

## **Revitalization of the Reed Industry - Two case studies in Kalapugama village-Kalutara district and Habakkala, Kaikawala villages in Galle district**

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### **Abstract**

#### **Case study 1**

*A case study of revitalization of the reed industry was conducted in Kalapugama Village in the Kalutara District. (Data were gathered on four aspects namely as resource utilization, environmental friendliness, economic and social aspects). Objectives of the study were to identify the present status, problems associated with input supply, processing, weaving, marketing and potential of expanding the industry in Kalapugama village. The sample was selected randomly based on the information collected from the mat weaving training centre at Kalapugama in Kalutara district. Sample size was 30 families. Data were collected using primary and secondary sources. Reed species, on four aspects namely resource utilization, environmental friendliness, economic and social aspects found in the area, were Galhe (*Cyperus corymbosus*), Pothukola (*Cyperus platyphyllus*) and Thunhiriya (*Schoenoplectus grossus*). Among them, only Galhe is cultivated because, other two species could be obtained from fallow paddy fields. Following the collection of raw materials, reed is subjected for drying, boiling, dyeing, pressing and weaving. Unlike Pothukola and Thunhiriya, Galhe can be used to produce a range of products like beach mats, pillow mats, handbags, lockets, shoes, carpets and bags to do marketing. Reed industry is mainly headed by the women (96%) and who are engaged as a part time occupation. Reed industry provides environmental benefits like reducing environmental pollution due to biodegradability, while being a good substitute for polythene. It enhances biodiversity by increasing the population of living organisms, such as mammals, reptiles, trees, shrubs and insects. When considering economic benefits, annual income could be increased considerably. Improvements of tools and machines can maximize the resource utilization. At the same time, integration of reed cultivation with *Nymphia* spp, establishing systematic marketing strategy, production of utility products, improving quality of the products can boost the gross returns. Diversification of labour can encourage younger generation to be involved in the reed industry.*

#### **Case study 2**

*Study was carried out to achieve the following objectives: To identify present situation; problems associated with the industry and possible solutions; and suggest suitable recommendations. Data were collected from relevant institutions by having formal and informal discussions with the people, using questionnaire. Sample size was 30. Wetakeya (*Pandanus furcatus*) was the most abundant reed species. This industry was a women headed industry. Average annual income was greater than Rs 13000.00. Ninety percent (90%) are expecting financial assistance from external resources to develop the industry. Biodiversity was enhanced due to the presence of insects, reptiles, etc in the reed-cultivated area. Non-biodegradable products could be substituted using reed products. Sixty five percent of women had a good technological knowledge about the industry. Fifty percent (50%) of the people had enough land to cultivate reed. Some contribution is being made by the reed industry to reduce poverty in the area. Due to the attitude of the new generation, this industry is gradually shrinking from the society. Low efficiency of the industry was due to the in efficiency of the people. Establishment of Gallehe species in the area, conservation of traditional knowledge while giving a good recognition to the reed industry, production of utility products with a good quality and diversification of labour can improve the productivity of the industry.*

**Key words:** Resource utilization, economic aspects, social aspects, environmental aspects, quality improvements utility products.

### **Introduction**

In Sri Lanka, there are villages, which are well-known for reed industry. The village Kalapugama is one of them, which has a long history with regard to reed industry. Establishment of reed industry in the village has been done at the beginning of 19<sup>th</sup> century. Basically, four resources are identified, such as planting material, women labour, traditional knowledge and technology. Plants, which are used to weave mats are termed reed, such as Thunhiriya, Haven, Borupan,

Pothukola, Hambu, Halpan, Elupan, Wetakeya and Hemp, etc. Reed is grown on boggy land where fallow paddy fields are available. Salt condition is favourable for the growth of reed. There are several reed species, used to produce reedware, (e.g. Galhe, Thunhiriya, Haven, Borupan, Pothukola, Hambu, Halpan, Elupan, Wetakeya and Hemp). In Kalapugama village Galhe, Pothukola and rarely Thunhiriya are used to weave mats. In addition to grasses and sedges, some tree species such as Indikola, Thalakola and Thalkola are also used. One of the major issues with regard to reed industry is complications in supplying raw material. There is no systematic arrangement for supplying raw material. At present, women collect reed from nearby areas. Some women purchase raw material from lorries travelling from Anuradhapura and Chilaw regions. Due to lack of coordination, nowadays supply of raw material by lorries is being totally discontinued.

Reed is sun dried before dyeing. For different grasses, different drying periods are required. e.g. For Galhe 7 days are required. Some women mix ash, while drying as a protection from harmful insects. Reed species like Galhe are not torn before drying while Thunhiriya is torn before drying. Galhe, Pothukola and Thunhiriya are crushed before hand weaving. In machine weaving, both Galhe and Borupan are crushed. In Kalapugama village, crushed Galhe is used for machine mat weaving. Machineries, which are used to process reed, are still at very primitive stage. So it is necessary to identify ways to improve machineries. Some mats named as "Rata Paduru" are weaved after dyeing. Currently artificial dyes are used. But in ancient time, dyes were prepared using leaves, roots and bark of some trees. Presently different colors of artificial dyes are available in shops. Some colours are mixed to get the required colour.

E.g. blue and red are mixed to get the purple color.

There is lack of systematic marketing strategies with regard to reed industry. Women are reluctant to continue with mat weavings due to unsatisfactory profit margins. Which is below Rs.500.00 per month? When considering the Kalapugama village, "Laksala" is the main outlet for weavers. They collect products regularly from "Mat weaving training centre- Kalapugama". An employee of the training centre sells the products to other salespersons too. But in the case of satisfactory orders, all the employees must be engaged in completing the order, as the first primes.

