A Path way OF Disaster Risk Reduction through Climate Change Adaptation in Aranayake, Sri Lanka (#495)

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1. Background

The Maha Oya Mithuro: Friends of the Maha Oya is the oldest Area Water Partnership (AWP) in Sri Lanka established in 2001. Through the AWP, Sri Lanka Water Partnership (also called Lanka Jalani) has played a catalytic role in bringing stakeholders together to foster productive management of water resources in the area and have been involved in tackling the issues of illegal sand mining and other community development activities for nearly two decades.

In Sri Lanka, second to Kelani Ganga, Ma Oya is the most industrialized and third longest river with a basin area of 1528 km^2. Unlike Kelani Ganga, it lacks a secure catchment with protected areas. Ma Oya provides water for agriculture, industry and domestic needs to approximately two million people from Aranayake in Sabaragamuwa Province to Pallansena, Kochchikade. Its deposits of river sand adds to the sand budget in the western shoreline of Sri Lanka acting as a buffer against coastal erosion.

As per the Central Environmental Authority (CEA), it has 14 National Water Supply and Drainage Board (NWSDB) water supply intakes and several community water supply schemes serving an urban population of 200,000 people (Central Environmental Authority, 2018). Families in the upper catchment including sections of Alagalla, Paranapattiya, Galagedara and Gampola in Central Province also tap its resources. The river serves a large number of downstream industries including large industrial estates in North Western Province (NWP), the Makandura Industrial Zone as well as important tourist zones near Negombo. It is also home to the largest concentration of tame elephants in Sri Lanka in Pinnawala Elephant Orphanage - one of the highest single income earners for Sri Lankan tourism.

Aranayake off Mawanella, a secluded agricultural area known mainly for tea and spice cultivation, came to the limelight for tragic reasons with the Samasara landslide of **May 2015**. Caused partly due to climate change and partly due to anthropogenic influences, the landslide was a result of six days of constant high intensity rains (Dissanayaka & Jayasena, 2017). The Disaster Management Centre (DMC)[1] reported that 420,097 people were affected due to floods and landslides out of which 299,806 persons were displaced. The incident also caused the highest number of casualties ever recorded in a Sri Lankan landslide (JICA Survey Team, 2016).

The National Building Research Organization (NBRO)[2] classified the affected areas as 'High Risk' (sites to be evacuated immediately) and 'Medium Risk' (sites to carry out mitigatory action in) (National Building Research Organisation, 2016). Of the 62 Grama Niladhari divisions in Aranayake – the smallest level of administrative unit used in Sri Lanka – 60 were classified as disaster prone. The fear of landslides has not left the sub-conscious of Aranayake's citizens. In late October 2017, heavy rains brought with them two more minor landslides in Ambalakanda and Aranayake leading to the immediate evacuation of at-risk families by local administrators.

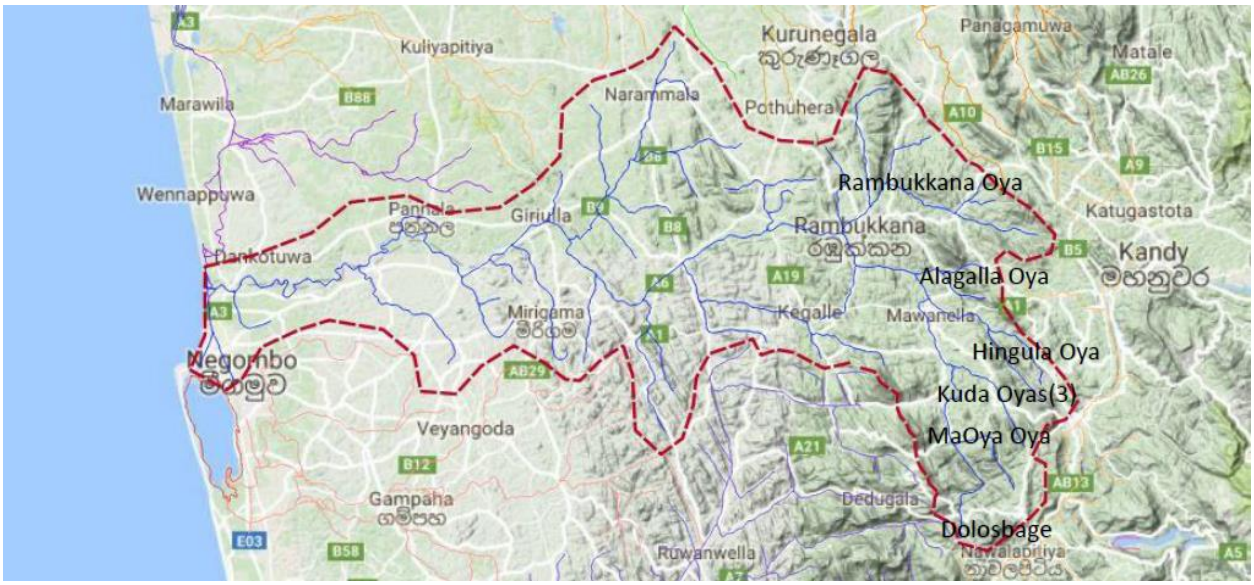
[1] www.dmc.gov.lk
[2] http://www.nbro.gov.lk/index.php?lang=en

