



**Gem and Jewellery Research
and
Training Institute**

Annual Report

2018

Gem and Jewellery Research and Training Institute
"RuwanSevena"

No:73/5/A

Weliwita.

2020.04.05

Hon. Minister of Mahaweli Development and Environment

Minister of Mahaweli Development and Environment

SobadamPiyase,

No416/B/1,

RobetGunewardena Mw

Battaramulla.

Dear Sir

Annual Report – 2018

In terms of sub section 14 (2) of the Finance Act No.38 of 1971, I submit the following documents.

1. The Administration Report of the Gem and Jewellery Research and Training Institute for the year 2018
2. Income and Expenditure Statement for the year ended 31st December 2018, Balance sheet as at 31st December 2018 and Cash Flow Statement for the year ended 31st December 2018
3. Report of the Auditor General for the year 2018

Yours Faithfully,



NawarathnaBandaraAlahakoon

Chairman

Gem and Jewellery Research and Training Institute

VISION MISSION & GOALS



VISION

“ To the Regional Center of Excellence in Research and Training in the Gem and Jewellery Industry while facilitating the Growth and Development of the Industry in Sri Lanka”

MISSION

“ To enhance the Competitive capability of Sri Lanka Gem & Jewellery Industry by providing high Quality Research & Training Services leading to Exploration of Gem Deposits, Technological Innovation, Skill and Competency Development and Quality Improvement for the satisfaction of our Stakeholders ”

GOALS

“ Harness the Gem Resource of Sri Lanka through sustainable methodologies, introduce innovative methods, and train new set of tradesmen for the industry to up life the country's economy ”

2. **Brief profile of the Directors and Senior Management**

2.1 **The profiles of the Board of Directors, of the Institute during the year 2018 were as follows.**

01	Mr. Nawarathna Bandara Alahakoon	Chairman of the Board of Directors From 18.03.2015 to date
02	Mrs.K.D.R. Olga	Member of the Board of Directors From 18.03.2015 to date
03.	Mr. M.L. Gammampila	Member of the Board of Directors From 28.09.2017 to 12.07.2018
04.	Mr. Nimal Bopage (Attorney-at-Law)	Member of the Board of Directors From 28.09.2017 to 09.03.2018
05.	Mr. Jayarathna Disanayaka	Member of the Board of Directors From 07.11.2017 to date
06	Mr.Asela Iddewela	Member of the Board of Directors From 09.03.2018 to date
07	Mr.H.P Sumanasekera	Member of the Board of Directors From 12.07.2018 to 24.06.2019

2.2 **Senior Management**

01. Dr.Prashan Fransis - Director General of the Institute
(B.Sc, Special, M.Sc in (Gem.,SL) M.Sc (Petro.,Canada), Ph.D. (Gem.,SL) Dip.Mkt(UK), G.G. (GIA,USA), MGA(SL)
02. Mr.B.G.R.W Gamlath - Director (Training and Development)
M.Sc (Gem), B.Sc (SP), (Physics) FGA (Cert) FG, MGA (SL)

3. Review by the Chairman outlining the Opportunities and Constraints faced in the year under review.

3.1 Opportunities and Threats

- Opportunities and Threats are related to External Environment. The identified opportunities and threats are described below.

Opportunities

- **Increase in the demand for Research and Training.**

There is a pressing need in the industry for skilled personnel in the industry locally and in foreign countries which has enhanced the potential demand for the services of the institute. The enhancement of the quality of the services of GJRTI also increases the demand for its services. There is no other Institution in Sri Lanka which offers the full range of services to the Industry in the area of training. In addition, there is no other service provider in the region which caters to the Research needs of the Industry. There is also an opportunity to capture the training market in the North and East which is untapped at present. Expansion of tourism industry will be benefited to increase gem and jewellery training activities.

- **Unfulfilled needs other than training**

There are still needs which are not fulfilled by the service providers to the Industry. These include the need for a designing and developing technology in exploiting institute gem deposits and providing training on computer aided jewellery design & manufacture.

- **Technological advancements**

There is an opportunity to innovate & introduce new machinery and equipment for gemming and colour enhancement etc.

- **Growth of the Institute.**

There is an opportunity to uplift the Institute to a University College level and fully fledged Gem & Jewellery University in the Asia region which can offer services to the customers from all parts of the world.

- **Other facilities.**

The Institute is placed in a unique position to offer various services to the industry by setting up Heat-Treatment plants in other locations of the country and also Research facilities.

- **Joint Programms for industry Development**

There is an opportunity for GJRTI in collaborating with other organizations such as National Gem and Jewellery Authority, Environment Authorities to promote environment friendly sustainable methods of gem mining. In addition, other various APEX bodies for various development projects and school curricular activities.

- **Gem/ Jewellery Training Strength** –Only government accredited Gem/ Jewellery Training Institute. GJRTI has a highly qualified and experienced set of instructors.

- **Gem/ Jewellery Research Strength** - Composed of highly qualified and experienced team of researchers. Although GJRTI is a small institute it has a laboratory comprises of several ultra model analytical instruments comparable with any world class research centre.

Weaknesses/ Constraints

The weaknesses of the Institute can be identified under a few headings and are described below:

- **Infrastructure facilities** – The Institution does not have the required its' owned infrastructure facilities such as buildings. Also at present the institute and its regional centres do not have enough spaces to accommodate executive staff and other subordinate staff to carry out their routine official duties.
- **Human Resources** – **There is a problem of lack of resource personnel due to not being able to offer attractive or market rates for their services, shortage of Research Officers Geologists, lack of opportunities advance trainings (Local and Abroad) for Researchers and Training Staff.**
- **Labourer mentality of the workers / poor attitudes**– The negative attitude of the most of staff members towards official work is a trend.
- **Financial Resources** – The institution is faced with severe financial constraints at present as the contribution from the Treasury has been reduced over the years compared to the requirement. Weaknesses in the area of financial resources also include lack of initiation to generate funds internally in the past.
- **Public Awareness**- Lack of awareness of the public about the Institute, lack of initiative to publicise the Institute adequately covering the full spectrum of stakeholders and all the regions, and lack of funds to implement awareness programs using public and private media etc.
- **Transport Facilities** – The institute does not have sufficient field vehicles (4WD) to conduct field surveys. And also does not have a mini bus to transport the student for training workshops and field activities.
- **Government laws and regulations** – **Adhere to government law and regulations/ too much of formalities. This is a handicap for the progress of the institute because everything need to undergo in a lengthily process.**

4. Directors Report

4.1 Objective

The Gem and Jewellery Research and Training Institute was established by the gazette notification No 882 of 28 July 1995 in terms of section 25 (1) of the National Gem and Jewellery authority Act No 50 of 1993 enacted for the purpose of the development of Gem and Jewellery industry.

Major objective of the institute is the regulation, improvements and development of the Gem and Jewellery industry by providing the necessary training and research facilities.

4.2 Powers of the Institute

Powers of the institute assigned thereto by the gazette notification No. 882 of 28 July 1995 are as follows.

- (i). To conduct surveys regarding gem minerals and gem deposits in Sri Lanka and to carry out research relating to the followings.
 - i. The location of Gem Deposits
 - ii. Their Identification
 - iii. Methods of enhancing the value of gem stones.
 - iv. Matters related to other fields concerning the institute.

- (ii). To provide technical and other advices regarding the digging of gem pits, Lapidary, Manufacture of Jewellery and methods of treatment of gem stones for the developing of the Gem and Jewellery industry including the production of machinery required for the industry.

- (iii) To provide training facilities in the following fields.
 - i. Gem Cutting, Polishing and Identification
 - ii. Jewellery Manufacturing
 - iii. Gemmology including Diamond
 - iv. Jewellery Designing
 - v. Colour Enhancement of Gem Stones by Heat Treatment.
 - vi. Other matters relating to the Gem & Jewellery industry.

4.3 Activities and Efficiency

4.3.1

Measures that are crucial for prompting the gem and jewellery training activities in the country were effectively implemented. Accordingly, it was possible to maintain increment in youth attraction to follow gem and jewellery courses introduced by the institute.

