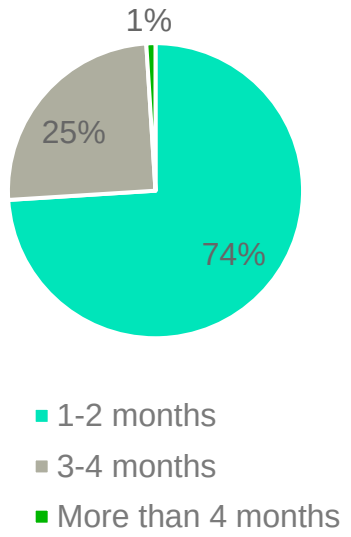
Key activities undertaken by respondents (multiple response)



Number of saplings grown in nursery

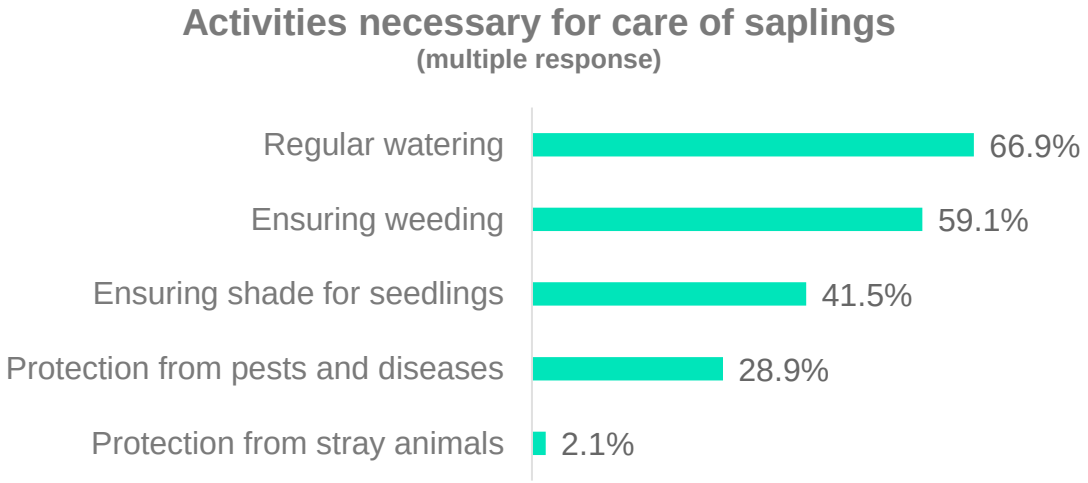


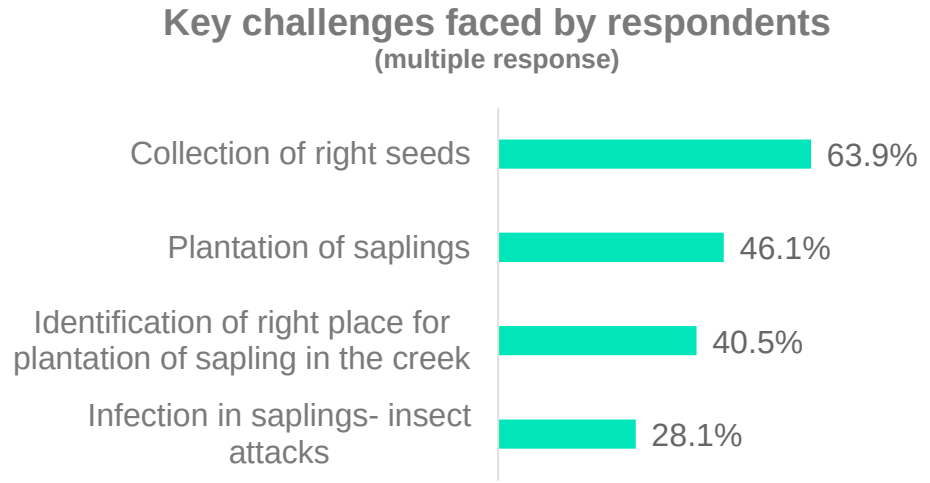
Period of engagement



- SHG women took turns in taking care of the plants in nursery, various duties were assigned to women within the group on rotational basis.
- Once the saplings were transferred from the nursery and planted near the creek, women monitored the survival of plants.
- Mangroves which could not survive in the initial days were replaced with new plants, SHGs prepared **buffer saplings** expecting a non-survival rate of **20-30%.**

Activities around mangrove restoration undertaken by SHG members (2/2)





- Respondents' knowledge around variety of mangroves was found to be low, majority of the respondents **(79%)** mentioned to grow only a single variety of sapling.
- Seed selection by SHG members was done in an arbitrary manner, they mentioned to collect the seeds fallen around the existing mangroves during the monsoon period.
- One of the **major challenges** faced by SHG members in the process is the **planting of saplings at the location**, due to the muddy nature of the soil in the area. For plantation purposes women were supported by their spouses.