2. Description of the Problem

2.1. Case Study Area

Communities in Aranayake used to be self-sufficient earning high income from spices and tea. At least 850-1000 kg of tea was collected daily from 30-40 growers at the teashop in Elangipitiya – this landslide stricken area was previously called "Salliwatte" – Land with money. Large houses were built with profits gained through tea cultivation and roads were constructed using JCBs on very fragile and steep slopes that greatly disturbed the terrain. Further, unauthorized encroachments of adjoining government land and clearing the existing forest for tea plantation changed the natural ecosystem of the area.

The target was crop management and not landscape management and ad hoc extensions to smallholdings accelerated runoff and soil erosion. Tea was planted on wholly inappropriate sites along with spices that provide a greater canopy cover being sidelined or replaced. Vertical drains from British time were not maintained and in some areas such as Ambalakanda were replaced with stones being used for walls instead. Across the landscape, buildings came up in the drainage paths thus cleared compromising the overall stability of the area. Some of these actions contributed to the intensity of damage of the landslide.



Map 1: Map of Ma oya's Catchment

There is a growing tendency for climate change related high intensity rains to be blamed for landslides, which are becoming a more frequent occurrence in catchment areas. However, a report by NBRO referenced in their training programmes stated that rampant logging in Elangipitiya, Ambalakanda and Galbokke in the upper Ma oya catchment, which preceded the landslide, might have been one of the contributory factors. In such a case informed by post-disaster surveys, catchment conservation and reforestation is a high priority for the Sri Lankan government which is committed to carrying out disaster risk reduction (DRR) in targeted areas (Ministry of National Policies and Economic Affairs & Ministry of Disaster Management, 2016).

2.2. Water Security Related Challenges in Aranayake

Aranayake, a significant part of Ma oya upper catchment is severely, continuously and increasingly water stressed. Following the Samasara landslide, communities in Aranayake noted several significant changes in the hydrological regime. 2016 saw very low levels of river flow in areas up to Alawwa (closer to Kegalle). Severe water stress was noted by media reports in downstream areas such as Dunagaha and Katunayake.

Usually sedimentation occurred only after prolonged periods of rain but visual observations by the activity team in the upper Ma oya following unseasonal rains in **August - October 2017** indicated that turbidity in the river was very high even after a single heavy shower. This indicated that upstream landscape changes due to legal and illegal expansion of tea cultivation and loss of soil cover was occurring with greater intensity than predicted.

Landslide sites and community groups in the 'Medium Risk' category reported intensive water shortages in the upper catchment following the landslide. Water supply in Mawanella was limited in **March-April 2017** and almost ran dry. It suffered an extreme drought with very low base flows. With increased logging and loss of tree cover, soil erosion increases, which increases the risk of landslides. Turbidity increases as a by-product and water purification for drinking purposes becomes more difficult and expensive, affecting the catchment's water security.