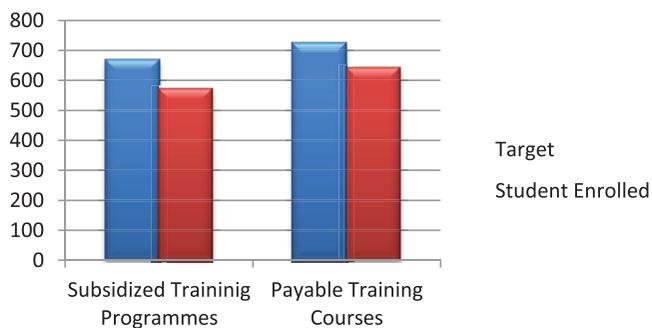
1. Training courses

Target Students for Year 2018

Course type	Target	Student enrollment
Subsidized Training Programmes	722	578
Payable Training Programmes	678	642
Total	1400	1220

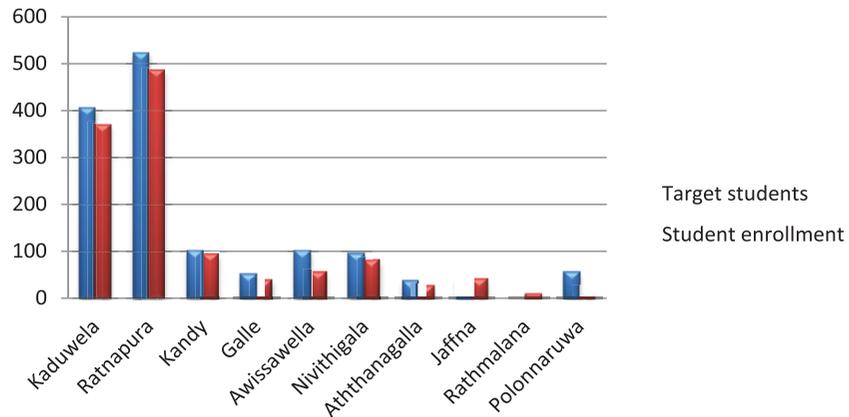
<i>Student Pass out 2018</i>	<i>523</i>
<i>Ongoing (2018 to 2019)</i>	<i>527</i>
<i><u>Drop out</u></i>	<i><u>170</u></i>
<i>Total</i>	<i>1220</i>

1.1

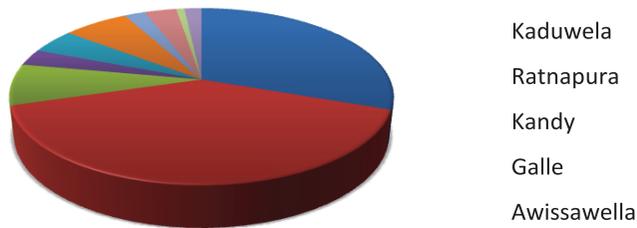


Recruitment of students in the year 2018

	Center	Target students	Student enrollment	%
1	Kaduwela	405	371	91
2	Ratnapura	520	484	93
3	Kandy	100	92	92
4	Galle	50	37	74
5	Awissawella	100	60	60
6	Nivithigala	95	80	84
7	Aththanagalla	35	26	74
8	Jaffna	40	39	98
9	Rathmalana	--	10	--
10	Polonnaruwa	55	21	38
		1,400	1,220	87



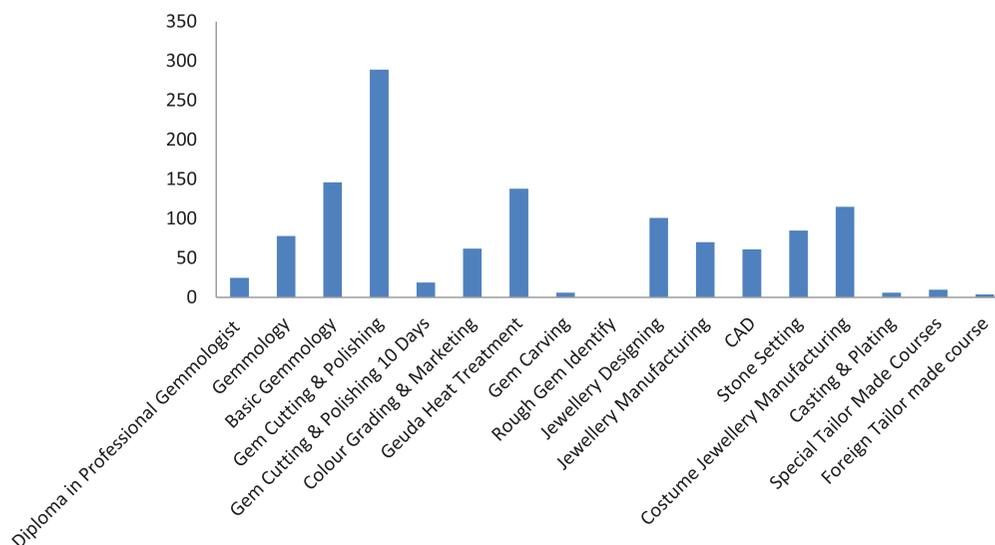
Student enrollment



1.2 Recruitment of students as courses in the year 2018

Course	Target	Enrollment
Diploma in Professional Gemmologist	10	25
Gemmology	105	78
Basic Gemmology	140	146
Gem Cutting & Polishing	345	294
Gem Cutting & Polishing 10 Days	15	19
Colour Grading & Marketing	40	62
Geuda Heat Treatment	120	138
Gem Carving	--	6
Rough Gem Identify	40	--
Jewellery Designing	150	101
Jewellery Manufacturing	92	70
CAD	70	61
Stone Setting	90	85
Costume Jewellery Manufacturing	140	115
Casting & Plating	30	6
Special Tailor Made Courses	7	10
Foreign Tailor made course	6	4
Total Enrollment	1400	1220

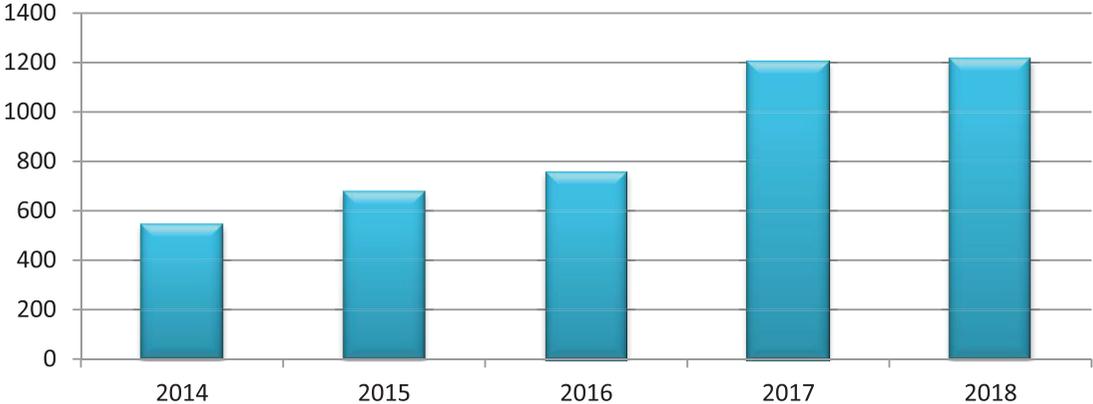
Enrollment



1.3 Trainees registered for training courses in the last few years

Training Programme	Year & Student Pass out								
	2011	2012	2013	2014	2015	2016	2017	2018	
Diploma in Professional Gemmologist	-	-	-	-	-	-	-	25	
Gemmology	13	30	43	105	134	97	69	78	
Basic Gemmology	-	-	-	-	-	31	113	146	
Geuda heat treatment	25	51	64	84	96	96	111	138	
Gem cutting and polishing	43	61	76	109	190	213	381	294	
Gem colour grading and marketing	72	48	118	175	157	73	87	62	
Gem Carving	-	-	-	-	-	12	4	6	
Jewellery Designing	30	16	44	18	37	30	95	101	
Jewellery Manufacturing	21	37	40	49	42	63	116	70	
Costume Jewellery Marking	-	-	21	-	18	48	104	115	
Jewellery Stone Setting	8	-	9	-	-	26	47	85	
CAD	-	-	-	-	-	20	22	61	
Rough Gem Identification	-	-	-	-	-	27	20	-	
Short Course In Basic Lapidary Techniques	-	-	-	-	-	21	21	19	
Casting & Electro plating	-	-	-	-	-	-	-	6	
Short Course in Gemmology	-	-	-	-	-	-	5	10	
Special Foreign Trainings	-	-	-	-	-	-	5	4	
Total	328	432	458	540	674	757	1200	1220	