> ***In so much mud ladies don't go. So, we only go there to help them. In such dense mud they cannot walk that is why they need help. We dig a hole and plant that tree.***
>
> ***- Farmers, FGD, Janvelibedi***

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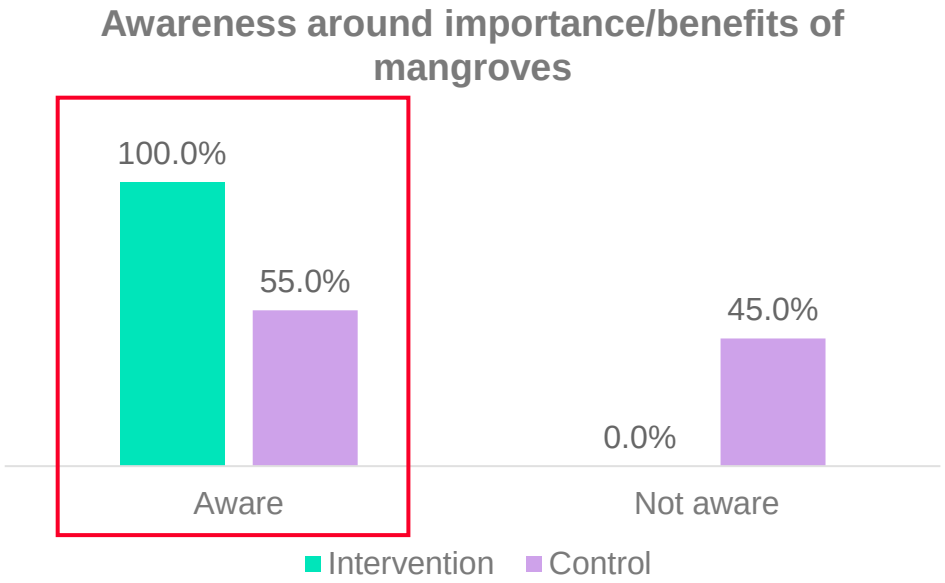
Intervention (n= 523)

4 Findings on program outputs and outcomes

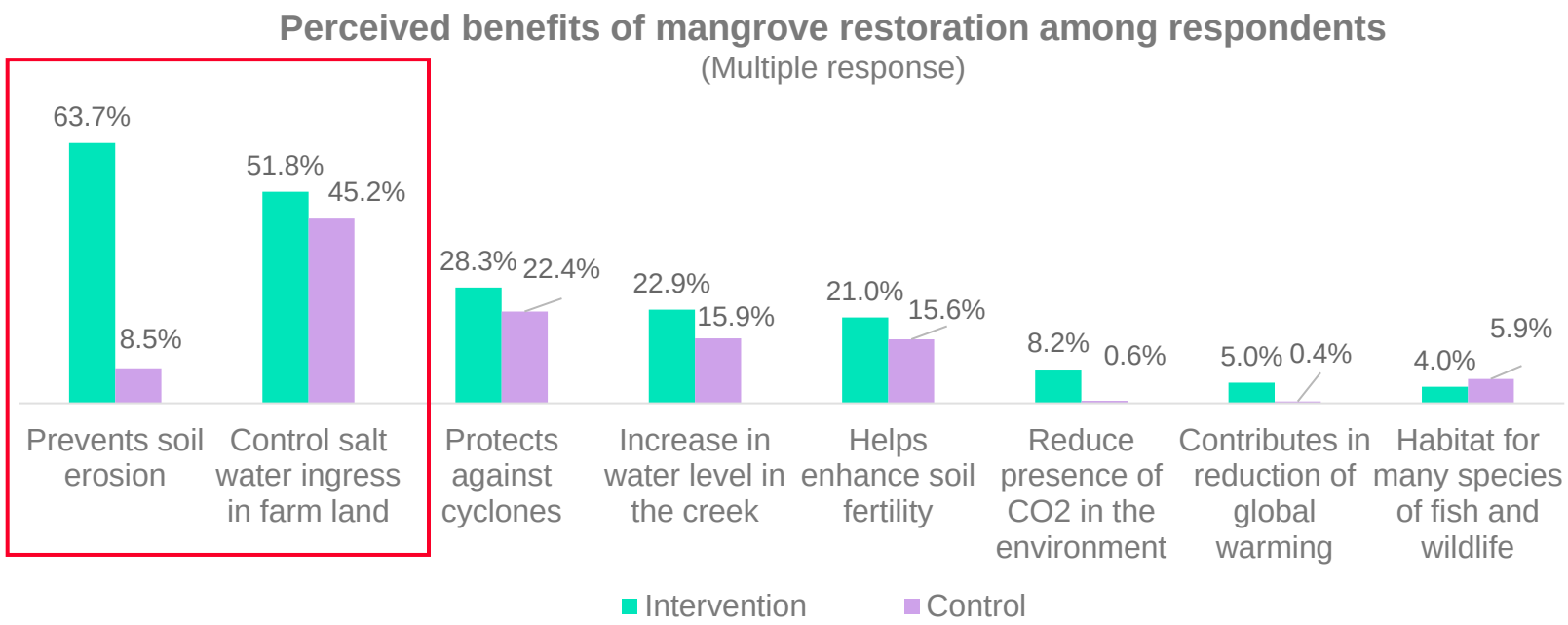
Perception and awareness around mangroves (1/2)

- One of the central goals of the initiative is to enhance the level of awareness around the benefits and importance of mangroves among the community members.
- The program has achieved significant impact in this area**. All the respondents from the intervention villages were aware of one or more benefits associated to mangroves**. While in control villages the awareness was found to be low, only **55%** respondents mentioned to be aware of the same.
- The **farmers in the intervention villages also displayed high awareness regarding the importance of mangroves** and their significance in protecting the agricultural lands.
- The **overall perception among beneficiaries regarding the restoration of mangroves was positive**. However, the larger impression among the community members was that the plants grow naturally on their own even in absence of interventions.