Another issue with regard to the reed industry is insufficient returns for the women's effort. Two main reasons that contribute to the situation are high cost of raw material and low purchasing prices of the products. When considering the machine weaving, two women are engaged in weaving one machine mat as to increase the efficiency. So it takes only 3 hours to weave a 6 feet long and 3 feet wide Galhe machine mat (2m x 1m). It is an essential item in day-to-day life. E.g. Weddings, feeding of rice for the first time to babies, adulating occasions, in funerals, in temples, "pirith" occasions, almsgiving and "thowil", cultural events and Social functions etc. In Kalapugama village, some women are used to weave mats and keep in their houses to strengthen financial security by selling these mats when needed. Bentota area has been one of the famous villages for the reed industry (Wetakeya, Gallehe, Hambu, Thunhiriya, Borupan, and Pothukola) Some people in the village are still engaged in the industry. In the past, these people have been considered as separate categories who were weaving mats. Wetakeya, Gallehe, Hambu, Thunhiriya, Borupan, Pothukola were used to produce reed products in early days.

Women were mainly engaged in the industry, while men supported to collect the raw materials and for the selling of products. This traditional livelihood was established in the area for a long period of time. There was a stabilized market for the reed products for a long time. People visited the market to sell their products. Even now on every Tuesday from 3.00-6.00 there is a reed fair at Gonapala village for the transaction of reed products. Techniques used in reed industry are very simple. The required equipments are prepared at the village level and their costs were very low. This helps to generate a large amount of job opportunities using less capital. We can use this industry to have a sustainable development. Reed products are environmentally friendly because these products are biodegradable and can have a market, once the government banned the use of polythene and plastic in the country. Even though this is very much important, the existing condition of the industry is not satisfactory. Still we have not developed a proper utilization mechanism of reed as a substitute for non-biodegradable polythene.

Many reasons affect the deployment of the industry. The number of people engaged in the industry has been reduced gradually. According to the survey done in 1980, number of employees was 840 and out of them 660 were women. But according to the statistics in 1990, it

has been reduced up to 380. (Bentota Provincial Secretary office, 1982-2000) Since 1999, there was no survey or records about the industry and this show less attention to the industry in the region. Reed industry contributes environmental conservation through biodegradability of reed, enhancement of biodiversity in the reed cultivation. Conserving genes of reed species, which are in danger. Almost all weeds in paddy fields can be seen in areas where reed is cultivated. In addition, a number of insects, mammals, reptiles, amphibians, birds and soil organisms can be seen in reed cultivation. So reed contributes considerably for the conservation of biodiversity. Reed is made of plant tissues. Unlike polythene, reed has no environmental pollution due to accumulation of non-biodegradable material. Reed can be used as an environmental friendly packaging material. So it is a must to promote reed as a substitute for polythene, while increasing the biodiversity.

The aim of this study is to prepare a review, which can be used as guide to revitalize the reed industry. This document will also provide information on how to increase the efficiency and effectiveness of resource utilization and ultimately to utilize resources in a more productive manner. It is easy to coordinate with foreign people, to seek financial assistance, to increase the living standards of people, engaged in reed industry. Identification of potential research areas is also possible. Then once publish those areas interested people will involve in discovering quality improving methods. The existing problems due to lack of communication could also be identified. In order to improve communication channels. Women labour can be utilized in a more productive manner by identifying way of maximizing profits. This document can also be used as an information source to establish a systematic coordination among growers, weavers, sellers and customers. Traditional knowledge, which is under threat can be conserved by publishing the findings. Conservation of reed species, which are becoming extinct, can be practiced with correct identification (e.g. Elupan). Reed material can be promoted as an environmental friendly packaging material, and as a substitute for polythene

#### **Objectives of the study**

To review the present situation of the reed industry in Kalapuagma , Kaikawala and Habakkala villages, for the identification of problems associated with input supply, processing, weaving and marketing in Kalapugama village, to identify the potential of expanding the industry, to identify the guidance, advices, technical assistance, encouragement and motivation which can be provided to expand the reed industry, to assess the environmental, social and economic benefits, expanding the reed industry.

#### **Methodology**

A study of the Kalapugama, village was carried out by selecting people who are employed in Sri Lanka Artistic Reed Designing and Training Centre, people who live around the training centre and people who liaise with the training centre. Basically, selected target group was concentrated around the training centre at Kalapugama. The study in Bentota area was carried out by selecting people who are employed in Wetakeya designing and training centre, people who live around the training centre and people who weave Hambu mats in surrounding area. target group was concentrated around the training centre- Habakkala and Kaikawala.

Social, economic and resource utilization information were obtained by providing questionnaire to the target group. Resource utilization aspects were also studied from field visits, having formal and informal discussion with growers, weavers and sellers in the target group. Information which was relevant to environmental aspects was gathered by field observations. Four resources were considered under resource utilization aspect, such as planting materials, traditional knowledge, women's labour and technology.