Annual Student Registration



Training Programmes for Staff - 2018			
	Name of the training programme/workshop	Participants	Institute
1	Workshop on "Training of Trainers"	1.Mr.J.M.G.K. Jayamaha (TO) 2.Mr. M.G.M.R. Dayarathna (TO) 3.Mrs. D.W. Chithrangani (TO) 4.Mr. Asanga Wimalaweera (TO) 5.Mr.A.M.A. Janaka (TO) 6. Mr. Chandana Jayaweera (TO)	Skills Development Fund Limited (SDFL)
2	Workshop on "Establishment Code & Public Financial Regulations"	1. Miss. R.R.M.P.M. Ratnayaka (AD-HR) 2.Mr.U.K.I.Dayarathna(TO) 3. Mrs. N.K.R. Prasadika (MA)	
3	Workshop on "Duties & responsibilities of Leave Clerks"	1. Miss. R.R.M.P.M. Ratnayaka (AD-HR) 2. Mr.J.P.K.Sandeep (MA)	
4	Workshop on "Clerical Skills"	1. Miss. B.G.I.P. Samaradasa (MA) 2. Mr.H.H.R.A. Herath (MA)	
5	Workshop on "Auditing of procurement procedure"	1. Mrs. H.A.N. Priyadarshani (Internal Auditor)	Prag Services (Pvt) Ltd
6	Workshop on "Telephone skills and etiquette training for front office staff"	1. Mrs. H.L.L. Janithri (MA) 2. Miss.K.R.W.S. Rajapasha (PL)	Skills Development Fund Limited (SDFL)
7	Workshop on "Report writing and professional letter writing"	1. Mr. J.P.K. Sandeep (MA)	
8	Workshop on "Duties and responsibilities of drivers"	1. Mr. Thilakarathna Bandara (Driver) 2. Mr. I. Gunarathna (Driver)	
9	National HR Conference	1. Miss. R.R.M.P.M. Ratnayaka (AD-HR)	Institute of Personal Management (IPM)
10	Reading and Understanding of Financial Statements	1. Mrs. U.A.D.D. Rupasinghe (MA) 2. Mrs. N.K.R. Prasadika (MA)	Skills Development Fund Limited (SDFL)
11	Discipline and Ethics for the Office Assistants	1. Mr. L.A.C.K. Liyanaarachchi (PL) 2. Ms. E.H. Pathirana (PL)	
12	Preparing of Cabinet Papers	1. Ms. S.R.P. Senevirathne (IDO)	
13	Carrier Development Programme for Management Assistants	1. Ms. F.R. Razeen (MA) 2. Mrs. K.M.N.L. Gunarathna	
14	Financial Regulations in the Public Sector	1. Ms. P.A.K.N. Perera (MA) 2. Ms. S.K. Vithanage (MA)	"Miloda" Academy of Financial Studies (Ministry of Finance)
15	Report writing skills	1. Ms. C.M. Rajapaksha (RO) 2. Mr. R.S. Diyabalanage (RO) 3. Ms. N.C. Manthirathna (RO)	
16	Leadership and Personality Development	1. Dr. M.S. Kandanaipitiya	Skills Development Fund Limited (SDFL)
17	Preparing of Financial Statements	1. Mrs. U.A.D.D. Rupasinghe (MA)	"Miloda" Academy of Financial Studies (Ministry of Finance)

18	Work shop on Repairing of Laboratory equipments	1. Mr. Wasantha Gamlath (D(T) 2. Mrs. N.C. Wijesinghe (AD) 3. Mrs. W.L.P. Surendra (AD) 4. Mr. I.K.M.S.C. Illangasinghe (RO) 5. Ms. K.M.R.S. Konara (TO) 6. Mr. G.H.G.B.A. Wimalaweera (TO) 7. Mr. U.W.K.A. Chandrakantha (TO) 8. Mr. N.K.P.C. Jayaweera (TO) 9. Mr. J.P.K. Sandeep (MA) 10. Mr. S.P.D.P. Kamalsiri (F&LA) 11. Mr. N.L.N. Nishantha (F&LA) 12. Ms. E.H. Pathirana (F&LA)	Organized by GJRTI Conducted by Senior Gemmologist (FGA) Mr. Dayananda Dillimuni
19	03 day residential training programme on teaching ability and Personality Development	Whole training division staff	Organized by GJRTI Conducted by Various experts held at MAS Fabric Park (Pvt) Ltd training facility
20	Gem Identification programme	1. Mr. P.L. Francis (DG) 2. Dr. M.S. Kandanapitiya 3. Ms. C.M. Rajapaksha (RO) 4. Mr. R.S. Diyabalanage (RO) 5. Ms. N.C. Manthirathna (RO) 6. Mr. W.G.C.N. Wewegedara (RO) 7. Mr. W.A.D.T.L. Wijesinghe (RO) 8. Mrs. J.M.C.K. Jayasundara (RO)	Organized by GJRTI Conducted by Dr. Jurgen from Germany
21	Personality Development Programme	Whole staff (Excluding the persons who didn't attend to No.18 training programme)	Organized by GJRTI Conducted by Mr. Mohan Palliyaguru
22	E bar exam		
23	Ministry of Science and Technology of South Africa	Mr. R.M.N.P.K. Jayasinghe (SRO)	Ministry of Science and Technology of South Africa
24	Master of Professional Accounts Degree Programme	Mr. S.L.J. Muhandiram (AD-F)	University of Sri Jayawardanapura

RESEARCH

Exploration and Assessment of Gem Deposits in Sri Lanka (EAGSDL)

- Objective of this project is to create detailed potential maps of gem deposits in Sri Lanka.
- This project is implemented in three phase.

Phase	Time Period	Area	
		Districts	No of Targeted DS Divisions
I	2016-2020	Moneragala, Badulla, Matale, Polonnaruwa and Rathnapur	50
II	2021-2025	Galle, Matara and Kandy	54
III	2026-2030	Nuwara Eliya, Kalutara, Colombo, Gampaha, Hambantota, Trincomalee and Kegalle	51

Bibile Divisional Secretariat Division (Monaragala district, Uva province)

- The Bibile gem potential map (figure) is completed and tabled for the reviews of the board of directors, GJRTI. The draft of technical report has been prepared.