> ***These trees are old, they are here since the period of our ancestors, previous generations. Even if they are not planted, these trees grow automatically with the fallen seeds.***
>
> ***- SHG member, FGD, Tamshibandar***

Perception and awareness around mangroves (2/2)



> ***Big waves which come from the sea they don't directly hit on the bunds, these bunds protect our farms, mangroves stops big waves from damaging the bund. Means compound breaks and drains in the sea water. That doesn't happen now.***
>
> ***- Farmer, IDI, Mothebhal***

> ***Because of the trees, we have cool breeze and oxygen, it also stops water from coming into our land (bandisti)***
>
> ***- SHG member, IDI, Tamshibandar***

- Majority of the respondents in intervention villages mentioned that the **mangroves protected the lands adjacent to sea from high waves** and **helped reduce the soil erosion**.
- Farmers expressed that the **plantation of mangroves near the creek helped ensure the longevity of their farm bunds**, as presence of mangroves prevented the sea waves from hitting their bunds directly.
- A few farmers mentioned that presence of mangroves very close to their farms had a negative impact on their farm productivity as the extended roots of the mangrove plants would drain out the rainwater from their crops.

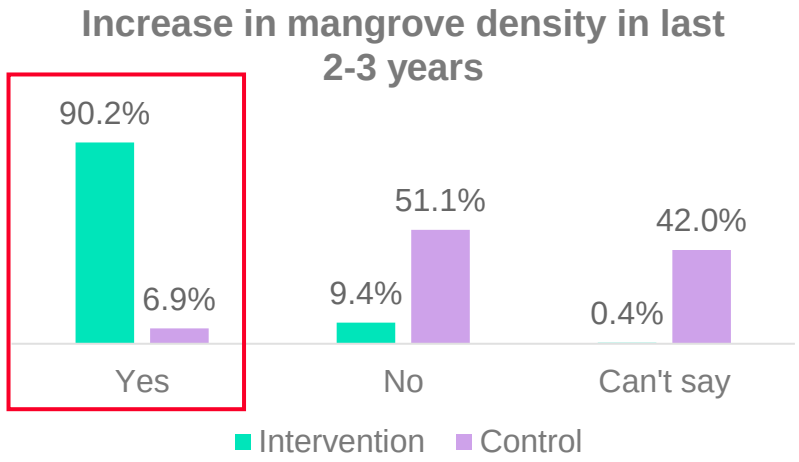
Improvement in mangrove vegetation

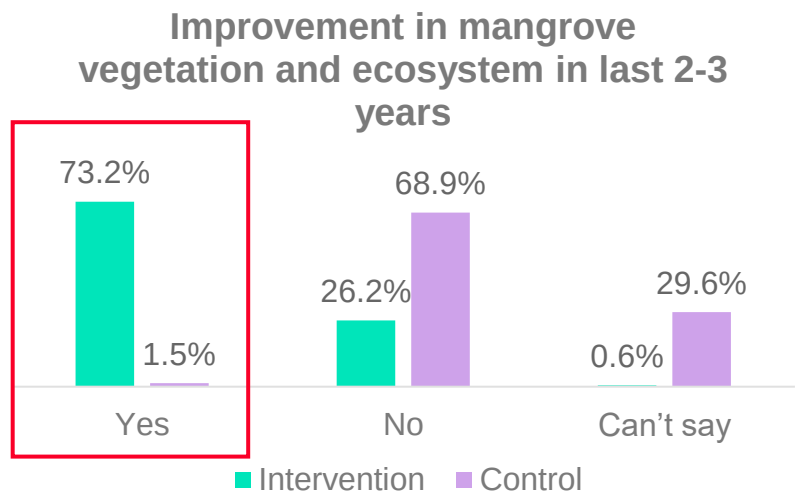
- Respondents in intervention villages expressed that with the increase in industrial activities in the region over the last few decades, the mangrove density has declined. But with the restoration activities undertaken in last five years, they have **observed a rejuvenation of the mangroves in the area**.

- The changes in density of mangroves were very evident in the intervention villages. **Majority of the respondents reported an increase in the density of mangrove cover** near their villages. In control villages no such increase was reported by the respondents.

- Similarly, significant difference was observed between the responses towards improvement in mangrove vegetation and ecosystem between the intervention and control villages.

- While majority of the respondents in the intervention village reported to observe improvements in the mangrove vegetation and the related ecosystem, no such improvements were reported in control villages.

