



Daily News

Wednesday, May 08, 2019

Vidya



RAAVANA I

The Raavana 1 satellite, set up with the supervision of Arthur C Clerk institute for Modern Technology under the purview of the Ministry of Science Technology and Research in Sri Lanka, was launched at 02:16 a.m. of the 18th April 2019. This was created by two Sri Lankan Engineers, for the first time of Sri Lankan history. