

**Study on
Safety Issues of Rural Water way Crossings of Sri Lanka**

*By
Granie R Jayalath, Sri Lanka*

1. The Executive Summary

The objective of this study was to assess the safety related issues of rural waterway crossings and concerns of communities and marginalized sectors of society, characteristics of rural waterway crossings in general and in particular of four rural villages within two provinces, Sabaragamuwa and Western Provinces of Sri Lanka. The study attempted to collect information by using a questionnaire and also by conducting expert focus group meetings on following three main areas:

- I. A general overview and an assessment of rural waterway crossings in Sri Lanka.
- II. An assessment of current state of safety concerns of local and other agencies including those of village communities.
- III. An qualitative analysis to assess the impact and involvement of communities and the marginalized sectors of society in planning such crossings.

The study selected four Pradeshiya Saba areas Kuruwita, Eheliyagoda, Kiriella of Sabaragamuwa Province and Dompe Pradeshiya Saba of Western Province. For each Pradeshiya Saba one representative village was selected. Table 1.0 summarizes details of villages selected for this study.

In general rural waterway crossings can be broadly be grouped in to two categories , those constructed and maintained by Pradeshiya Sabas, these are engineered structures whereas other group of crossings are non-engineered and are supposed to looked after by the respective communities themselves. The road network within which the category 1 crossings are located exceeds 66,500kms whereas the road network in which the category 2 crossings are located is mainly footpaths that exceed 150,000kms.

According to a previous study done we have over 120,000 estimated engineered waterway crossings of category 1, but so far no attempt has been made to estimate the number of non-engineered waterway crossings available in Sri Lanka, on which this study is focused on.

This study was focused on non-engineered waterway crossings in rural Sri Lanka. Within the four villages 67 waterway crossings were examined and 142 affected but representative families were interviewed in order to buildup a qualitative perception.

Out of 67 crossing structures examined it was found that:

1. 75% of these crossings had a width of $\leq 0.91\text{m}$ (3'.0)
2. More than 92% of these structures do not have the principal/basic engineering arrangements. Most significant deficiency was the non-availability of firm abutments. Hence these structures need immediate/frequent supervision which is not at all now, to avoid possible catastrophic failures.
3. Only 15% of these structures were fitted with at least one hand rail and almost all crossings were in full dark during nights.
4. Only 50% of these crossings had the width just sufficient for a motor bike or a foot bicycle to pass through.

Out of 142 families interviewed, it was revealed that they use the crossing mainly because it cut shorts the distance to service locations compared to the distance along normal roadway. Further analysis revealed that

- a. More than 80% tend to use a crossing when the saved travel distance exceeds 50%.
- b. In average each person interviewed crosses waterway at least 6 times a week
- c. About 90% were satisfied about the location where the crossing has been constructed.
- d. There were 35% families that had only the waterway crossing to have access to main road.
- e. Especially the females have been losing more opportunities as they are compelled to stop using crossings in early hours of nights, thus affecting the socio-economic status of these villages.

2. Introduction

a. The General overview of rural waterway crossing structures

The literature survey was supported by two preliminary discussions with two expert groups. The group of Sabaragamuwa Province comprised with two Pradeshiya Saba chairmen and two senior technical officers whereas the group of Western Province comprised with two Pradeshiya Saba members, two Gramaniladari and 3 senior village citizens.

In general no literature/documentation was found where the issue of rural waterway crossings is solely addressed; the two expert group discussions helped to ascertain a general overview of these crossings structures.

The RDA (Road Development Authority, Sri Lanka) has estimated that Sri Lanka has a provincial road network of 15,532km and on it 1262 bridge crossings are available. The country has an unclassified rural road network exceeding 66,500km that comes under the administrative control of local authorities while a further network of footpaths exceeding 150,000 km falls on nobody's control and almost all of waterway crossings examined in this study were located within this network.

The two focus group discussions followed by initial sites inspections revealed that the vast majority of drainage crossings found in Sri Lanka are relatively narrow and span of these structures varies from small coconut logs of 5' to 8' long, laid across banks of narrow streams to large suspension cable crossings. It was further observed that some of these structures have been constructed a long time ago and some have been improved recently with concrete beams/slabs. For 90% of these improved cases, the Pradeshiya Sabas have provided only the construction materials free.