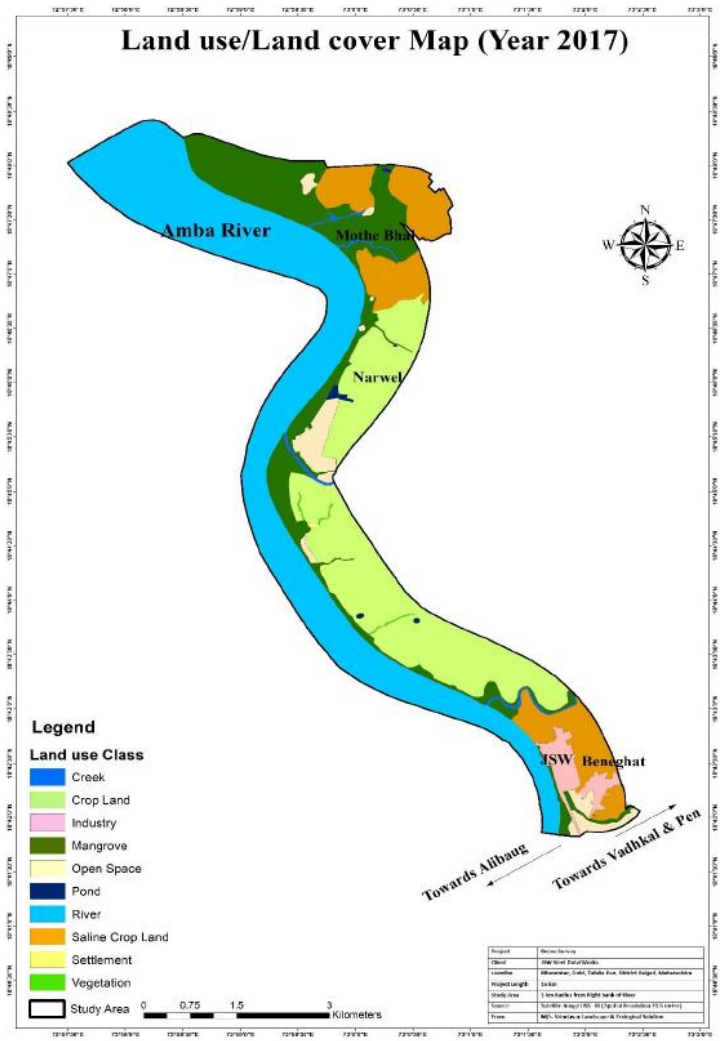


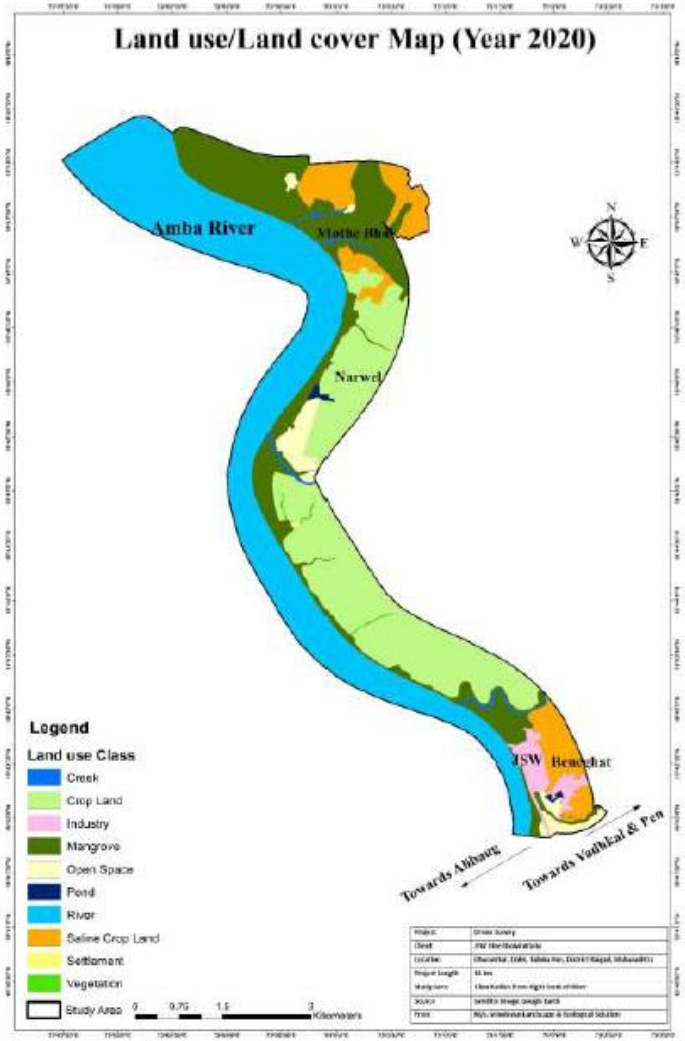


Change in land use/cover in the project area

- The beneficiary responses towards improvement in mangrove cover and vegetation are synonymous to the findings of the Project -Drone Survey of Mangrove studies for JSW at Dolvi.
- Following are the details of the area under mangrove cover in the project area during the last few years-