Environmental aspects were mainly focused on biodegradable material as a substitute for polythene, by preventing environmental pollution through do away from solid wastes. Also finding the potential to enhance biodiversity through cultivation of reed species. Social aspects were basically focused on productive utilization of women labour; promote reed industry as an additional income generating method to increase the living standards of rural people. Facilitating self-esteem to rural people who are engaged in reed industry. Under economic aspects, ways of facilitating timely coordination as a marketing strategy, increasing the productivity by improving machineries, increasing the efficiency and the effectiveness of production, maximizing profit margins and improving quality of the product and minimizing wastage of planting materials were

considered. Relevant institutions were visited to collect information (e.g. IDB, EDB, IUCN) etc. Study was conducted in 709 Kalapugama GS division selecting two small villages named as Kalapugama and Kalapumulla. Kalapugama 709 GS division belongs to the Kalutara DS division. Kalapugama GS division was demarcated by paddy fields around the “Kosmade” village, “Kappu ele” from east at the end of “Kajuwatte road” and end of “Kapumulla Road” from south, paddy fields around the Kalapugama Sri Sumangala temple from west. Reason for selecting Kalapugama for the study was, presence of Sri Lanka artistic reed designing and training centre. There are only two, mat designing and training centre in Kalutara district. Kalapugama training centre is the oldest and most active centre at present. At the same time, the village has an old history, and tradition of reed industry. Out of residence in 709 GS division, 17.9 % have been engaged in reed industry. Sixty percent of them were selected randomly; those who had some experience in with reed designing and training centre Kalapugama. These 30 families represented 60 % of people who were engaged in the reed industry regarding 709 Kalapugama GS division.

Study area located in Southern Province in Bentota District Secretary division (Figure 3.3). From Kaikawala 9 GN division and Habakkala 9c GN divisions have been selected for the study. Habakkala was selected because Wetakeya training center is located there. People living around the centre are employed in the centre. In Kaikawala, people are producing different products using different reed species like Hambu and Gallehe. During early days, they have used Gallehe in large scale but today it is much reduced. Kaikawala is considered as the village that engaging most number of people in the reed industry from early days as well. These 2 GN divisions were selected as many people are engaged in the reed industry. Thus it facilitates to explore the real problems exist in the industry.

Data were collected using preliminary (eg questionnaires, formal and informal discussion, field visits, observations) and secondary data sources (CEA, IUCN, EDB, Laksala, DS office)

## Results and Discussion

### Processing

**Wetakeya:** Leaves are harvested from the tree, cut two corners of the leaves, using a tread, remove thorns, remove mid rib, using a blade tear in to same width strips, make bundles, boil in water for three hours (Adding Keppetiya, Billin, Walhabarala or Ananas), soaking in clean fresh water for 10 hours. Washing with clean and fresh water, allow to dry for 5 days (day and night), dyeing, weaving.

**Pothukola:** Leaves are cut 2 to 3 months after planting, separate leaves from weeds, tearing into 2 strips (Number of strips can vary, sun drying for 2 days (8 hours per day starting 8.00 am to 4.00 pm), dyeing is done for 2 hours using, dye added boiling water. (Using chemical dyes-kukul sayam), sun drying for another two days with low sunlight, pressing of leaves using, pressing machine and weaving by hand.

**Thunhiriya:** The process involved harvesting leaves 2 to 3 months after planting, separating from weeds, tearing into 3 strips, sun drying for 3 days (8 hours per day starting 8.00 am to 4.00 pm), dyeing for 2 hours using dye added boiling water. (Using chemical dyes-kukul sayam), sun drying for another two days with low sunlight, pressing leaves using, pressing machine, weaving by hand.

**Galhe:** Harvesting of Galhe two months after planting, 4 to 7 days after flowering using a sickle, then separating from weeds. Making of bundles (As to carryout from the field. Weight of one bundle is 5 kg.) Sorting of Galhe again to separate small and large size leaves. Sun drying of leaves separately according to a schedule. (Day and night for 3 consecutive days and 4 days day time only)

**Dyeing:** Boil 1.5 litre of water (half a pot) for a period of 30 minutes to one hour. 100 g of dyes, medium size 4 salt crystals and one teaspoon of turmeric should be added. It's better to use coconut leaves to produce the flame rather than using fire woods. Five to Ten reed leaves are tied into one bundle. Bundles are folded 5 to 6 times. Then it is inserted into the pot. It is kept for about 30 minutes to 1 hour then sun drying under low sunlight for 1 to 2 days depending on the weather condition. (Sun drying period per day is 7 hours from 9.00 am to 4.00 pm)

**Pressing:** Pressing of Galhe is done for hand weaving. For machine mats this step is not practiced. Five leaves can be pressed within 2 to 3 minutes. Pressing is done in both directions Finally hand weaving of mat. But for machine mats pressing is not done.

**Table 1: Parts of a Galhe weaving machine**

Name of the part	Function
Sead	Tightening & collection of treads
Batten	Tightening of Galhe while weaving in the machine
Heels bar	Moving the thread up and down as to weave in both directions
Pedals	Moving the heels bar up and down
Mat beam	Finishing mat is wrapped around this beam.
Thread beam	Threads which are use d to weave mats are wrapped around this round beam.
Reed bar	Facilitating movement of reed strip through threads without blocking or sticking.

**Weaving Galhe mats using the machine**

Wrapping of threads in corn to bobbins  
 Placement of bobbins in bobbin rack Collection of thread terminals through the thread frames.  
 Wrapping each thread terminal around the wope roller. Wrapping of threads into the thread beam using the special tool named as “reed”. Wrapping of threads in to the beam. Connecting thread beam in to the weaving machine. Weaving of mat:  
 Using the heels bar threads are moved up and down according to the desired design. Weaving the mat with simultaneous steps. (Pressing the pedals, putting the reed leaf, pressing the moving bars). Concluding of machine mat weaving. Special Steps: Finishing of beach mats using the sewing machine. Making hand bags (use of blocks and cut the mat into pieces)

**Comparisons of planting materials (input sources)**

Machine mats are woven using Galhe. Kalapugama village is well known for manufacturing machine mats. So highest percentage (60 %) of people use Galhe as the input source.