Even after the landslide near Asupini Ella, (community sources estimated it to be 40 acres), Aranayake lacks adequate soil conservation safeguards. The Soil Conservation Act of 2009 seems to be in abeyance in Ma oya upper catchment. Available water in wells, springs and hand pumps was observed to be turbid in Galbokke; forcing poor families to spend ~ 200 LKR per day in dry spells to obtain water from external sources. A lucrative trade in hauling water in trishaws sprung up in Aranayake. Sources outside Aranayake from Thulhiriya also reported very low flows in mid-2016. Therefore, the river is experiencing overall diminishment of dry season flows.

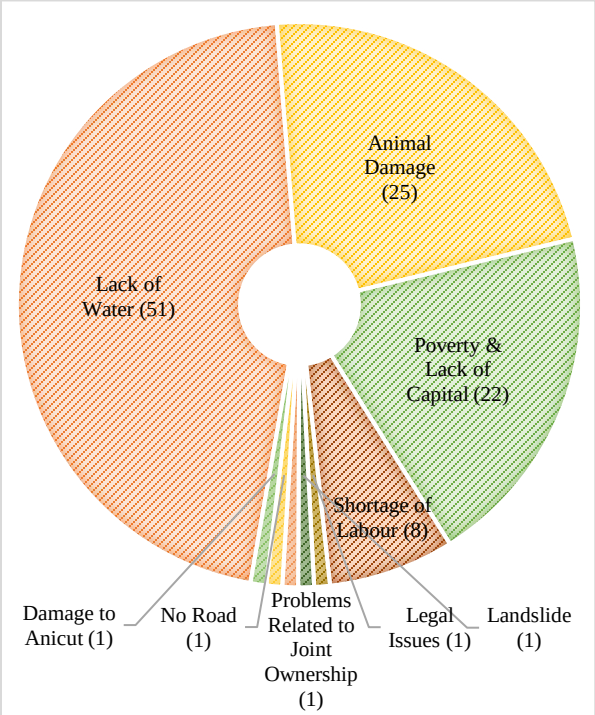


Chart 1: Survey Responses from Aranayake Communities for Non-cultivation of Paddy Fields from October 2017 (Source: SLWP Team Surreys)

Aranayake has an abundance of abandoned paddy lands. Constraints to cultivation of fallow field was attributed to lack of water. An analysis of survey data collected in 52 *Grama Niladari* divisions by the SLWP Project Team in Aranayake for non-cultivation in October 2017

highlights the issues faced by paddy farmers after the landslide (Chart 1).

Post the landslide, the SLWP Team comprising of technical and field experts identified schools with significant water related issues; wells were dry, neighbouring springs were running dry and hand pumps were damaged or dry. In early 2017, the team visited these sites to ascertain ground conditions. It was found that drinking water had to be brought from homes and often purchased through trishaw based water dealers. Water for sanitation was almost non-existent. Community feedback obtained through face-to-face interviews highlighted that groundwater problems worsened after the Samasara landslide. Rainwater harvesting is not new to Aranayake as some older *walauwwa* (colonial manor house) had roof top harvesting collected in the tanks in the *meda midula* (central courtyard) but it is not currently practiced.

3. Decisions and Actions Taken

In 2013, Sri Lanka Water Partnership (SLWP) collaborated with the University of Colombo to carry out a major activity in Aranayake titled 'Water Quality Distribution and its Impact on Community Livelihood Development in Upper Catchment of the Maha oya River Basin' supported by Janashakthi PLC in Aranayake. The activity included reforestation of significant catchments and riverbanks, support for women programmes as well as construction of Rainwater Harvesting (RWH) systems in Rahala West School and Hemmatagama hospital. These systems are still functioning well and the Ministry of Health (MoH) requested another RWH tank.

This activity was organized by SLWP partner NetWwater (NWW) who have supervised and constructed 26 RWH systems for rural hospitals supported by Retourschip Foundation, NL and have supervised construction of 17 school RWH and sanitation systems supported by the National Development Bank PLC (NDB Bank) in Denuwara Education Zone, Central Province. Through these activities, SLWP has established considerable experience in rainwater harvesting systems. In addition, since 2014 SLWP has promoted the use of RWH systems for agriculture as part of its climate change adaptation (CCA) outreach for farmers with the assistance of Department of Agriculture including the Grain Legume and Oil Crops Research Centre at Angunukolapelessa in Southern Province.