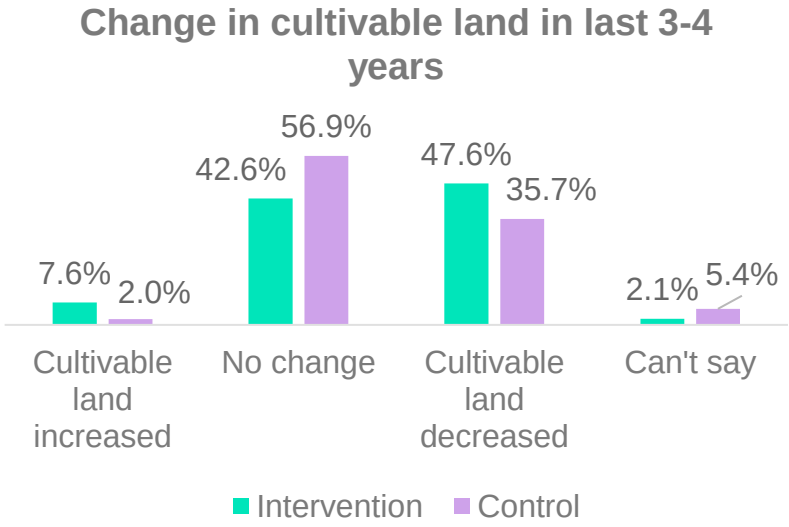
Year	Area in Ha.	Area in %
2016	523.13	19.09%
2017	490.01	17.87%
2018	564.20	20.55%
2020	576.54	21.06%

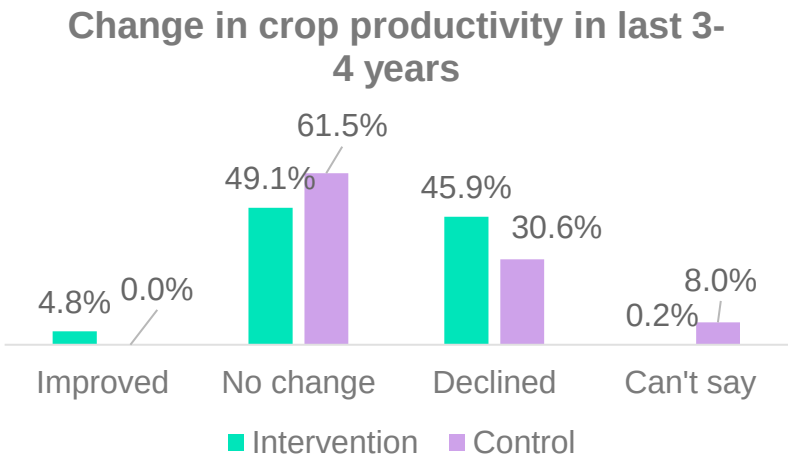




Change in agricultural activities and productivity

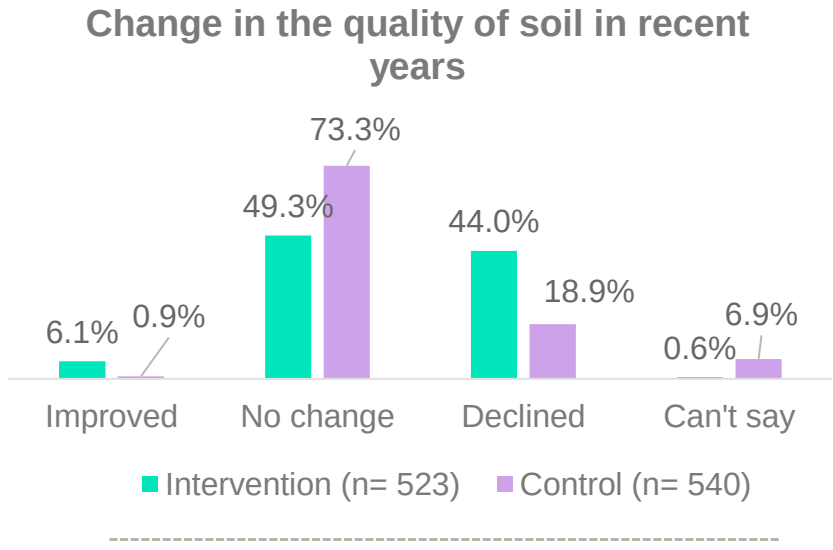
- Though a significant improvement was reported in the overall growth of mangroves in the intervention villages, its impact on agricultural productivity and related activities was not observed.
- **No differences were observed between the trends in agricultural practices** across the intervention and control villages.
- Moreover, during qualitative discussions, farmers in the intervention villages highlighted a decline in their agricultural activities in the past 10-15 years. **Stating the reason that once affected by saline water ingress, it takes a long time (3-4 years) for their farmlands to become fit for agriculture.**
- Coupled with the **challenges of water scarcity in the region**, **farmers mentioned to take only single crop in the year** (that is rice), grown largely for self-consumption.