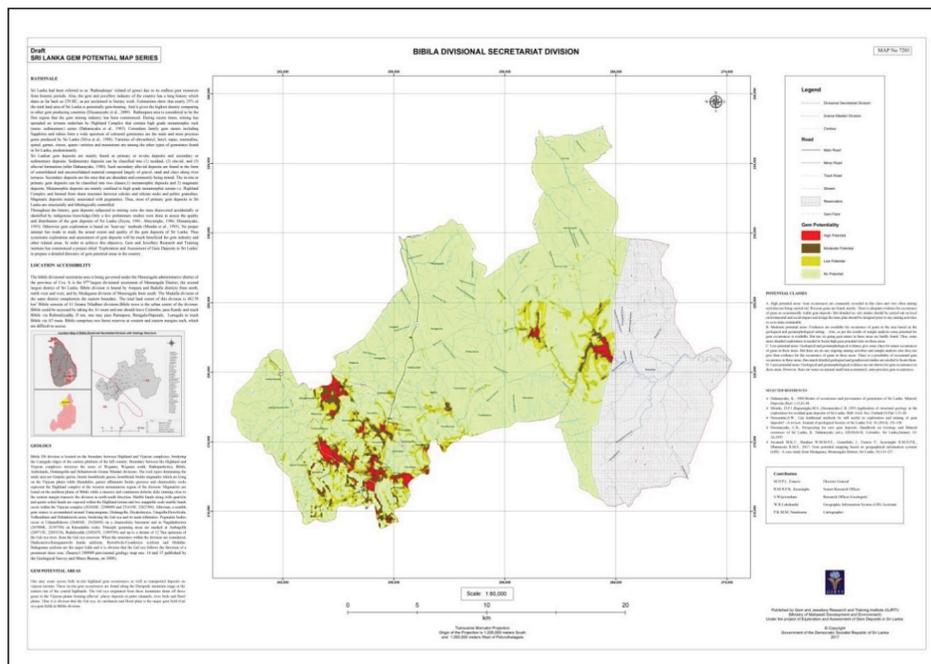


Figure 01: Final gem potential map of Bibile DSD

Haputale Divisional Secretariat Division (Badulla district, Uva province)

- The field data have been collected and the sample analysis (microscopic analysis, XRF analysis) is approximately 75% completed.
- A gem potential map is under preparation and the potentialities of sample points below (figure 02) are being relied on aforementioned laboratory assessments.

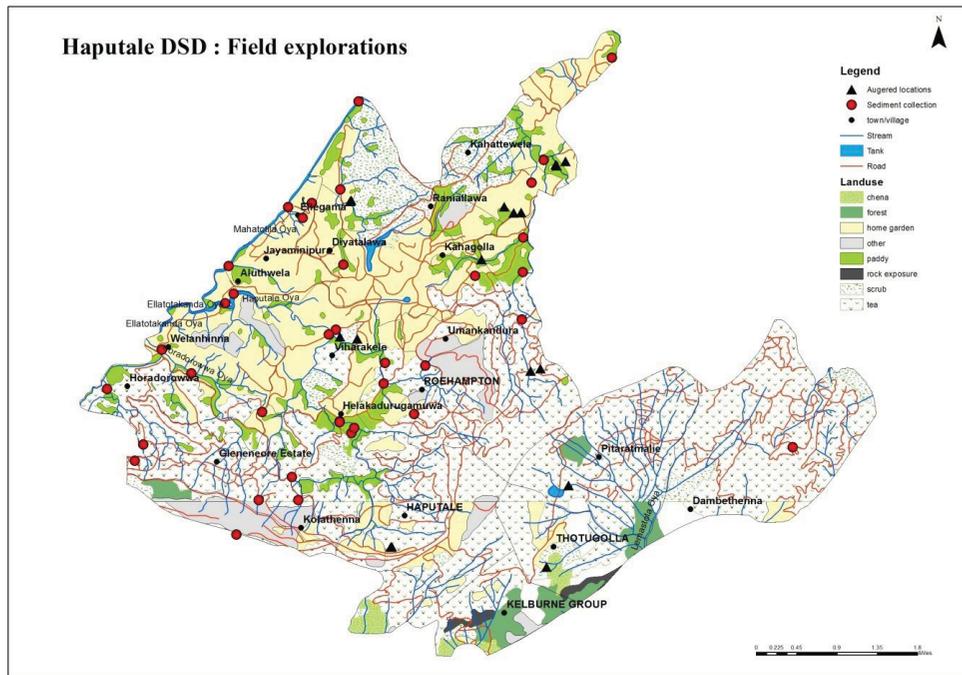


Figure 02:- Field points of Haputale DSD

Haldummulla Divisional Secretariat Division (Badulla district, Uva province)

- The field data have been collected and the sample analysis (XRF analysis, Sieve analysis and Microscopic studies) and the report under compilation.



Figure-03 sample Collection from Illama Sample Collection- Hand Auger Sampling

Improvement of Quartz as a material for ornaments

- The following information were revealed from treating a range of samples belonging to the quartz family (both macro crystalline and cryptocrystalline varieties).

Temperature (°C)	Observations
1000 -1200	Became cryptocrystalline, quite opalescent and almost opaque (*This is to be heated together with geuda in gas furnace expecting them to be carnelian, since they bear an appearance similar to that of the SiO ₂ variety locally known as Sewwandi.)

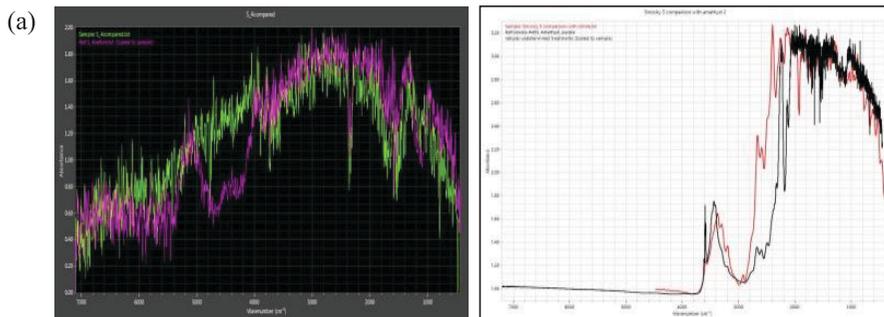


Figure-04:– (a) Comparison of FTIR spectra of treated samples with the reference spectra (b)

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Analyzed result

Sample name	AM WSD	Date	4/19/2018 11:42 AM			
File name	AM	Counts	1			
Application	Modified for Gems	Sample results	Blank			
No.	Component	Result	Units	Statistical error	Detection limit	Quantitation limit
1	Si	0.010 mass%				
2	Zr	0.047 mass%		0.0020	0.0005	0.0014
3	Al	0.147 mass%		0.0024	0.0006	0.0016
4	K	0.0962 mass%		0.0021	0.0026	0.0078
5	Ca	0.0020 mass%		0.0022	0.0016	0.0049
6	Fe	0.0159 mass%		0.0006	0.0006	0.0019
7	Sr	0.0024 mass%		0.0001	0.0001	0.0004
8	Na	0.0065 mass%		0.0002	0.0003	0.0010
9	Mg	0.0014 mass%		0.0001	0.0001	0.0004
10	Cr	0.0029 mass%		0.0001	0.0002	0.0007
11	Mn	0.0014 mass%		0.0001	0.0001	0.0003
12	Cu	0.0019 mass%		0.0001	0.0002	0.0007
13	Pb	0.0004 mass%		0.0001	0.0002	0.0006
14	Ni	ND mass%		0.0001	0.0003	0.0010
15	Mo	ND mass%				
16	P	ND mass%				
17	V	ND mass%				
18	Y	ND mass%				
19	Mb	ND mass%				
20	Co	ND mass%				
21	Zn	ND mass%				
22	Ce	ND mass%				
23	As	ND mass%				
24	Se	ND mass%				
25	Rb	ND mass%				
26	Mp	ND mass%				
27	Ru	ND mass%				
28	Rh	ND mass%				
29	Pd	ND mass%				
30	Ag	ND mass%				
31	Cd	ND mass%				
32	In	ND mass%				
33	Sb	ND mass%				
34	Te	ND mass%				
35	Cs	ND mass%				
36	Ba	ND mass%				
37	Hf	ND mass%				
38	Bi	ND mass%				
39	Tl	ND mass%				
40	Po	ND mass%				

(b) XRF analysis results of an amethyst sample

Heat treatment of low quality spinel

- Translucent dark blue and purple spinel samples were heat treated using electrical furnace ('ALTEC AL 808') in temperature series but no clarity enhancement was observed as expected. Further studies are to be carried out at higher temperature and soaking periods.

Development of a novel value addition method for low quality Moon Stone

- In this project, we have revealed a novel method to add value to moonstone. Deposition of nano-film onto stone yielded blue appearance to the gem without sacrificing its intrinsic optical sheen endowed by nature.
- Such a value addition to moonstones has not previously been reported. This color development method by epitaxial growth is the by far the most felicitous method to add a value to moonstones. Our novel technique gives long lasting blue tint without sacrificing its intrinsic sheen.