To implement the Disaster Risk Reduction (DRR) activity outlined in this case, Hatton National Bank (HNB) entered into an agreement with SLWP in **January 2017** with the following objectives:

1. Improving school sanitation, renovation of school sanitation facilities and supplying RWH tanks and associated activities for **10 selected schools across Aranayake** to improve levels of hygiene and community well-being.
2. Enhancing awareness and carrying out sanitation sensitization of school-related stakeholders in targeted communities.
3. Improving access to education for improving health and leading to better living.

The activities carried out under Phase I of the project included:

A) Reconnaissance Survey Using Rapid Rural Appraisal (RRA)
B) CCA for DRR Activity alongside Pre-Construction RWH Maintenance Training
C) Construction and Handing Over of Four RWH Systems in Selected Schools
D) Display Boards –'Let Us Overcome Disasters through Preparedness'
E) World Water Day School Programmes

After the inspection of RWH systems handed over to four schools, HNB was pleased to support a Phase II follow-up activity based on the good progress made under Phase I. An agreement to conduct Phase II from **May-mid November 2017** was signed between HNB and SLWP on **18 May 2017** with HNB agreeing to limit its contribution to 2.0 Million LKR as in Phase 1 and the balance to be borne by SLWP and partners.

Phase II was planned to complement and reinforce earlier activities in six new schools and included the following interventions:

A) Reinforcing and Troubleshooting Programme
B) RWH Site Selection and Construction of RWH in Six Selected Schools

Other Activities:

A) Engaging Youth in Environmental Conservation
B) Community Advocacy/Citizen Science Programmes
C) Media Tour to Raise Awareness about Aranayake
D) Micro Catchment Conservation and Replanting

For a while, Phase I and Phase II activities ran concurrently and both phases concluded in November 2017.

3.1. Ma Oya Area Water Partnership

The Ma oya Area Water Partnership (MOAWA) is the first Area Water Partnership (AWP) setup by SLWP and the Ma oya-Kuda oya Surakeeme Vyaparaya (MKSV) – SLWP's local partner organisation in the upper Ma oya catchment in 2001.

MOAWP carried out several activities in the lower reaches including in and around Mawanella. These included garbage disposal and river pollution interventions, tackling illicit and unregulated sand mining issues collaborating with the Central Environmental Authority (CEA) and providing toilets and sanitary facilities in collaboration with the Rotary Club of Colombo North to encroacher families in and around the NWSDB water intake, which was a source of considerable faecal pollution.

Studies and surveys in the mid and upper reaches identifying land use/land degradation issues were undertaken in Aranayake up to Asupini Ella by MKSV. The University of Colombo and Lions Club of Pilimatalawe have been active collaborators in most activities undertaken in Ma oya.

4. Activities in Aranayake Schools

Phase I

A) Reconnaissance Survey Using Rapid Rural Appraisal (RRA)

Led by the activity leader and research officer, the reconnaissance survey for the project was done in **February-March 2017**. Visits to NBRO in both Colombo and Kegalle, the Zonal Department of Education and Divisional Secretariat in Aranayake and the Land Use Policy Planning Department and National Water Supply and Drainage Board in Kegalle were made. This survey and later interactions highlighted the importance of acute sensitivity to caste when working in Aranayake.

Ground realities showed disturbance to springs and water sources. Aranayake used to be an old style community with a high degree of self-sufficiency and self-confidence. The landslide brought in a high degree of insecurity (even in families which were not displaced) and increased dependency on state agencies and external sources because of the deluge of aid which came to the region. Despite this, most displaced persons were yet to receive compensation and housing at the time of the survey.

Image 1: Extent of Landslide Damage

Communities were reluctant to carry out even minor soil conservation activities on own lands which could be done using family labour without seeking any state support. As a result, disaster mitigation efforts were proceeding very slowly and in turn compromising the long-term water security of the catchment.

B) CCA for DRR Activity alongside Pre-Construction RWH Maintenance Trainings

Four programmes focusing on CCA measures for reducing disaster risks by construction and maintenance of RWH systems were held in targeted schools for selected students, parents and teachers in **February 2017**. Existing wells in schools were inspected to study the possibility of groundwater recharge. A RWH construction specialist was tasked to conduct a hands-on review and revision session at each school. The objective of this activity was to diversify RWH learning within the school community and to develop a pool of trained persons who could deal with future maintenance issues.