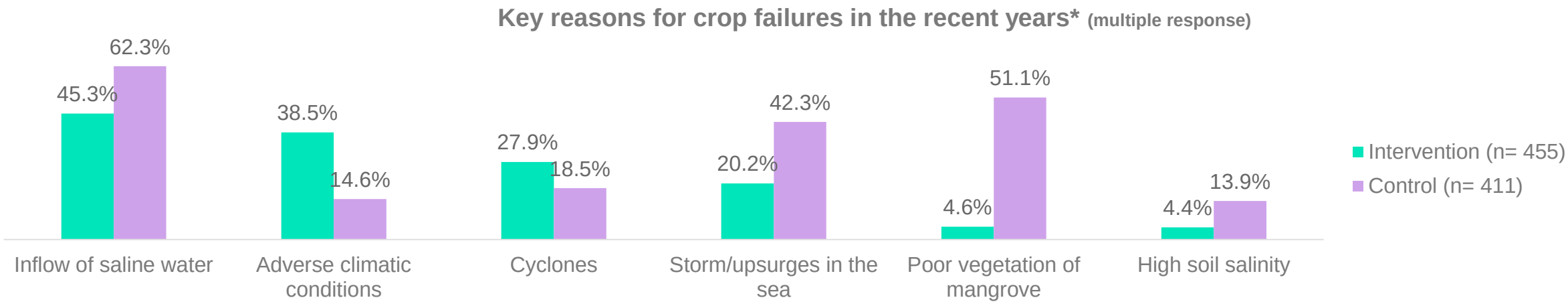




Change in soil quality

- No major improvements in the quality of soil were reported by the respondents. Qualitative interactions also suggested that the **mangrove restoration program helped in controlling the soil erosion around the fields, but its impact on soil quality was not yet fully realized by the farmers.**
- Analyzing the key reasons for crop failures mentioned by the respondents, the incidences of crop failure in control villages were caused due to higher instances of saline water ingress, sea upsurges and poor mangrove vegetation compared to the intervention villages. Indicating a positive impact of the mangrove restoration on the soil quality in the intervention villages.





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* Reported by respondents who have had a case of crop failure in recent years.

Change in fishing activities

- Similar to agricultural activities, no impact of mangrove restoration was seen on the fishing activities in the intervention villages, as the respondents attributed sharp decline in fish catches due to increase in movement of heavy boats in the region.
- **Practice of pisciculture was reported very low** among the community members in intervention villages, people involved in fishing mentioned to catch the fish from the creek or sea.
- They further mentioned that with a decrease in fish catches in the sea and increase in the amount of time and effort involved in the process, the profitability in fishing business has declined. Many **people have now shifted to practice fishing only for self-consumption purposes**.
- Engagement of respondents and their family members in intervention villages in other related **activities such as crab fattening, shrimp farming etc. was also found to be very low.** Majority of the respondents mentioned a decline in the presence of crabs, shrimps and oysters around the creek near their villages.

> ***Earlier when I used to put the net in for 3-4 hours, it used to take us 8-10 men to pull it out, now I get hardly half to one kg catch.***
>
> ***- Farmer, FGD, Janvelibedi***

> ***Number of boats has increased. Fans on the boats are so big so they crush fish eggs. There is no chance to grow fish here.***
>
> ***- Farmer, IDI, Mothebhal***

Environmental benefit through CO_2 sequestration

- Mangroves are considered among the most important ecosystems that can be managed for adaptation and mitigation strategies against the impacts of climate change. They are considered as 'Blue Carbon systems' because of their capacity to store a large amount of organic carbon (OC) over long periods*.
- A recent study by Suresh et al. estimated the carbon sequestration potential of Indian mangroves. For the three dominant species in JSW foundation's intervention area following are the estimated rate of annual carbon sequestration-

Mangrove species	Local name	Annual carbon sequestration (t C ha^{-1})	Relative frequency (as per MRP drone survey report)
Avicennia officinalis	Pala	0.233 ± 0.14	20%
Avicennia Marina	Big Pala	0.226 ± 0.296	36%
Sonneratia apetala	Vandala	0.097 ± 0.13	12%

- Assuming the proportion of the three species to be the same as observed in their relative frequency during the drone survey. The annual carbon sequestration capacity for the **240 hectares of mangrove plantations is estimated at around 49 tons.**
- However, the amount of carbon dioxide a tree absorbs varies tremendously depending on its species, age, size, health and location. Thus, the above-mentioned figures are only broad estimates derived from existing secondary information. Arriving at more realistic and factual estimates will require a more scientific approach involving rigorous on-ground truthing.

* Source- Howard J, Hoyt S, Isensee K, Pidgeon E, Telszewski M. 2014 *Coastal blue carbon: methods for assessing carbon stocks and emission factors in mangroves, tidal salt marshes, and seagrasses*. Conservation International, Intergovernmental Oceanographic Commission of UNESCO,

Perception around ecological benefits and change in bio-diversity

- Understanding around ecological benefits of mangrove restoration was found to be moderate to low among the program beneficiaries (based on qualitative interactions with respondents in intervention villages).
- **Respondents did not report any enhancement in the population of aquatic life (such as crabs, shrimps, oysters)** both in intervention as well as control villages. Though a few respondents **(22%)** in the intervention villages mentioned an increase in the population of birds in the region.
- The overall perception among the respondents with respect to change in bio-diversity was a bit negative. Majority of them attributed the increase in industrial activities in the region as the reason for the decline in the marine life around the creek.
- However, majority of the program beneficiaries mentioned that with the increase in mangrove plantations in their region, **the weather and air quality has improved.**