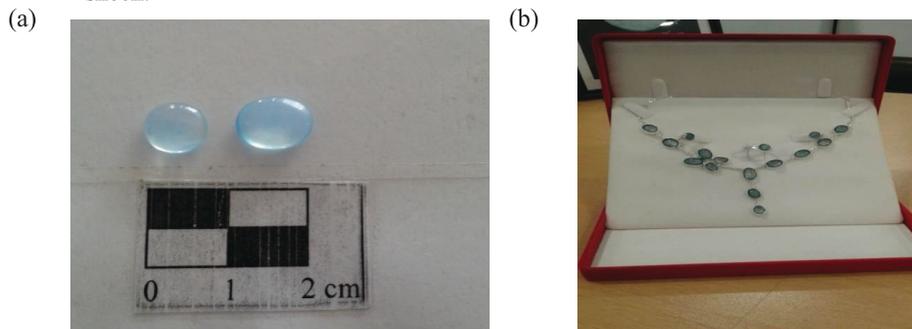


Figure-06: (a) Colored moonstone (b) The coloured stones were set into jewellery

Characterization of Corundum in Different gem fields and their potential for value addition

- This study focuses on economically valued 'geuda' from different geological locations in Sri Lanka.
- Samples were collected at the original gem pits along with soil samples from the pit and the gem bearing washed sediments.
- Geological location was obtained by using GPS. Soil samples were prepared for elemental analysis. Collected 'geuda' samples were analysed under XRF, Raman spectrophotometer and FTIR. Then stone was subjected to heat treatment in gas Furnace at GJRTI. Results show clear difference among 'geuda' samples found in different locations.

Investigation of physiochemical Properties of gem material and their potential medical application



- This study has commenced under Preparation of Nano-Tourmaline out of low-quality tourmaline gems.
- Pretesting for the bacteria samples were carried out using nano tourmaline and nano mica colloidal solutions as antibacterial solutions using ABST method and broth dilution method.

- Preliminary studies have shown that utilization of scaffold material whose inhibition activity of bacterial growth is imparted to the mechanism of hijacking the essential trace metal ions.
- This study is still processing and several discussions were made with MRI and University of Colombo for the clinical trials.

Study on use of Gem cutting Dust for improvement of physical properties of lay products

- Quartz powder was obtained by grinding low quality quartz gem stones. The samples were mixed with the clay samples accordingly 2:8 ratios respectively and $10 \times 10 \times 10 \text{ cm}^{-3}$ clay cubes were prepared for test properties compared with the controlled sample that is without adding quartz dust.
- The compressive strength was tested for both samples and quartz added sample block shows higher strength than the controlled one.

Establishing of treatment method for low gem quality spinel

- The GJRTI has performed survey on gem market survey and gem trader's perception on low quality gem mineral in the Ratnapura area. The results clearly revealed that, most frequently found low quality gem mineral type is spinel. Therefore, development of treatment method for low gem quality spinel is paramount important to get maximum economic benefits from gem resources.
- This research main attempt is to develop a method for gem quality enhancement of low-quality spinel through heat treatment. The low gem quality spinel was collected from the Ratnapura gem market.
- Before the treatment chemical and spectroscopic analysis were performed using UV-VIS-NIR spectrometer, FTIR spectrometer, Ramman spectrometer and EDXRF analysis. Then samples were heated in neutral atmospheric condition in multi-stem temperature.
- The results are shown in Figure 1 and clearly shown transparency slightly improved. The study is ongoing.

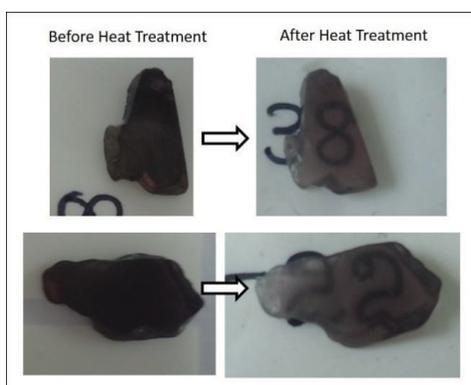


Figure-07. The image is shown appearance changes in the heat treatment.

Investigation of coloring mechanism of different color zircon in Sri Lanka

- Zircon coloration is occurred due to mainly trace element and lattice defects induced by radioactive element. Different color zircons are frequently found in Sri Lankan gem market. However, color formation mechanism is still yet to be. Therefore, in this research color formation mechanism of zircon is investigated through spectroscopic and chemical analysis.
- To perform this study different color cut and polished zircon samples were collected. The samples will be performing spectroscopic analysis using UV-VIS-NIR spectrometer and Raman spectrometer. While chemical analysis was performed using EDXRF analysis. The selected samples are shown in figure -08.



Figure -08-: Selected samples for the analysis

Formulation of nutrient enriched Micro minerals Brick and Investigation of slow releasing kinetics.

- Specifically, Rocks or industrial minerals that present high plant nutrients, like mica, feldspars, potassium nitrate, dolomite and other silicates can be used as alternative sources for slow release fertilizers so that nutrition brick was fabricated using those minerals with coconut coir fibers. The Chemical and structural analyses will be done.

Study for a sustainable alternative material/ method for replacing timber and kakilla which are used for the structure of a gem pit

- In this research, study about the gem-pit structures and then identified the characteristic features which must be included in the alternative materials. According to that try to find the low-cost light weight high strength and durable new material.
- Due to the ideal physical properties and the recycling capability of waste PET bottles, it was selected as the major raw materials for light weight high strength alternative bricks and also for the improvement of the strength plan to be add the nano silica powder. So that first study was done for prepare the low-cost nano silica powder using the rice husk. According to that successfully prepared the nano silica powders.
- According to the XRF data the percentage of pure silica in the extracted powder is 96.529%. Then using the chemical extraction method extracted silica was converted to the nano silica (Nano silica was obtained from sodium silicate solution using precipitation method) also extracted nano silica samples were sent for the SCM analysis.
- When considering the hardness of the silica powder it can be used as abrasive material so that separate project was done using this property according to that silica powder was used as the gem polishing materials. The raw gem materials were polished using extracted nano silica powders and surfaces were observed using microscope.

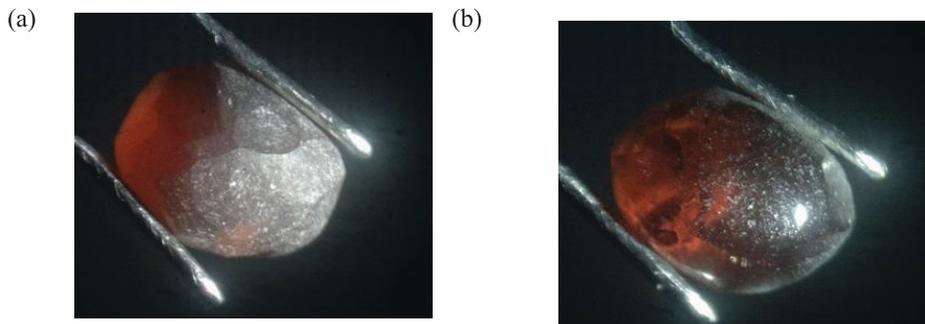


Figure-08 (a) Before the polishing (b) After the polishing of spinel gem stone

- PET bottles flaks were melted and then mix with the sand for produced the composite bricks. Testing and other preparation must be done the project is going on.