C) Construction and Handing Over of Four RWH Systems in Selected Schools

Schools where RWH systems were installed were selected in collaboration with SLWP's local partner MKSV and the Aranayake Zonal Education Office according to perceived needs. Though many schools required aid, the selection process took into consideration the level of impact of

landslide, need for water, general level of maintenance of schools and enthusiasm of the school authorities for adoption of new technology.

The construction of the four rainwater-harvesting tanks was carried out concurrently and was supervised by the activity leader. The construction was completed and handed over to the Zonal Education Office in the presence of HNB officers on **7 April 2017**. The tanks were plastishell mounted on a concrete base. Water for construction had to be brought in barrels by lorry from afar since neighbouring wells and springs were completely dry.

Table 1: Details of the Selected Schools for RWH Systems in Phase I

No.	Name of School	No. of Students	No. of Staff	Impact of Landslide
1	Mahanadi KV	561	26	Children displaced by damage to Siripura and Elangipitiya (some living with relatives, some in camps) enrolled in these schools. Deforestation and illicit land use threat to community and water security
2	Hathgampola KV	220	11	
3	Debathgompola KV	120	17	
4	Galbokke KV	220	11	Extreme water insecurity
5	**Total**	**1121**	**65**	**1186**

Of all schools, D.S. Senanayake KV in Galbokke had no access to water when visited. Families in Galbokke – the most water insecure village in Aranayake were spending up to 1000 LKR (~7USD) per week in obtaining drinking water. Water for sanitation and health was extremely limited and diseases were spreading due to extreme lack of water for hygiene. The same water used for washing rice was reused for washing vegetables, dishes and then for ablutions.

Image 2: Construction of Rainwater Harvesting Systems

Galbokke village was reportedly given 60 Ferro-cement domestic RWH tanks constructed by the Hadabima Authority as donation by SANASA Development Bank, of which only 20 were functional at the time of visit in 2017 - the rest were abandoned due to lack of proper training and poor maintenance. Schools too had damaged/abandoned Ferro-cement tanks. Ferro-cement tanks need careful construction and maintenance. A minimum amount of water has to be maintained without draining the entire tanks else the cement cracks in the dry season. Recipients of these tanks have either not adhered to or not received post-construction training.

To prevent a similar situation, school DRR RWH trainings were held on **14 and 15 March** for all the 4 schools. Experience emphasized the need to have a core group of persons in the school community who are conversant with the RWH technology; this core group included students, parents and educators. NBRO and NWSDB provided resource persons for these activities.

D) Display Boards –'Let Us Overcome Disasters through Preparedness'

MKSV requested four public message boards to be set up in prominent public places in **February and March 2017.** Accordingly, four message boards were set up in front of Mahanadi School, Hathgampola School, Rajagiriya School and on the road leading to Galbokke School. The theme and designing of the display boards was carried out by MKVS.

E) World Water Day School Programmes

Image 3: World Water Day Ceremony

The Aranayake World Water Day Celebrations and Prize Giving was held in Rajagiriya MV, Dippitiya, Aranayake on **7 April 2017**. The Chair of Ma oya Kuda oya Surakeeme Sanvidanaya, Zonal Education Director and Divisional Secretary of Aranayake and the Chair of SLWP were present. Several presentations highlighting NBRO's work on disaster prevention in Aranayake and highlighting the dangers of continued deforestation were presented. This activity received support from the local business community.

Phase II

A) Reinforcing and Troubleshooting Programme

Due to the perceived need for reinforcement of maintenance messages, two programs were planned before monsoons for the school community. Follow-up post-construction maintenance visits (pre NW monsoon) were carried out in **September 2017** to reinforce earlier maintenance trainings. All tanks were well maintained and in full use. During all school visits, a refresher training was given to school community members.

B) RWH Site Selection and Construction of RWH in Six Selected Schools

The activity team visited and reviewed a list of schools identified under the reconnaissance survey to select six new schools for project expansion. Schools were selected based on water shortage as well as supportive stance of the school administration.