**Table 2: Durability of different input materials**

Material	Duration (Years)
Galhe	60 -80
Thunhiriya	8 -10
Pothukola	2 - 4

\*Above mentioned time was valid if mats were not wetted. Galhe was the most durable planting material with regard to others. In addition Galhe can be bent easily without any breakage, compared to other materials. So a variety of products can be produced using Galhe. Collection and drying was easy when compared to other materials. Machine mat weaving was done using non-crushed Galhe.

**Table 3: Main Products**

Galhe	Thunhiriya	Pothukola
Large mats(2m x 1m)	Large mats(2m x 1m)	Large mats(2m x 1m)
Small mats(1.50 m x 0.75 m)	Small mats(1.50 m x 0.75 m)	
Beach mats(1.50 m x 0.75)		
Pillow mats (1.50 m x 0.75 m)		
Carpets(20m x 20m)		
Hand bags(0.25m x 0.30m x 0.20 m)		
Lockets (0.06m x 0.05 x0.03 m)		

**Table 4: Fresh matter requirement to wear (2m x 1m) mat**

Galhe	Pothukola	Thunhiriya
5 kg	4 kg	2 kg

Galhe fresh matter requirement was high due to the small size of Galhe leaf when compared to other two species.

**Table 5: Harvesting time of different reed species (months)**

Galhe	Pothukola	Thunhiriya
2-2.5	2-3	2-3

Harvesting time was almost same for all three species. Because all are fast growing perennials.

**Table 6: Propagation material usage**

Galhe	Pothukola	Thunhiriya
Long & creeping rhizome	Short 10 cm length rhizome	Stolon /corm having 5mm thickness

There is a high potential of propagating Galhe with compared to other two sedges since it has long creeping rhizomes.

**Table 7: Average length of leaves which were taken for weaving**

Galhe	Pothukola	Thunhiriya
0.9 m	2 m	1.2 m

**Table 8: Average drying period in days**

Galhe	Pothukola	Thunhiriya
7 days	2 days	3 days

\* From 8.00 am to 4.00 pm was considered as one day.

Moisture content in the Galhe leaves was higher than Pothukola and Thunhiriya.

**Table 9: Average Drying Period in hours**

Galhe	Pothukola	Thunhiriya
3 hours in boiling water	2 hours in boiling water	2 hours in boiling water

Galhe absorbs high amount of dyes when compared to others. So it has to be kept for long time in boiling water. At the same time dyeing was compulsory step in weaving of Galhe.

Very small amount of dyes were applied to Pothukola & Thunhiriya with compared to Galhe.

**Table 10: Average period in minutes**

Galhe	Pothukola	Thunhiriya
2-3 minutes	3-4 minutes	2-3minutes

For machine mats Galhe was used without crushing. But for hand weaving Galhe was crushed. Four to five leaves was crushed at a time for 2-3 minutes.

Pothukola and Thunhiriya were also crushed for hand weaving.

**Table 11: Average number of days required for hand weaving of (2m x1m) mat**

Galhe	Pothukola	Thunhiriya
7 days	4 days	6 days

Since Galhe leaf length (0.9 m) was less compared to other two species it consumes less time. But for Pothukola, time consumption was high due to the large size of the leaf (2m). Mat weaving was done as a part time employment.

### Economic Analysis (Kalapugama village)

#### Cost Analysis

Seventy two (72) large mats (2m x 1m) were considered for the average cost, income gross margin analysis of Galhe and Pothukola. In the case of mixed weaving thirty six (36) Galhe and thirty six (36) Pothukola mats were considered in the same manner.

**Table 12: Average annual cost**

Input material	Cost (Rs)
Galhe (72 mats)	8335
Pothukola (72 mats)	751
Galhe and Pothukola (36 Galhe &36pothukola)	2202

#### Income Analysis

**Table 13: Average annual income**

Input material	Income(Rs)
Galhe	18337
Pothukola	5252
Galhe and Pothukola	13504

**Gross Margin Analysis**

**Table 14: Average gross margin per year**

Input material	Gross margin (Rs)
Galhe	10002
Pothukola	4501
Galhe & Pothukola	11302

Maximum average gross margin (Rs.11302) per month was obtained by weaving both Galhe and Pothukola mats, Second highest gross margin (Rs.10002) was obtained from weaving Galhe mats. Less gross margin (Rs.4501) was gained by weaving Pothukola mats alone.

**Economic analysis (Habakkala and Kaikawala villages)**

Sixty percent of people were engaged in Wetakeya industry, 20 % of people were engaged in products made from Hambu, 10% of people used Gallehe and another 10% used both Hambu and Wetakeya.