Investigation of Physiochemical Properties of gem materials and their potential medical applications

Assessing the suitability of natural minerals as novel sorbent materials to remove toxic elements from aqueous solutions

- As a continuation of the investigation of applicability of naturally occurring minerals as novel sorbent materials in water and waste water treatment, batch kinetic experiments were carried out in detail. Effect of dosage of materials, Initial concentration and pH effect on adsorbing toxic heavy metals were tested.
- The effect of dosage experiments revealed that 0.1 g of tourmaline reduce the 50 mL of 20 mg/L Pb^{2+} solution to 3.72 mg/L whereas 0.25g reduce it to 0.99 mg/L.
- Experiment was conducted to other selected sorbent materials (topaz, hessonite garnet, mica) and analysis is in progress. Other than that, the leaching of elements was also tested and the concentrations were determined using ICP-MS.
- The resulted values were well below the WHO drinking water standards. In order to characterize the materials, XRD spectrums was obtained and to explain the adsorption mechanism, FT-IR spectrums were obtained for raw and treated materials.
- The reusability of materials was tested by adsorbing Pb^{2+} and Cd^{2+} ions and treated with diluted HCl using ED-XRF analysis. Results revealed that the materials can be regenerated by introducing a diluted acid to the system.

Chemical and Mineralogical Characterization of gem deposits of Sri Lanka

To delineate the fertile terrains for gem occurrence the filed surveys were continued in Elahera (Mahaweli river basin) and Getahetta areas. Sieve analysis, microscopic investigations and ED-XRF analysis is in progress.

Introduce novel scientific method to delineation of gem potential areas using geochemical signature, mineralogy composition of gem bearing sediments and geochemistry of indicator minerals it is essential to study the geochemistry of known locations. To achieve that objective, a survey was carried out in Neelagama region, Palmadulla (Figure 2). Licensed gem mining location (109 Locations) information was obtained from the National Gem and Jewellery Authority.

A detailed questionnaire survey was also performed in the area to gather existing traditional knowledge on gem exploration concurrent to the filed survey. Soil and sediment samples were collected from randomly selected locations and analysis is in progress. Together with that animal bone samples and amber were collected for carbon isotope analysis for paleontological studies.

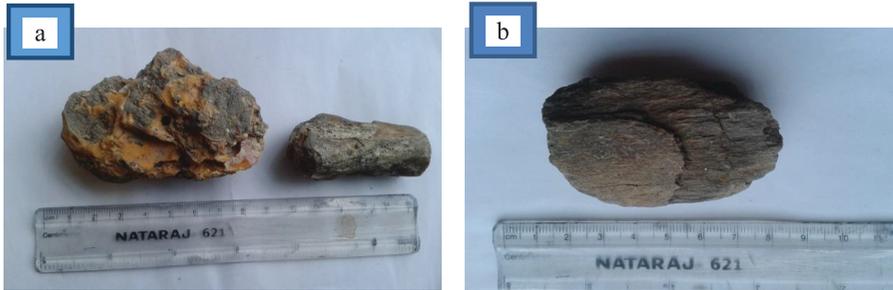


Figure 3: Collected (a) amber and (b) bone samples

Development of mapping methodology

- Ground Penetrating Radar (GPR) method is a method used to identify the geological features beneath the earth surface and it provide high resolution images of the sub surface. It is applied in determining the shape, size, extent and depth of buried objects.
- The use of GPR technique in gem bearing layer identification was tested in collaboration with National Building Research Organization (NBRO). GPR technique was tested in five locations to detect the gem bearing sediment layer.
- The GPR profile was obtained closed to the existing gem pits and data interpretation is in progress.

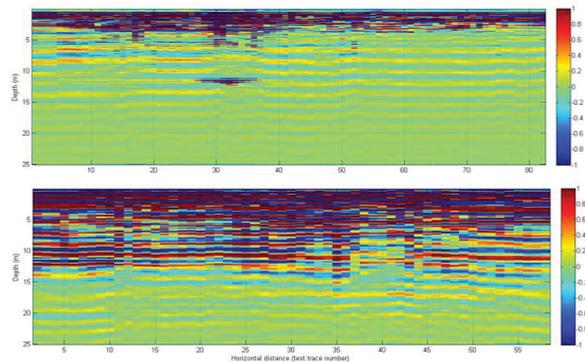


Figure -09: (a) Testing of GPR technique for gem bearing layer identification and (b) obtained profile images

Audited Financial Statement
Financial Information for last 05 years

	2014	2015	2016	2017	2018
Operating Revenue					
Treasury Grants	43,357	47,081.0	58,627.0	62,440.0	79,854.0
Other Contributions	13,862.9	26,447.4	33,522.7	38,742.2	37,104.7
Course Fees	6,941	6,408.5	9,445.4	8318.48	10,835.1
Income From Services	-	-	50.3	20.0	76.5
Income From Geological Services	-	-	-	-	-
Total Operating Revenue	64,161	79,936.9	101,645.4	109,520.73	127,870.3
Other Revenue	303	625.8	342.6	1,849.25	2,114.2
Interest	309	248.2	837.0	506.20	519.4
Other Income	-	49.5		29.96	25.59
Total Revenue	64,773	80,860.4	102,825	111,906.14	130,529.49
Less: Expenses					
(a)Personnel and Administration	44,558	57,081.4	68,467.8	77,363.08	88,935.1
(b)Depreciation and General	17,572	31,260.6	27,769.4	35,854.2	38,806.7
Total Expenses	62,130	88,342	96,237.2	113,217.28	127,741.8
Surplus/(Deficit)	2,643	7,481.6	6,587.8	1,311.14	2,787.6

**GEM AND JEWELLERY RESEARCH AND TRAINING INSTITUTE
STATEMENT OF FINANCIAL PERFORMANCE FOR THE YEAR ENDED 31ST DECEMBER -2018**

	2018(Rs.'000)		2017(Rs.'000)	
Operating Income				
Recurrent Grants - Treasury		79,854.00		62,440.0
Other Income				
Income from Training Courses		10,835.12		8,318.48
Geuda Heat Treatment Service Charges		76.5		20.0
Geological Research services				
Interest Income		519.36		506.20
Sundry Income		2,114.18		1,849.25
Total Operating Income		93,399.08		73,133.93
Less: Operating Expenses				
Personnel Emoluments		51,991.37		43,542.46
Traveling		188.8		425.92
Supplies and Consumable Items		3461.4		2,531.44
Maintenance Expenses		4657.3		4,176.38
Contractual Services		23,555.99		21,684.43
Training Programme Expenses		4214.8		3,236.28
Other Operating Expenses		832.0		1,740.12
Total Operating Expenses		88,901.66		77,337.03
Surplus / (Deficit) From Operating Activities		4,497.42		(4,203.09)
Less: Finance Cost		(33.25)		(26.05)
Grants- Capital Expenditure Portion	19,438.17		26,836.48	
Other Receipts				
	19,438.17		26,836.48	
Less: Depreciation and Amortization Expenses	(21,140.21)	(1,702.04)	(23,948.43)	2,888.05
Other Capital Investment Grants				
Less: Capital Investment Expenditure	17,666.54		11,905.77	
Improvements of Capital Assets	(16,160.18)		(11,005.26)	
NET Expenditure on Other Capital Investment	(1506.36)		(900.51)	
Total Non-Operating Revenue		(2,762.13)		2,862.01
Add: Gain on Sales of Assets		25.59		29.96
Net Surplus (Deficit) Before Extra-Ordinary Items		2,787.62		(1,311.1)
Extra Ordinary Items				
Net Surplus / (deficit) for the period		2,787.62		(1,311.1)
Add:				
Net Surplus / (Deficit) from previous years	(37,233.23)		(41,976.6)	
Less: Prior year Adj.		1,385.55		6,054.5
Net Surplus / (Deficit) C/F		(33,060.06)		(37,233.24)

**GEM AND JEWELLERY RESEARCH AND TRAINING INSTITUTE
STATEMENT OF FINANCIAL POSITION AS AT 31ST DECEMBER - 2018**

Description	2018	2018	2017	2017
	(Rs.'000)	(Rs.'000)	(Rs.'000)	(Rs.'000)
ASSETS				
Non Current Assets				
Property, Plant & Equipment				
Contribution (LT)	131,881		122,084	
Gratuity Fund	1,445	133,326	1,436	123,520
Differed Expenditure				
Partitioning & Modification				
Current Assets				
Stock & Consumables	2,675		1,368	
Books for Sale				
Loan and Advances	2,655		2,067	
Deposits (Gratuity)	5,013		4,547	
Deposits	5,085		710	
Trade & Other receivables	3,296		4,078	
Poverty Alleviation Project	10,110		6,654	
Prepayments	702		780	
Bank & Cash Equivalents	792		205	
Total Assets		30,328		20,410
		163,654		143,930
LIABILITY				
Current Liabilities				
Payable	1,110		235	
Accrued Expenses	3,316	4,426	2,656	2,892
Non-Current Liabilities				
Grants-Other Institutions			232	
Provisions for Gratuity	11,278		11,135	
NSF	3,306		3,932	
		14,584		15,298
		19,010		18,190
		144,644		125,740
Net Assets/Equity				
Contributed Capital	50,000		50,000	
Reserves	186		186	
Other Contribution	850		850	
Staff Circulating Fund (Loan)	1,277		1,121	
Differed Income –Capital Grants (a)	125,391		110,815	
Accumulated Fund	(33,060)		(37,233)	
Total Net Assets/Equity		144,644		125,740

**GEM AND JEWELLERY RESEARCH AND TRAINING INSTITUTE
STATEMENT OF CASH FLOW FOR THE YEAR ENDED
31ST DECEMBER – 2018**

Rs.000

Description	2018	2017
Cash Flows From Operating Activities		
Surplus/(Deficit) from Operating Activities	2,787.63	(1,311.0)
Non Cash Movements		
Depreciation	21,140.21	23,948.40
Interest	(519.37)	(506.2)
Write-off Capital Expenses	17,666.55	11,905.80
Differed Capital Provision	(37,104.73)	(38,742.30)
Prior Year Adjustment	1,385.55	6,054.50
Increase/Decrease Payables	1,535.36	336.70
Increase in other Non-current Liabilities		1,767.50
Profit from sale of Property Plant & Equipment	(25.59)	(30)
Lease Rental	473.48	(473.5)
Provision for Gratuity	1,077.32	-
Write off WUSE fund	(231.77)	-
Adjustment of Fixed Assests	(2,290.85)	(11.4)
Payment for Gratuity	(934.64)	-
Increase in Other Current Assets	(8,865.34)	(5,770.2)
Net Cash Flow from Operating Activities	(3,906.17)	(2,831.8)
Cash Flow from Investment Activities		
Purchase of Property Plant and Equipment	(29,120.08)	(20,734.3)
Decrease in Gratuity Fund	(9.62)	(933.8)
Increase in Staff Circulating Fund	-	143.2
Increase of Reserves	-	186.5
Capital Nature Expenses	(17,666.55)	(11905.8)
Interest Income	675.93	-
Increase in Fixed Deposit	(466.05)	-
Profit of Property Plant & Machinery sales	25.59	30.00
Net Cash Flow from Investment Activities	(46,560.78)	(33,214.20)
Cash Flow from Financing Activities		
Capital grant	51,680.00	34,906.0
Interest Income	-	(506.2)
NSF Fund	(625.72)	-
Net Cash Flow from Financing Activities	51,054.28	35,412.20
Net Increase /(Decrease) in Cash and Cash Equivalents (a)+(b)+(c)	587.33	(634.00)
Cash and Cash Equivalents at Beginning of period	205.17	839.00
Cash and Cash Equivalents at End of Period	792.50	205.00

NATIONAL AUDIT OFFICE

My No. } IEN/D/GJRTI/1/18/ Your No. }

Date: 30 May 2020

Chairman
Gem and Jewellery Research and Training Institute

Report of the Auditor General on the Financial Statements of the Gem and Jewellery Research and Training Institute and other Legal and Regulatory Requirements for the Year Ended 31st December 2018 in terms of Section 12 of the National Audit Act No. 19 of 2018

1. Financial Statements

1.1 Qualified Opinion

The Financial Statements of the Gem and Jewellery Research and Training Institute for the year ended 31st December 2018 consisting of the Statement of Financial Position as at 31st December 2018, the Statement of Financial Performance, Statement of Changes in Equity and Statement of Cash Flow for the year then ended, Notes to the Financial Statements, and a Summary of Significant Accounting Policies were audited under my direction in terms of the provisions of the Finance Act No. 38 of 1971 and the National Audit Act No. 19 of 2018 read with Article 154 (1) of the Constitution of the Democratic Socialist Republic of Sri Lanka. My Report will be tabled in Parliament in due course in terms of Article 154(6) of the Constitution.

The opinion I hold is that, apart from the effects of the matters described in the section “Basis for the Qualified Opinion” in my Report, the Financial Statements of the Institute reflect a true and fair depiction regarding its financial position as at 31st December 2018, and its financial operation and cash flows for the year then ended in accordance with the Sri Lanka Public Sector Accounting Standards.

1.2 Basis for the Qualified Opinion

- (a) Instead of adjusting the gratuity expenditure of Rs. 1,854,749 as funds generated from operational activities to the Cash Flow Statement and adjusting Rs. 777,426 of gratuities payable to the changes in working capital, Rs. 1,077,426 had been adjusted to the Cash Flow Statement as funds generated from operational activities, contrary to Sri Lanka Public Sector Accounting Standard No. 02.

- (b) The motor vehicles had been depreciated limiting it to 04 years without making a proper evaluation of the useful life of such vehicles while a motor car, whose cost had been Rs. 6,390,000, had been depreciated at 6.2 % without making an evaluation on its useful life contrary to Sri Lanka Public Sector Accounting Standard No. 07. Although 05 motor cars costing Rs. 31,565,440 and depreciated fully in terms of Paragraph 65 of the Standard had continued to be used, steps had not been taken to revalue and enter them in accounts.
- (c) The provision for depreciation pertaining to motor vehicles had been overstated in accounts by Rs. 126,875 during the year under review.

I conducted the audit in accordance with the Sri Lanka Auditing Standards (SLAudgSts). My responsibility under these Auditing Standards has been described further in the part styled "The Responsibility of the Auditor regarding the Auditing of Financial Statements" in this Report. It is my belief that the audit evidence I have obtained for furnishing a basis for my qualified opinion are adequate and relevant.

1.3 Responsibilities of the Management and the Parties who Govern Regarding Financial Statements

It is the management that is responsible for the preparation and fair representation of these Financial Statements in accordance with the Sri Lanka Public Sector Accounting Standards, and determining the internal controls necessary to enable the preparing of Financial Statements without substantial false statements that may occur due to fraud or mistake.

It is also the responsibility of the management to determine in preparing Financial Statements whether it is possible to maintain the Institute continuously and unless the management intends to liquidate the Institute or to stop operations when there is no alternative, it should keep the accounts on the basis of perpetual existence and reveal the matters pertaining to the perpetual existence of the Institute.

The responsibility for the financial reporting process of the Institute is borne by the parties who govern.

The Institute should properly maintain its books and reports pertaining to its incomes, expenses, assets and liabilities so that annual and periodic Financial Statements of the Institute can be prepared as per subsection 16 (1) of the National Audit Act No. 19 of 2018.

1.4 Auditor's Responsibility Pertaining to the Auditing of Financial Statements

My aim is to give a fair assurance that Financial Statements as a whole are devoid of material false statements caused due to frauds and errors and to issue the 'report of the auditor' containing my opinion. Although a fair assurance is a high quality assurance, it is not an assurance that it always unveils material misstatements in carrying out the audit in accordance with the Sri Lanka Auditing Standards. Material misstatements may occur due to individual or collective effect of fraud and errors while it is expected that it may cause an effect on the economic decisions taken based on these Financial Statements by their users.