No.	Name of School	No. of Students	No. of Staff
1	Al-Jalal Muslim Maha Vidyalaya	91	11
2	Polambeygoda K.V.	185	21
3	Uduwewala Junior School	274	13
4	Uduwewala M.V.	224	27
5	**Thammita K.V.**	**174**	**16**
6	**Gurubavila KV**	**145**	**15**
	Total	**1093**	**103**

Table 2: Details of the Selected Schools for RWH Systems in Phase II

Post identification of the schools, a NWSDB technical officer following the norm of RWH work done by SLWP approved designs and plans. Material and labour was sourced by the same construction team led by SLWP partner Lions Club of Pilimatalawe who have extensive experience in constructing RWH systems for schools and hospitals.

Project work was carried out successfully despite difficulties posed by intermittent rain and ongoing road repairs that blocked access to target sites. NWSDB personnel carried out quality control before, during and after the activity. Pre-maintenance programmes were carried out for school societies/community groups akin to Phase 1.

To prevent waste of resources and tackle deficiencies of construction or maintenance, the Aranayake-HNB programme planned community maintenance training sessions on **9 and 10 October 2017**. Each school was asked to nominate a caretaker group of students, teachers and parents to ensure that a critical pool of school community stakeholders trained in troubleshooting exists if any problem were to occur. The programme covered introduction to objectives of the RWH system and need to ensure optimum use of this important asset that supports and supplements water needs of the school.

Need for regular inspection and cleaning of gutter before the rainy seasons and pruning of overhanging branches was emphasized. Tank cleaning and filter replacement at regular intervals was explained. Stickers with pictures of project benefactors' logos were placed on the tanks. The list of school RWH systems have been sent to the Zonal Education office with a request to include it as an item in the regular school maintenance inspection rounds.

Image 4: RHWMaintenance Trainings

In response to a request made by the MOAWP, improving water security through provision of RWH systems is an important feature of the Aranayake activity. Six RWH tanks built for selected schools were handed over to the school authorities in Aranayake on **13 October 2017**. Involved stakeholders from SLWP, HNB and governmental authorities were present and allied activities like tree planting followed.

5. Other Activities

A) Engaging Youth in Environmental Conservation

A special programme involving more than 75 young persons was held in cooperation of the National Youth Services Council (NYSC) at Gavilipitiya on **24 June 2017**. Resource persons from NBRO and NWSDB laid out the challenges of the current situation in Aranayake and the consequences of inaction. A special session was conducted on project proposal formulation.

B) Community Advocacy/Citizen Science Programmes

The activity team carried out a reconnaissance tour of selected sites to prep the community and finalize activities/sites to be covered. Lesser-known branches of Ma oya starting in Alagalla, Paranapattiya and Dolosbage in Central Province were covered in this survey.

The SDG Advocacy Programme ran in tandem with Phase I activities and the micro catchment programme. A series of small-scale pocket meetings and interviews with village leaders promoted DRR implementation. Linkages between landslides and disturbances to the landscape were highlighted to instil improved land conservation practices. These meeting were held in community groups in Ambalakanda and Gataberikanda **from August until November 2017**.

Apart from larger meetings, 23 advocacy pocket meetings were conducted in the selected micro catchments of Ambalakanda and Gataberikinda. The discussion was to mobilize communities for conservation through a simple understanding of the Sustainable Development Goals (SDGs) relevant to DRR - SDG 1, 3, 5, 6, 13 and 15.

A meeting for Divisional Officers (DOs) of various governmental agencies active in the Aranayake region was organized at Lakmini Hall, Gavilpitiya on **8 August 2017.** 207 participants including community leaders attended the programme where resource persons from the Department of Meteorology, NBRO, and the Department of Agrarian Development gave an outline of future climatic conditions and its impacts on potential landslide sites in Aranayake. Visuals displayed the damage done to catchments and potential danger points for future landslides. Many participants had never seen existent and potential landslide sites in Aranayake and had previously depended on field officers for information. This proved to be a good way of networking with stakeholders for Phase II's micro catchment activity in Getaberikanda and Ambalakanda.