**Cost analysis**

The majority of people (89%) spent Rs.2600-Rs.5480 as cost of production per year for Wetakeya. Fifty percent of people had to spend above Rs.2300 as cost of production per year for Hambu. Sixty six percent of people had to spend above Rs.5000 as cost of production per year for Gallehe. Sixty six percent of employees had to spend above Rs.2600 as cost of production per year for combination of Wetakeya and Hambu. Gallehe recorded the highest cost of production (Rs.5840.00) while Wetakeya remain 5 second (Rs.3990.00) Sixty one percent of employees had an annual income of Rs.15000-24200. Sixty seven percent of employees had an annual income above Rs.12000 for Gallehe while People involved in making Wetakeya products had the highest average annual income (Rs 19955.00). Highest percentage of people gained annual gross margin between Rs 12000 to 15680. Maximum average gross margin (Rs.15964) per year was obtained by weaving Wetakeya products. Second highest income was obtained by weaving both Wetakeya and Hambu (Rs. 12290). Less gross margin was achieved by weaving Hambu alone

**Social aspects**

In Kalapugama village, the majority of women (57%) were between the age group of 31 to 40 years In Kaikawala and Habakkala villages seventy four percent of women were between 47-60 years.

**Table 15: Attitude of the people in Kaikawala and Habakkala villages.**

Problem	Very important (%)	Important (%)	Important up to some extent (%)	No importance (%)
Raw materials	85	2	3	10
Raw material processing		75	25	
Market			70	30
Financial	90	10		
Knowledge			30	70

**Limitations**

- Some people did not provide correct information about their income, expenditure and the marketing of the products
- Written documents about the industry are very few and difficult to find
- Cannot find much information about history of the area and research based on industry are also very rare
- Some people have given up the industry and later some people joined to the industry. So their knowledge about the industry was very poor

**Discussion**

**Resource utilization**

Galhe was the most durable (60 – 80 years) material compared to Pothukola and Thunhiriya. This was due to strength of leaf. Dried Galhe leaf was difficult to break, but other two leaves break easily. Due to easiness of bending without breaking, using Galhe, various types of products

such as large mats, small mats, beach mats, pillow mats, and small beach mats, carpets, hand bags, lockets, shoes and table mats etc. can be produced. Fresh matter requirement to weave 2mx1m large mat was high as compared to other two due to the small leaf size. Harvesting time of three species were almost same (2 to 3 months). So there are four harvesting seasons per year. This is because of being fast growing perennials. Average drying period of Galhe was (7 days) higher than Pothukola (2days) and Thunhiriya (3 days). Due to its high moisture content in the leaf. Average boiling period of Galhe was high because of its high absorption capacity of dyes. So Galhe absorbs large amount of dyes compared to other two. Average pressing period of Pothukola was high (3-4 minutes to press 1 leaf) due to the large size of leaf (length 2m).

#### **Economic aspects**

More than half of the people (60%) were engaged in weaving of Galhe products. This is due to the durability and the ability to weave various products using Galhe. Collecting of Galhe is also easy compared to other two. Weaving both Galhe and Pothukola within the year can maximize the gross returns per year (Rs.11302). By weaving Galhe mats alone, one can obtain considerable gross margin (Rs.10002). But cost for reed materials becomes zero with regards to Pothukola and Thunhiriya.

#### **Social aspects**

When considering social aspects, 93% of the employees were women. So this industry can be defined as women headed industry. There were only 7 % of men who were involved in the industry. To weave machine mats, it is necessary to be patient, should have a good memory and ability to concentrate on delicate work for a long period of time. Unlike the men, Asian women with living environment learns to tolerate and workout with hard responsibility. When focusing on attitudes of people, 90% were satisfied with their employment in the reed industry. At the same time, they were confident enough to produce new utility products, if they were assisted by some resource person. More than 50% were interested in cultivating Galhe, but they are provided only with the necessary guidance. Younger generation of the village was reluctant to engage in the industry due to lack of self-esteem. Working in a private institute can provide more self-esteem due to its smart environment.

#### **Environmental aspects**

Cultivation of reed contributes considerably for the enhancement of biodiversity. Lists of mammals, reptiles, birds, trees, insects etc provide enough evidence for that, conservation of genes of reed species ("Elupan", "Ata pan", "Havan pan")

Reduction of environmental pollution due to its biodegradability. Thus it can be used as a substitute for polythene. One reed bag (0.50 m x 0.40 m x 0.30 m) can be substituted for three medium size (0.20 m x 0.25 cm x 0.10 cm) polythene bags. At the same time one Galhe bag can be used at least for 10 years unlike polythene bag. This will avoid the pollution caused by thousands of polythene bags.

#### **Present situation of the reed industry in Habakkala and Kaikawala Resources utilization**

People, who are engaged in producing Wetakeya, grow Wetakeya trees in their own lands. But landless people have to buy these leaves from outside. Hambu and Gallehe cultivations do not exist in the area. So the producers have to buy Hambu and Gallehe from villages away from the producing place. Ninety five percent (95%) of the people were mentioned that the price of Gallehe was too much. Therefore, eighty percent (80 %) transferred to Hambu instead of Gallehe. Women who were recently engaged in the industry started to produce Hambu products, because Gallehe is scarce in the area and the price is also too high. But still twenty percent (20 %) of women have not given up the production of Gallehe products.

#### **Land use pattern of the area with regard to reed species**

Even though Iduruwa area has four percent (4.72%) reed cultivation or total land area, large amount of land is covered by non durable reed species like Borupan. There is a potential to grow reed species in eighteen percent (18.44%) or the total land area.

Wetakeya and Gallehe products have high value than other products. But Gallehe raw material is very scarce in the area. Even Southern Development Authority and National Craft Council



conducted some programs to cultivate Gallehe in the area. Hambu pan comes from Ambalangoda area. Another problem is Borupan like species were not grown as in earlier times. Its size has been decreased while decreasing the value. Today raw material scarcity has become one of the major problems with regard to the industry. Women who were at the age above 60 years had been used as labors to cut reed species from the “pan kotu”, but finding labors has also become a problem and the wages for them were not satisfactory. The reason for the scarcity of Gallehe reed species was insect attack (Stem borer) few years ago. It caused the reduction of large amount of cultivation from the area.