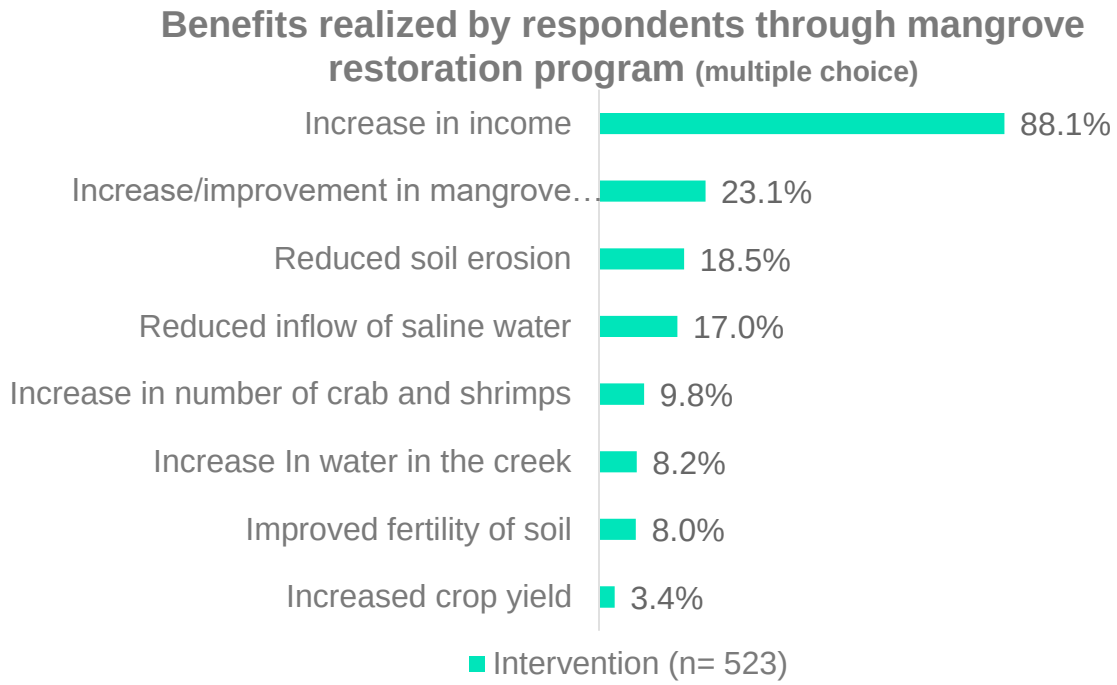
> ***Mangroves only stopped soil erosion, there is no increase in marine culture. Marine culture has reduced as water is polluted by the fuel released from passing boats. Also, the industries release wastewater which is chemical based, another reason for decline in breeding of fishes and crabs.***
>
> ***- SHG members, FGD, Bhairamkotak***

> ***Lobster was popularly available in the sea which is popular in international market, now its breed has declined in the sea.***
>
> ***- Farmers, FGD, Shirki Chal No. 2***

> ***These trees give us shadow, soil isn't carried away. In fact, now it gives nice and fresh air.***
>
> ***- SHG members, FGD, Tamshibandar***

Key benefits of mangrove restoration realized by program beneficiaries (1/2)

- Though the program helped in increasing awareness among the community members around the importance of mangroves, the **most significant benefit that the beneficiaries associated with the program was the increase in their incomes through plantation activities**.
- The monetary benefit associated with the restoration activities formed the key motivating factor for the respondents to undertake the initiative.
- Due to the belief that mangroves grow naturally; program beneficiaries did not take any self-initiated actions towards mangrove restoration besides JSW initiatives.
- **90%** respondents mentioned that in absence of the external support, they will not be able to manage the activities around mangrove restoration.
- However, they mentioned to **pro-actively take up initiatives to protect the existing mangroves** realizing their importance.



> ***Mangroves can stop the storm. Because of mangroves when last time there was a storm our village did not get affected with that.***
>
> ***- Farmer, FGD, Mothebhal***

Key benefits of mangrove restoration realized by program beneficiaries (2/2)

- Engagement of SHG members in the mangrove restoration program helped them generate additional incomes.
- On an average SHG members reported to get an additional annual income of **INR 3,500** through their mangrove restoration work.
- Majority of the women mentioned to utilize the amount to meet their household expenses **(96%)** and invest in their children's education **(11%).**
- Some of the beneficiaries mentioned that prior to JSW's intervention there were no SHGs in their village, the **mangrove restoration program helped increase women participation in SHGs**. Involvement in SHG activities also created avenues for women to save deposits and access finance during emergencies.
- Participation of women in SHGs also **helped empower** them to **manage their finances, promote cross learning** among the members and **provides an avenue for economic development**.