As a result of the Officer Roundtable, a Citizen Science Programme for 150 community leaders was organized on **25 August 2017** at the MOH Hall in Dippitiya. NBRO and NWSDB sent resource persons who elaborated on environmental threats like illicit logging and poor land management in tea areas where old colonial drainage systems had been dismantled. Participants reported increased logging, which is difficult for DOs to monitor. High levels of logging were observed in Salawa, Debathgama, Deiyannewela, Ambalakanda, Gataberikanda, Podape, Arama and Kalugala which will severely affect downstream industrial activity. Interaction with the community indicated an urgent need for an integrated response within the officer community.

C) Media Tour to Raise Awareness about Aranayake

A media tour with the aim of highlighting the challenges currently facing Aranayake that will eventually influence downstream water availability and industrial capacity and bring it to the notice of national decision makers was held on **15-16 October 2017**. Representatives from local media, Lakehouse, ITN, Derana, BBC Sinhala, Sudaroli, Lankadeepa and two independent journalists attended the programme.

Permits given to number of mobile sawmills (reported by community as 30 in Aranayake, 17 in Mawanella and 6 in Rambukkana) pose a major threat to water security in Ma oya. Medium risk families stated that they are rapidly becoming high-risk families due to this factor. It was agreed that there was a need to urgently take the mobile sawmills issue to the political decision makers through this media awareness program. Extensive print and visual coverage resulted in temporary cessation of logging in some areas although long-term it resulted in limited impact on illicit logging that has powerful patrons.

Image 5: Field Visits during Media Tour

D) Micro Catchment Conservation and Replanting

Image 6: Tree Planting in Action

In view of ongoing high levels of deforestation, there was a need to replant bare, eroded and degraded sites. Post-landslide population pressure and negative human behaviour and land cultivation practices have contributed immensely to making this area disaster prone to floods through uncontrolled runoff and landslides. NBRO inspection reports gave clear instructions to work urgently to improve drainage capacity to withstand high intensity rains. This programme selected sites through transect walks with the administration and community members to start replanting in suitable micro-catchments.

Selection criteria and implementation plan for the micro-catchment pilot activities were as follows:

- Micro catchments where current land use practices may contribute to landslides
- Areas where mostly medium and low risk families (using NBRO assessment following the Samasara landslide) were present as interventions in sites with more high risk families were problematic
- Availability of supportive community organization and village leaders

The selection of sites for reforestation proved to be much more difficult than expected since it rained constantly from **August-November** with the constant threat of landslides. The original sites recommended by the District Secretary for reforestation were unsuitable or too difficult to access. Some communities deliberately did not identify suitable lands for reforestation as their members were already carrying out illicit logging in such areas. Further, more land was being reportedly

opened for tea under Tea Shakthi Programme with little after attention to soil conservation and drainage, thereby creating potentially new landslide prone areas.

The team met with and conducted community meetings with numerous groups, attended community organization meetings, talked to village leaders and village level officers to find an acceptable solution. Eventually, a pilot replanting activity in Ambalakanda-Puwakwaththa and Gataberikanda mobilized and encouraged the local community including youth groups and students to contribute to and realize the importance of catchment conservation. Recipient schools of RWH tanks donated some plants and the rest were purchased.

For tree planting, with the consensus and participation of the Divisional Secretariat, local partners and newly settled families, a plot adjacent to Vasanthagama was selected. The activity was carried out in the slope below new houses to stabilize slopes on **6 November 2017**. Department of Forest officers in attendance demonstrated the best way to plant the trees. The need to direct storm water and domestic drainage water into designated drainage paths flanked by new vegetation and to maintain such a drainage map was emphasized to the new settlers and local village officers.

The conservation activity started in the second pilot site of Ambalakanda on **26 November 2017** with 41 participants who planted 121 high value nutmeg plants and distribution of another 100 indigenous plants. These plants filled gaps and were close to the homestead so that harvesting is easy. With high-risk families, being evacuated there was a fear of robbery of spice crops leading many farmers to harvest cloves, nutmeg and coffee crops before maturation and as a result obtaining very low prices for their produce. This caused community members to welcome the opportunity to obtain high value trees.