**Status of marketing**

In Habakkala those who produce Wetakeya products sell their products to Laksala or Tourist hotels. Gallehe and Hambu mats were sold to buyers who visit their places or they have to carry it to the Gonagala fair. Fifty percent (50 %) of the people said that they were selling products to the buyers who visit their places. Fifty percent (50 %) said that, they sell to those buyers or selling at the fair. Even some times they could have high prices at the “Gonagala fair”. Due to lack of transport facilities to the fair, people used to sell their products to the buyers at village level. Still certain amount of people depends solely in the fair. Marketing problem is not that serious as compared to raw material problem. Because if they have products any how they can sell the products.

There is a potential to sell these reed products to the foreigners as well. Foreigners are gathered around villages due to the presence of tourist hotels in the surrounding area. But in that case language becomes a problem. Poor quality of mat was another problem. Mat when washed or exposed to sunlight it becomes discolored and easily decayed too. Compared with good quality mat, we could see many inequalities in these village products. Demand goes down because of the poor quality. Consumer can buy imported mats having good finish at a lesser price than the village produced Gallehe mat.

**Social Situation**

Labor problem also affects the reed industry. Labour usages reflect as follows.

**Table 16: Labour usage for the reed industry**

Labors	Percentage (%)
Family labor	84
Relatives	10
Neighbors	6

These laborers were not paid. It reflects the community interrelation. When using family labor women have to face some problems. If children are schooling then they have to face problems to allocate time to support production process. People involved in the industry getting old is another problem. We couldn't see any intervention of the new generation to the industry. Therefore when women are getting old, labor force becomes scarce. Study was done by collecting information from women aged between 41-71 years. Out of them seventy three percentage (73%) were between 47-60 years. Thirteen percent (13 %) were aged between 40-46 years and thirteen percent (14 %) were aged between 61-74 years. The reason for the less intervention of new generation is they can have other alternative opportunities in garment sector. At the same time wages of the industrial sector is higher than that of reed industry. This cause people away from reed industry and some people have gone abroad for new jobs.

**Knowledge of technology**

Less attention given to the utility value of the product was identified as a problem in marketing. If they are aware of the recent demands, then can have good gross margins from the products. Technological knowledge of mat weaving is important to produce quality products. During the study, it was revealed sixty five percent (65 %) of women had developed good technological skills. Eighty four (84 %) of them were aged above 50 years. Sixteen percent (16 %) of them were between 40-50 years. These people have gained knowledge from their parents and from the training center. A lady called “Milly Nona” has received Presidential award for her creativity and fantastic finishing of mats. Other thirty five (35 %) had less attention to the industry. Gradually they are moving to give up the industry. Even though they have Wetakeya training center nearby,

most of them don't have time to go there, because of their duties at home. A mat having traditional design has high economic value. Verses weaved in those mats were really appreciable. Example: verse composed by Milly Nona

Enna tharagayata apahata denna	ida
Heda weda maddida mewa iduruwe	weda
Bentota pan paduruwenuwen nagana	handa
Niyathi gahanawa rata paduratath	mada
එන්න තරගයට අප හට දෙන්න	ඉඩ
හැඩ වැඩ මදිද මේවා ඉදුරුවේ	වැඩ
බෙන්තොට පත් පැදුරු වෙනුවෙන් නගන	හඩ
නියතයි ගහනවා ඊට පැදුරටත්	මඩ

Translation: Come on give us a chance to compete  
 Isn't it beauty, these are products of Iduruwa  
 This represents the voice of Bentota reed mats  
 We will definitely win from the competition

Other than reed mats, she has produced “atulpath”, wall hangers, bags, tablemats etc. Even though “Milly Nona” has this knowledge regarding the designs and products, this knowledge won't be transferred to the next generation. Her knowledge will end after her death. She is one of the best examples to show that still there is a great potential to revitalize the industry. Because she had some standing orders from foreigners value is exceeding Rs. 5000 per week. But now she is 71 years old. So it is difficult to weave mats by staying at a same stance for a long period of time. She has won many awards. And requesting to have a pension for her own expenses.

**Financial problems faced by women**

Reed industry is an industry supporting the rural poor. Women involved in industry have to face many monetary problems. Often they have to take credit from other people. If they have products they can sell, when necessary and can earn something more.

Some weavers were scared to provide true details about monthly income, because they thought that it might affect the subsidies and donations received by the government. But any how rough amount about the monthly income could be calculated. There was no fixed income, which depends on the effort they put in. In the family, most of the time at least one person was employed in a monthly paid occupation. So, that helps for to increase their average monthly income. But in this study, the importance was to find out the income of employees in reed industry.

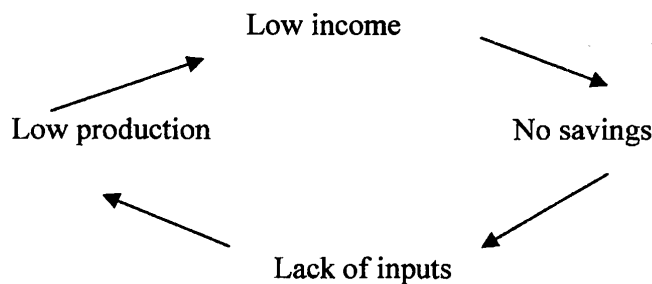


Figure 4.1: Economic problems for employees  
 When weavers get loans the economic status had become much worse.