> ***Ladies changed their thought process. Who always used to sit, now they came and started working, who never had courage to do so.***
>
> ***- SHG member, IDI, Tamshibandar***

> ***Bachat gat helps our women to save money and manage children's education and other exigencies. They don't give money in their husband's hand otherwise they will spend money in liquor.***
>
> ***- Farmer, IDI, Mothebhal***

> ***Now we can take loan from our gat, we don't have to mortgage our jewelry to meet the basic needs.***
>
> ***- SHG member, FGD, Thakurbedi***

Benefits of other trainings around livelihood activities

- **26%** respondents from the intervention village mentioned to undertake training on tailoring from JSW. **25% respondents** who received the training mentioned of being engaged in the activity as a source of alternate livelihood.
- Major reason for low uptake of tailoring as an income generating activity was the lack of business viability in the villages. Beneficiary mentioned that with increasing preference for ready made clothes, the profitability in tailoring business has gone down. Though it enabled them to be **self-sufficient to meet their personal needs**.
- A few beneficiaries mentioned that they could not afford to purchase a sewing machine and hence did not pursue the activity further.
- Some of the beneficiaries also mentioned to receive training around fish product making, but the same was not pursued by them due to lack of market for the products in their villages.

One of the SHG members in Tamshibandar, mentioned that after getting the training in tailoring, she utilized the money earned through the mangrove restoration activities to buy a sewing machine. Through her business she is able to generate some additional income through out the year and support her family to meet the household expenses.

> ***The population of village is so low that even if we invest in stitching machine the quantum of business won't be more. Also, most of the women have taken training of stitching so they can manage to stitch their own clothes.***
>
> ***- SHG member, FGD, Bhairamkotak***

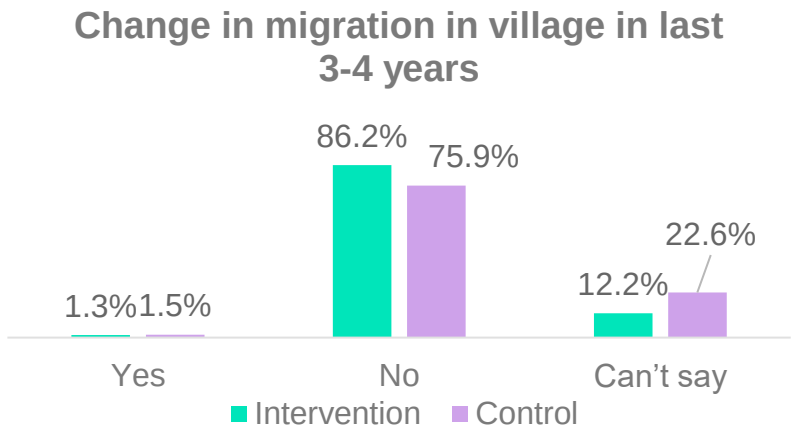
Trends in migration

Migration of family members in the household for livelihood purposes

0.8% In intervention villages

5.4% In Control villages

- In both intervention as well as control villages, **no change in migration was reported by the respondents**. Though, instances of migration of family members were found to be higher in control villages in comparison to the intervention villages.
- Our qualitative interactions suggested that out migration in intervention villages was reported low because of two key reasons-
  - Firstly, a lot of people in the village came back from cities post COVID-19 and decided to stay back.
  - Secondly, respondents mentioned that the cost of living in cities was very high in comparison to the safety nets available to them in their villages. Majority of them preferred doing labour work in nearby sites as and when available.



> ***If we go out we have to pay for the rent and for that atleast we should have money. Very few people go, those who are educated or those who get jobs.***
>
> ***- Farmers, FGD, Mothebhal***

5
Key take-aways

Overall understanding of study findings

1 Economic enhancement of the communities through alternate livelihoods

Economic enhancement of SHG members was observed as the mangrove plantation work provided them with the option for alternate livelihood. Though their engagement in the activity was limited to only a few months, they appreciated the additional income they could generate and utilize it to meet their household expenses.

2 Program impact on improving the environment and enhancing soil quality

Program has a positive impact on restoring the ecology in the region, program beneficiaries mentioned a survival rate of 70-80% of the mangrove plantations. They mentioned to avail the benefits of better air quality, cleaner surrounding and improved weather in the region. The plantations also ensured the longevity of bunds near their farms, which prevented soil and protected their fields of saline water ingress. As it takes 3-4 years for the soil infiltrated by saline water ingress to become fit for agriculture, the positive outcomes of the initiative on agricultural activities might take some more time to reflect.

3 Self-sustenance of the initiatives and level of community ownership

Though community engagement in the program was very high, ownership of the initiative was not observed. The monetary benefits associated to the program were highlighted as the key driving factor for participation in the program by the beneficiaries.

Points to consider…

Gaps in market linkages

Beneficiaries highlighted that they could not actively derive economic benefits from the trainings received under the programs due to the lack of markets for the products/services in their villages. Beneficiaries demanded for facilitation of marketing channels and creation of avenues for them to sell their products/provide services.

Lack of clarity around program intent

A lack of clarity around the overall goals of mangrove restoration program, its objectives and intended benefits was observed among the beneficiaries. Some of the beneficiaries mentioned that the programs implemented by the foundation were being done with an intent of creating benefits for the industries in the region and to facilitate their activities.

Need for vocational trainings

Beneficiaries expressed a need to receive trainings around skills that can help them or their children to get employment opportunities in the nearby factories, such that they do not have to migrate from their villages.

Thank you