One fundamental fact revealed at the expert group meetings was that no-body bears responsible for the maintenance of these crossings, except in few cases where small village groups voluntary have become responsible to maintain such crossings.

b. Current state of safety of the water way crossings

At the first instance all these crossings were non-engineered crossings and most significant deficiency was the poor attention given to abutments and at present the structural stability of these crossings is at risk. In addition communities had no perception over this structural deficiency.

Further because of the restrictions attributed by factors such as narrow width, no handrails and no lighting these communities have lost the full socio-economic development potentials compared to those of city dwellers.

c. Community Involvement

The most predominant feature of these crossings was that the location decision and construction initiative have been taken by the affected communities. About 40% of such crossings have been constructed initially because of individual need and subsequently been allowed for use by majority.

Almost all of crossings examined have been constructed mainly to shorten the walking distance to nearest facility location, on the other hand 80% of such crossings have an alternative access but the distance is 5 to 12 times more compared to the shortest path.

Another significant feature worth to note was that in Sabaragamuwa province, some 80km away from capital, the villagers were so keen and enthusiastic to have the “Participatory Approach” for planning, construction and to maintain.

3. Methodology

After the preliminary discussions with the two expert focus groups followed by an inspection it was decided to formulate a methodology to assess:

- a. Views of communities especially those of marginalized sectors who use waterway crossings made locally using timber logs, steel plates etc especially on safety related issues.
- b. To assess in general the safety aspects of these crossings it-self.

3.1 Selection of representative geo-geographical locations to collect field information and views of communities

The country’s topography in general varies from flat coastal zones towards hilly and mountainous terrains in center hence two locations one from flat coastal zone and other from hilly zone were selected. The fig 1.0 shows the spatial relation between the selected locations.

Fig.1.0: Spatial relation of representative study areas



Table 1.0 summarizes the details of the villages selected for this study

Province	Pradeshiya Saba	Gramasewaka Division	Village Name	Population
Sabaragamuwa	Eheliyagoda	142B-Mitipola	Mitipola	941
-ditto-	Kiriella	147B-Deheragoda	Deheragoda	1120
-ditto-	Kuruwita	-ditto-	Deegalla	864
Western Province	Dompe	413-Malwana	Lenagampola	1512

Table 1.0: Basic details of the selected villages for field works

a. General assessment of the safety of rural waterway crossings

A check list was designed mainly to collect information related to safety of these structures and altogether 67 waterway crossings, 22 from Western Province and 43 from Sabaragamuwa Province were examined. Salient features examined are listed below.

- i. General physical characteristics of structures such as width, length and type of materials used etc
- ii. Structural soundness, deck. Abutments and piers etc.
- iii. Safety concerns of local authorities such as of Pradeshiya Saba and assistant government (AGA).

b. Assessment of the impact/involvement of communities and marginalized sectors of the society.

In order to assess the impact/involvement of communities and the marginalized sectors of the society whose livelihood depends on these waterway crossings, a comprehensive two page questionnaire was designed and five enumerators were briefed the objective of the study and deployed in 4 villages 3 in Sabaragamuwa and 1 in Western Province to interview and to collect information.

Villagers selected for assessing the impact and involvement were those that have access only through waterway crossings. A representative number of 20 families were selected for each representative village and altogether 142 families were interviewed. In addition four (4) Pradeshiya Saba chairmen and three (3) Grama-Neladari (officer represents government for each village) officers too were interviewed.

Both quantitative and as well as qualitative information were collected and analyzed, the findings are depicted in section 4.0

4. Findings and Analysis

As stated findings of the study could be broadly be grouped in to three sections and they are:

- i. Safety related characteristics of rural waterway crossings.
- ii. Safety concerns of local administrative bodies
- iii. Impacts and involvements of communities and marginalized sectors of society.

4.1 Safety related characteristics of the waterway structures.

A total of 67 waterway structures were examined 22 of them were within the Western Province and 43 were form Sabaragamuwa Province. Information of 67 waterway crossings revealed following safety related characteristics and features of structural significance.

- a. 75% of these structures had a width $\leq 3'0'$ (approximately 0.91m)
- b. 12% of these structures had a width exceeding $6'0''$
- c. More than 92% of these structures do not have any sort of engineered abutments, instead railings, concrete beam, slab or tree trunks have been kept just over the cannel banks and these footings are continuously subjected to scouring and erosion. Hence almost all these structures are so vulnerable to collapse and need immediate attention to avoid possible catastrophic failures. Variation of crossing types as a % is depicted in fig 2.0.