**Other problems**

In addition to above mentioned problems, there were a number of other problems too, such as lack of proper transport facilities, lack of technological improvements to improve the quality of product, lack of proper coordination between the suppliers and the weavers, lack of utilities (ex. Processing machine) and declining trends in the number of people engaged in the industry. The main reason for the shortage of employees in the industry is younger generation would prefer to occupy in the garment industry. At the same time negative attitude, exist in young educated generation that people involved in reed industry have no self-esteem.

Women who have experience in the reed industry and moving out to another village, after marriage will decrease the skilled labor focus in Iduruwa. Presently even village people do not hesitate to send female family members for jobs.

### **Conclusions drawn from Kalapugama village**

Resource utilization of reed industry is at unsatisfactory level.

Following problems are associated with the reed industry.

**Supply:** High cost of production for Galhe cultivation Lack of promising good quality raw materials (e.g. Galhe).Lack of attention of authorized people regarding, the complaints on cultivating land improper management of available land and water resources for Galhe cultivation. Declining contribution of men for the reed cultivation

Lack of communication between growers and weavers engaged in the reed industry

**Processing** Lack of protection from cattle and goat. (dried leaves are eaten by cattle and goats).

Bright sunlight is needed to dry the leaves just after cutting; otherwise, fungi may infect leaves.

High cost for dyes. Longer time period needed for sun drying. Absence of labour diversification.

Lack of facilities and utensils (good floor for sun drying, poor technology, containers etc)

**Weaving:** Spending more time for wrapping of thread. Breakage of reed leaves. For hand weaving, reed leaves should be pressed well. Lack of involvement of younger generation in reed industry. Availability of alternative job opportunities in two factories located nearby village.

Lack of quality improving techniques

**Marketing:** Lack of coordination between sellers and weavers. Lack of transport facilities. Lack of awareness about the market where there is a high demand for reed. Lack of utility products. Lack of promotional strategies. Lack of proper collecting centres and outlets in the area. Lack of new designs with higher demand

**Research:** Lack of research with regard to the reed industry. Improvements in agronomic practices to increase the quality of reed. Identification of good quality and promising planting materials. Production of natural dyes. Improvements of instruments capable of measuring the related indicators

(e.g. soil resistance).Technological improvements of tools and machinery used in reed cultivation Identification of possibility of integrated farming for reed cultivation. Though there are a number of problems in the industry, there is a great potential to expand the industry in Kalapugama village.

### **Conclusions drawn from Habakkala and Kaikawala villages**

#### **Resource utilization**

Difficulties in collecting raw materials (e.g. Pothukola, Thunhiriya, Gallehe), raw materials transportation has become a problem because Hambu is not growing in the village. It has to be brought from outside the village. Sometimes, Gallehe also has to be purchased from outside, low efficiency of the industry effect for growers, producers and sellers as well. Seventy percent (70 %) of women involved in the industry have worked for more than 10 years. So they have well developed skills which can be considered as a good human resource for the industry. Employees have to face problems with raw material supply. Basically, within a week, one producer could complete about three quality finish products (two 2m x1m mats and medium size bag.), if raw materials are available. Women involved in the industry have a good knowledge about different patterns and designs, which is a great advantage to produce new products

#### **Social aspects**

Some contribution is made by the industry to reduce poverty and for the development of the area. Now, people involved in the industry are above 40 years of age. Many of them have number of problems in their family life, thus decreasing the efficiency of the industry. Inefficiency of the industry is the result of inefficiency of the people. Due to the attitudes of new generation, this industry is gradually shrinking from the society. At the same time with the open economy, people are moving away from this kind of traditional industries. Improving the living standards of the employees. Productive utilization of women labour while increasing the family income. Conservation of traditional knowledge, people like to see the reed industry with a good recognition, but still it exists as in the past, improving the attitudes of people towards the environmental friendly materials and professional knowledge about designing is high in old women. Once the old generation is lost, the traditional knowledge would become almost extinct.

#### **Economic aspects**

Today the main products are bags and mats. But some people weave spoon hangers, wall hangers, lids of food containers, table mats, lockets and carpets, Gonagala fair was the main

market place for the products during early days. But now buyers come to the houses and buy the products. This has caused lesser importance of the fair. Industry should modify according to the requirements of the modern society. Products must have value addition with a utility value. Thus getting the chance to cater to both local and foreign markets.

### Environmental benefits

Biodiversity of reed species is under threat in the study area. Uncertainty of this industry can be a threat to the biodiversity in the area. Enhancement of biodiversity. Reduction of environmental pollution due to its biodegradability and ability to substitute for polythene and gene conservation of reed species.

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### Annex 01

#### Environmental aspects

##### Conservation of genes of reed species

No	Common name	Botanical name	Family
1.	Wetakeya	<i>Pandanus furcutus</i>	Pandanaceae
2.	Dunukeya	<i>Pandanus thwaitesii</i>	Pandanaceae
3.	Thalakola	<i>Corypha umbraculifera</i>	Aricaceae
4.	Thalkola	<i>Borassus flabelifer</i>	Aricaceae
5.	Indikola	<i>Phoenix zeylanica</i>	Aricaceae
6.	Galhe	<i>Cyperus corymbosus</i>	Cyperaceae
7.	Thunhiriya	<i>Schoenoplectus grossus</i>	Cyperaceae
8.	Havan	<i>Cyperus pangorei</i>	Cyperaceae
9.	White jute	<i>Corchorus capsularis</i>	Corchoraceae
10.	Tossa jute	<i>Corchorus olitorius</i>	Corchoraceae
11.	Pothukola	<i>Cyperus platyphyllus</i>	Cyperaceae
12.	Hambu	<i>Typha angustifolia</i>	Typhaeaceae
13.	Cajana	<i>Coccus mucifera</i>	Palmae
14.	Atapan	<i>Lepironia articulate</i>	Cyperaceae