The audit was conducted by me with professional judgment and professional skepticism and in terms of Sri Lanka Auditing Standards. Further,

- Obtaining of adequate and appropriate auditing evidence to avoid risks caused by frauds or errors by planning opportune audit procedures in identifying and assessing the risks of substantial false statements that could occur in Financial Statements due to frauds or errors was the basis of my audit opinion. The impact of a fraud is stronger than the substantial misstatements while collusion, forgery, deliberate omission or bypassing internal controls all lead to a fraud.
- Although an understanding was obtained regarding the internal control of the Institute for planning appropriate audit processes, it is not intended to express an opinion about the effectiveness of the internal control.
- The reasonability of the accounting policies and accounting estimates used and the desirability of the related disclosures made by the management were evaluated.
- The relevancy of using the basis of perpetual existence of the Institute for accounting was determined based on the audit evidence obtained on whether there exists a substantial uncertainty about the continuity of the Institute due to events or circumstances. If I come to the conclusion that there exists a substantial uncertainty, I should make reference in my Audit Report to the disclosures made in the Financial Statements in this regard while if the revelations are not adequate, I should modify my opinion. Nevertheless, perpetual existence may cease due to future events or circumstances.
- The presentation, the structure and the content of the Financial Statements which contain the disclosures were subjected to evaluation and whether fair and

appropriate inclusions of the underlying transactions and events were made in Financial Statements was also evaluated.

The governing parties were informed of the significant audit findings, major internal control weaknesses and other matters identified during my audit.

2. Report regarding Other Legal and Regulatory Requirements

The National Audit Act No. 19 of 2018 contains special provisions regarding the following requirements:

- According to the requirements in section 12 (a) of the National Audit Act No. 19 of 2018, apart from the effect of the matters stated in the section 'Basis for Qualified Opinion' in my Report, I have obtained all the information and explanations necessary for my audit and as evident from my examination the Institute had maintained proper financial reports.
- As per the requirement of Section 6 (1) (d) (iii) of the National Audit Act No. 19 of 2018, the Financial Statements of the Institute which had been presented correspond with the Financial Statements of the previous year.
- As per the requirement of Section 6 (1) (d) (iv) of the National Audit Act No. 19 of 2018, the recommendations made by me in the previous year have been incorporated in the Financial Statements.

Nothing which warrants making the following statements caught my eye within the courses of action adopted, and upon the evidence obtained and the confinement within the material facts:

- That a member of the governing body of the Institute has a relationship direct or otherwise, extraneous to the ordinary course of business in respect of an agreement pertaining to the Institute, as per the requirement stated in Section 12 (d) of the National Audit Act No. 19 of 2018.
- That conduct inconsistent with any written law or any other general or special directives issued by the governing body of the Institute has been observed, apart from the following observations, as per the requirement stated in section 12 (f) of the National Audit Act No. 19 of 2018.

	Reference to Law, Rule of Directive	Description
(a)	Section 3.1 of Chapter XV of the Establishments Code of the	Although no officer within the period of probation should be sent abroad for studies

	Democratic Socialist Republic of Sri Lanka.	or training, one such officer had been sent for overseas training during his period of probation.
(b)	Paragraph 6.5.3 of Public Enterprise Circular No. PED/12 dated 30 th June 2003	The Annual Reports containing audit reports for the years 2015, 2016 and 2017 had not been tabled in Parliament even as at 31 st March 2019, which was the date of audit.

- As per the requirement of Section 12 (g) of the National Audit Act No. 19 of 2018, the Institute had acted in a manner inconsistent with the powers, functions and mandate of the Institute.
- As per the requirement of Section 12 (h) of the National Audit Act No. 19 of 2018, the Institute had not procured and used frugally, efficiently and effectively the resources of the Institute apart from the following observations:
 - (a) The quotations received as per a calling of international competitive bidding for the purchase of 03 assets for the Training Division had been rejected without giving any clear explanation and newspapers advertisements had been republished spending Rs. 162,552.
 - (b) The institute had not prepared the Procurement Plan in detail nor a procurement time schedule as per procurement guideline 4.2.2. The Procurement Plan of the year under review had been approved on 4th June 2018.
 - (c) The following was observed with regard to the procurement process of the Institute:
 - (i) The Institute had not purchased the equipment it had planned to purchase by allocating Rs. 13,000,000 in the year under review and, a sum of Rs. 8,730,976 was spent in the previous year for purchasing equipment as planned.
 - (ii) While the Technical Evaluation Committee had approved the price of Rs. 275,000 to purchase Gemological Trinocular Stereo Zoom Microscope for the Training Division, the Procurement Committee had refused to purchase. The equipment had been purchased subsequently on the approval of the Procurement Committee at the price of Rs. 547,560 quoted at the second calling of quotations. The loss caused to the Institute in purchasing two units of the equipment concerned was Rs. 545,120. Even as at March 2019 the Institute had not received these pieces of equipment needed for a course that had commenced in September 2018.

3. Other Audit Observations

- (a) An expenditure of Rs. 801,826 had been borne for an official visit to Myanmar by three officers of the Institute from 4th to 10th November 2017. The main objectives of the visit were establishing a centre of the Institute in Myanmar and earning foreign exchange by bringing pearl oyster farming knowhow of that country into this country. As a result of approving this foreign tour for bringing into this country knowledge on pearl oyster farming, which does not fall under the purview of the Institute, and paying combined allowances for 06 days by approving 7 days for the programme which had lasted 03 days, a sum of Rs. 103,092 had been overpaid.
- (b) Action had not been taken to recover a residual sum of Rs. 750,869 due from an officer of the Institute pertaining to a fraud involving gold and silver worth Rs. 2,395,749 committed in the year 2007.
- (c) An officer from whom Rs. 619,646 should have been recovered as overpaid salaries and allowances had been released to another institution and action had not been taken to recover that money even as at the date of audit.
- (d) Two vehicles had remained idle – one for 09 years the other for 02 years.
- (e) The following were observed pertaining to planning of affairs of the Institute and the performance with regard to those affairs.
 - (i) No Action Plan had been prepared for the year under review basing on the Combined Plan in place while sectoral plans had been prepared only for the Human Resources and Administration Division and the Research and Training Division. Performance Reports had not been prepared to conform to the Action Plans laying down financial targets and physical targets.
 - (ii) 03 activities of the Research Division and 02 activities of the Administration and Human Resources Division totaling 2.35 million rupees according to the Action Plans had not been implemented during the year. Only 20.1 million rupees had been spent from the 30.95 million rupees allocated for 02 activities of the Administration and Human Resources Division.
- (f) Project for Exploration and Evaluation of Gem Deposits in Sri Lanka
 - (i) Although the Department of Management Services had granted approval to recruit 23 employees to the staff on contract basis, those recruitments had not been effected.
 - (ii) Although exploration and mapping of gem deposits in 50 Divisional Secretariat Divisions should have been completed and final reports issued during the period 2017–2021 under the first phase of the project, exploration work on gem deposits was being carried out only in 09

Divisional Secretariat Divisions within 02 Districts only by the end of the year under review. Gem potential maps had been issued in respect of 05 of the Divisions concerned while final reports had been issued in respect of 02 of them. 78 of the lands identified to have gem deposits remained under private ownership while 44 of them had been under government ownership. Recourse had not been made towards courses of action to earn incomes through auctioning the identified government-owned lands and selling maps while no course of action had been prepared to sell maps of private lands.

- (g) A 3-year project amounting to Rs. 9,975,088 to introduce effective and efficient methods to enhance the colour and clarity of gemstones of low value had been commenced. Oiling and wax-coating treatments and purchasing of 2 machines, which should have been performed within 02 years from the commencement of the project, had not been done even as at the date of the audit. Rs. 2,639,564 had not been spent even as at the end of the year under review out of the Rs. 4,115,848 provided for the project in the year 2017.
- (h) Out of the 1,220 students enrolled to the Institute for courses of study 284 students, i.e. 23 %, had left the courses. Only 02 courses had been conducted at the Polonnaruwa Training Centre, from which 09 students from a total of 21 enrolled had left the courses. The Centre had been closed down due to paucity of students. A course, which had planned to enroll 40 students, had not been conducted.
- (i) The approved cadre stood at 131 by the end of the year under review and 58 of the positions remained vacant. Action had not been taken even as at the audited date to recruit for the post of Director (Research), which had remained vacant for 08 years.

[Signed illegibly]
W.P.C. Wickramarathna
Auditor General