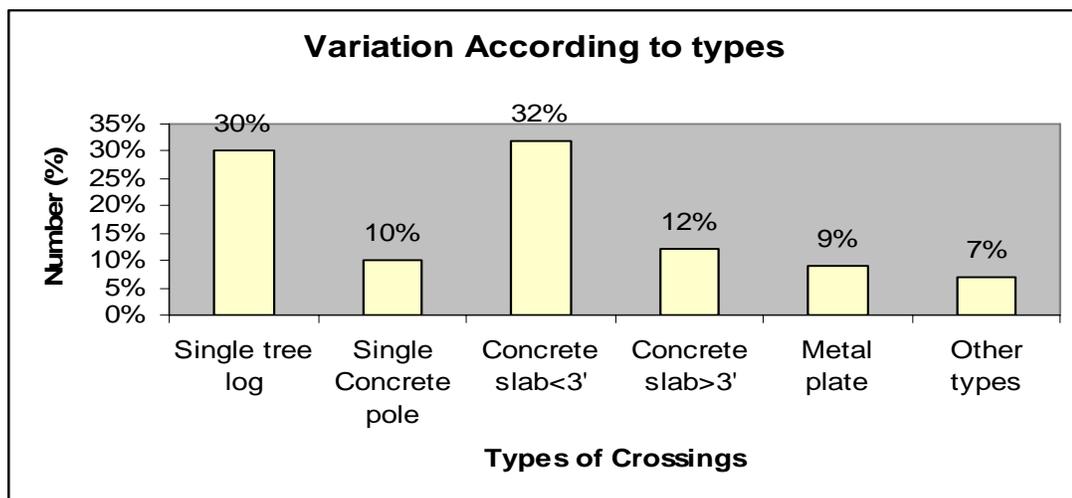


Fig: 2.0 Variations of Crossing Types

- d. It was revealed that all most all these structures haven't had any sort of pre-engineering planning or support prior to construct.
- e. Almost all structures i.e. 100% were in full dark during night.
- f. Only 15% of these structures were fitted with handrails on either side whereas another 15% had only one railing and these railings were made out of bamboo or jungle sticks, see fig 3.0.
- g. Only 50% of the crossings had the width just sufficient enough for a motor bike or a foot bicycle to pass through.
- h. Out of 142 families interviewed, 45% were able to recall about an accident taken place in past on these crossings accidents recorded were dragged down recorded on these 67 crossings surveyed.



Fig: 3.0: Initially both poles were together at the same level

4.2 Safety concerns of local administrative bodies.

The whole Sri Lanka has 274 Pradeshiya Sabas and it could be estimated in average there could be 120,000 engineered rural waterway crossings and logically it could be estimated that Sri Lanka has non-engineered waterway crossings in the order of 255,000.

The smallest administrative body is the Pradeshiya Saba. Out of 67 water crossings the Pradeshiya Sabas have provided construction materials free for 40% of the structures but they haven't provided any sort of engineering guide or supervision during construction or even after.

All those who were interviewed claimed that Pradeshiya Sabas never have maintained these crossings and they haven't even listen to whatever complains they made so far either by verbally or in writing.

Meanwhile the two expert focus group discussions revealed that the 274 Pradeshiya Sabas do have a road network amounting to 66,550kms and in addition approximately 120,000 bridges and culverts within this network. Hence because Pradeshiya Sabas do not have sufficient finance, human resources they are unable to maintain the rural waterway crossings which they termed as non-engineered and non safe crossings.

4.3 Impacts and Involvement of communities & marginalized sectors of society.

- a. Villagers tend to use a non-engineered waterway crossing despite its risks to their lives, whenever the travel distance saved exceeds 50%
- b. In Sabaragamuwa Province 35% of the families didn't have an alternative road to reach the service locations instead only had the waterway crossing.
- c. One significant phenomenon observed was the average family size within western province was 6 whereas in Sabaragamuwa it was 4.0 numbers.
- d. Other significant feature was that families of the western province in average make 6 passes per week whereas in Sabaragamuwa they cross the waterway in average 3 times per week.
- e. In general non-engineered waterway crossings save both travel time and travel distance, hence 80% of those interviewed were satisfied about the spatial locations where these crossings have been constructed.
- f. Almost all stated that during floods these crossings are not accessible, instead compelled to use alternative roads and in this regard in Sabaragamuwa province where 35% families had access only through waterway crossings get completely isolated and then they use boats.
- g. It was further revealed that 60% of these structures even though at present are used by majority have initially been constructed for the benefit of one individual or for a group of 4-6 people.
- h. About 12% of the families interviewed could be able to recall and described accidents occurred during their lifetime. Accordingly only 2 fatal accidents have occurred in Sabaragamuwa province whereas 16 droppings into cannels were recorded and 70% of these have been occurred during early night periods. Out of 16 droppings female count was 9.



Fig: 4.0: Majority of accidents were droppings through decks

- i. Over 90% of those who interviewed expressed dissatisfaction towards Pradesahiya Saba over their attitudes towards the maintenance and improvements of these waterway crossings.
- j. Out of 142 families interviewed about 40% were able to recall incidents where they have been compelled to keep their sick old mothers at home, mainly because of the difficulty to take them over the water crossings with them kept on chairs.
In Sabaragamuwa province it-self there had been three (3) incidents during the course of last two decades where old sick mothers have been passed away, according to their belief mainly due to the difficulty to cross over the waterway.
- k. 60% families were highly worried because their children do not have the full opportunities to make use the education facilities available in city, because of unsafe crossings especially in late evenings. Almost all these crossings are not provided with lightings.

5. Conclusions and Recommendations

- a. From this study it was revealed that the density of non-engineered waterway crossings varied spatially and accordingly density was low in coastal areas but significantly high when the terrain varies from rolling to mountainous.
- b. Despite having a very comprehensive administrative network comprising 274 Pradeshiya Saba covering the whole island, still development potentials of remote villages which are very obvious have so far been unable to materialized because of non optimized “connectivity” to services, there by hindering the socio-economic developments of these villages.
- c. In general there wasn’t any sort of government own organizations including Pradeshiya Saba to maintain these non-engineered structures. Out of 67 structures examined only 15% have been maintaining by small groups 4-5 villagers, the same groups who have initiated and constructed these crossings.
- d. Almost all these crossings inspected have been constructed either by an individual or by a group of villagers except for few cases where the Pradeshiya Sabas have provided only the construction material free, hence non of these crossings were not engineered structures and are at risk of collapsing without notice.
- e. Immediately it is required to maintain an inventory of these crossings by each Pradeshiya Saba and then to rank the crossings based on a set of

criteria, for example the number of families served would be one major criterion. Such one approach will assign an unique reference number for each crossing and will further ensure effective utilization of limited funds whatever small they get.

- f. It is recommended that Pradeshiya Sabas should further provide engineering guidelines during planning and supervision during construction, and then gradually the prevailing situation could be eradicated.
- g. To supplement the effort of Pradeshiya Sabas (PSs) the author suggests that PSs should encourage "Participatory Approach" for planning, construction and maintain of these waterway crossings.
- h. Eventually author would like to take up an trial assignment to inventoried the waterway crossings initially of few PSs and then to work out a ranking system to facilitate investment decision of said PSs. The local IFRTD could initiate such a assignment.
- i. Because these structures are non engineered frequent attention is required to avoid or to prevent catastrophic failures, hence it is appropriate each Pradeshya Saba to appoint groups comprising 4-5 villagers and to establish effective communication with these groups.
- j. Ministry ofTransport and Railways at the moment is engaged in the preparation of a "National Transport Policy" for Sri Lanka and thre you do not get any provision with regard to the rural waterway crossings, so it is correct time that our National Transport Policy should taken this issue up.

6. References

- (i) A.S.Kumarage, G,Connors, 2001," *An Introduction to Road Funds –A conceptual case study for Sri Lanka*".pp1-pp24,The Chartered Institute of Logistic and Transport in Sri Lanka, Colombo.
- (ii) LFRTD, 2005, " *Promoting Pro-poor Transport Policies & action in Sri Lanka*" pp13pp57, Lanka Forum on Rural Transport Development, 45, Lionel Edirisinghe Mawatha, Kirulapona, Colombo 05.
- iii. <http://www.ruralwaterways.org/case/case.htm> and <http://www.ruralwaterways.org/case/India-summary.doc>

Granie R Jayalath

Consultant Highway/Roads Engineer

Sri Lanka,

+94 01122873807-Telephones

+940112871150-Fax

077 3536596- Mobile

granierj@eol.lk