**Annex 02 - List of plants found in the surrounding area of reed cultivation.**

No	Family	Botanical Name	Common Names	Life-form
1.	Anacardiaceae	<i>Spondias dulcis</i>	Emberella	Tree
2.	Apocynaceae	<i>Cerbera manghas</i>	Kaduru	Tree
3.	Araceae	<i>Alocasia macrorrhiza</i>	Habarala	Herb
4.	Asteraceae	<i>Eupatorium odoratum</i>	Podisinno	Herb
5.	Asteraceae	<i>Mikania cordata</i>	Gahalewel	Herbaceous climber
6.	Asteraceae	<i>Vernonia cineria</i>	Monerakudumbiya	Herb
7.	Clusiaceae	<i>Garcinia quaesita</i>	Goraka	Tree
8.	Clusiaceae	<i>Calophyllum inophyllum</i>	Domba	Tree
9.	Combretaceae	<i>Terminaria</i>	Kottamba	Tree
10.	Euphorbiaceae	<i>Macaranga peltata</i>	Kenda	Tree
11.	Fabaceae	<i>Desmodium triflorum</i>	Undupiyaliya	Herb
12.	Fabaceae	<i>Gliricidia sepium</i>	Wetahira	Tree
13.	Fabaceae	<i>Mimosa pudica</i>	Nidikumba	Herb
14.	Malvaceae	<i>Hibiscus rosasinensis</i>	Wada	Shrub
15.	Malvaceae	<i>Thespesia populnea</i>	Gan suriya	Tree
16.	Meliaceae	<i>Azadirachta indica</i>	Kohomba	Tree
18	Moraceae	<i>Artocarpus heterophyllus</i>	Kos	Tree
19	Musaceae	<i>Musa acuminata</i>	Kesel	Herb
20	Palmae	<i>Cocos nucifera</i>	Pol	Tree
21	Passifloraceae	<i>Passiflora foetida</i>	Padawel	Herbaceous climber
22	Umbelliferae	<i>Centella asiatica</i>	Gotukota	Herb
23	Verbenaceae	<i>Lantana camara</i>	Hinguru	Shrub
24	Nymphaeaceae	<i>Nymphaea lotus</i>	Olu	Aquatic plant
25	Sapindaceae	<i>Filicium decipiens</i>	Pihimbiya	Tree
26	Verbenaceae	<i>Lantana camera</i>	Gandapana	Shrub

**Annex 03 - List of reptiles found in the surrounding area of the reed cultivation**

VC=Very Common

C=Common

No	Family	Species	Common name (English)	Common name (Sinhala)	Status
1.	Colubridae	<i>Ptyas mucosus</i>	Common rat snake	Garandiya	VC
2.	Colubridae	<i>Amphiesma stolata</i>	Buff-stripe keel-back	Aharakukka	C
3.	Elapidae	<i>Naja naja</i>	Cobra	Naya	C
4.	Viperidae	<i>Hypnale hypnale</i>	Merrem's hump-nosed viper	Kunakatuwa	C
5.	Gekkonidae	<i>Hemidactylus frenatus</i>	House gecko	Gewal huna	VC
6.	Gekkonidae	<i>Gehyra mutilate</i>	White house gecko	Sudugeval huna	VC
7.	Agamidae	<i>Calotes calotes</i>	Green garden lizard	Pala katussa	VC
8.	Scincidae	<i>Mabuya beddomii</i>	Stripped skink	Vairan hikanala	C
9.	Varanidae	<i>Varanus salvator</i>	Water monitor	Kabaragoya	VC
10.	Varanidae	<i>Varanus cepedianus</i>	Land monitor	Talagoya	VC

**Annex 04 - List of birds surrounding the area**

VC=Very Common

C=Common

No	Family	Species	Common name (English)	Common name (Sinhala)	Status
1.	Phalacrocoracidae	<i>Phalacrocorax fuscicollis</i>	Indian shag	Kadapalu diyakawa	C
2.	Phalacrocoracidae	<i>Phalacrocorax niger</i>	Little cormorant	Punchi diyakawa	C
3.	Ardeidae	<i>Egretta intermedia</i>	Median egret	Sudu kokka	C
4.	Ardeidae	<i>Ardea purpurea</i>	Purple heron	Karaval koka	C
5.	Ciconiidae	<i>Mycteria leucocephala</i>	Painted stork	Lathuvakia	C
6.	Anatidae	<i>Dendrocygna javanica</i>	Lesser whistling teal	Mahathumba seruwa	C
7.	Accipitridae	<i>Haliastur indus</i>	Brahminy kite	Bamunu piyakussa	C

**Annex 05 - List of Amphibians found in the surrounding area of the reed cultivation**

No	Family	Species	Common name	Status
1	Bufo	<i>Bufo melanostictus</i>	Common toad	VC
2	Ranidae	<i>Limnonectes limnocharis</i>	Common paddy field frog	C
3	Ranidae	<i>Euphyctis hexadactyla</i>	Six-toed green frog	VC
4	Ranidae	<i>Euphyctis cyanophlyctis</i>	Skipper frog	C