6. Outcomes

- 10 schools with 2,214 students and 168 staff members were provided with RWH tanks and trained on how to operate and maintain these structures to raise water security of the region. Al Jalal School was already collecting water off the roof in a barrel when the reconnaissance survey was carried out and the idea of a proper RWH tank was extremely well received. All schools responded well to the activity and maintained it post-completion.
- At every school students, teachers and parents expressed gratitude for provision of water as they had been faced the trauma of an extremely dry spell. This activity and the ongoing drought raised awareness of the school community on valuing water as a resource.
- Due to recognition of the contribution by the Ma oya AWP, Mr Chandra Ranatunga, Chair of the AWP was appointed as a member of the Cabinet Task Force on Kelani Ganga that reviewed pollution mitigation issues.
- Post the tree planting activity, it was noted that a large retaining wall was being constructed already, as the authorities had realized the need for further embankment protection.

7. Lessons Learned

- There was consensus that unless immediate measures are taken to improve soil conservation in relation to tea smallholdings and reforestation is done in the catchment, there is a strong possibility of another landslide.
- Engaging with the community helped identify the most important form of DRR – a model that involves and is supported by local communities (UNDP, Global Environment Facility, Small Grants Program, & Australian Agency for International Development, 2016).
- Schoolchildren can be the most important conduit of DRR information. A child who does not encounter value in his or her own environment cannot be expected to protect it. A non-supportive environment for ecosystem protection is caused by a school system, which does little to foster encounters with ground conditions.
- To educate students about their own environment, school micro catchment enrichment programmes for RWH are proposed for the 10 schools that were given RWH systems. Nature treks to affected sites can raise DRR awareness and activities to commemorate World Environment Day will further help create a DRR perceptive younger generation, which is essential for the conservation of the ecosystem.
- Few schools instituted environment clubs (*Parisara Batakandayam*) which can be used as conduits for delivering knowledge material to students. Further, laboratory facilities can be used to monitor nearby streams and springs and teach water quality.
- Schools that received RWH tanks are expected to use this for maintenance of school attendance especially for girl children. Menstrual Hygiene Management (MHM) calls for properly maintained, preferably girl friendly toilets. This is very important to maintain girls' education as studies have shown that poor sanitation leads to absenteeism of 3-5 days for girls in many schools. With access to water through RWH, it may be possible to increase the debate to MHM as well.

Recommendations:

- A future programme should consolidate Phase I and II activities. Water security needs to be enhanced with groundwater recharge for wells. A pilot project on recharging wells and its assessment can help inform future projects.
- Community sources stated that heavy logging in Elangipitiya preceded the Samsara landslide. As logging is an important part of the rural economy in Aranayake, especially for the poorest families measures to curb illicit logging and reforestation require a modicum of community consensus. Thus, it is imperative that community awareness programmes especially for youth go in tandem with catchment conservation.
- The influx of wild life (monkeys and rock squirrels) to the villages damaging all agricultural crops and home gardens can be curbed by planting fruit trees, mainly guava, jak and *waldel* in the forest reserves.
- Micro catchment reforestation activity in upper Vasanthagama should be continued to make the area disaster proof.

8. Conclusion

This SLWP- HNB intervention was timely and addressed a real issue impacting the lives of communities in Sri Lanka's Central Province .The complexity of this disaster has highlighted the need for speedily operationalizing the SDGs in future activities and moving away from disaster relief to disaster risk reduction. Most areas in and around Aranayake (barring two Grama Niladari divisions) have now been identified as being landslide prone. The 'High Risk' families have already been evacuated. 'Medium Risk' families have been asked to take reasonable safeguards including soil conservation measures.

Changing weather regime with frequent light rains over last two years in this microenvironment proved to be favourable for tea, and good incomes made this land valuable for community's livelihoods. Therefore, it is crucial that stakeholders support catchment conservation activities with proper awareness programs to save their lands and livelihoods. SLWP's work with the communities in Aranayake have provided a road map for education and conservation and brought together multiple stakeholders to attain one goal – that of improving the resilience of the areas affected by landslides in Aranayake.

9. References

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11. Supporting References

Phase I and Phase II Completion Reports can be downloaded from SLWP Website- http://lankajalani.org/.

Phase 1 - http://lankajalani.org/wp-content/uploads/2017/11/HNB-Phase-1-final-report.pdf
Phase 2 - http://lankajalani.org/wp-content/uploads/2018/05/HNB-Phase-2-Final-Report.pdf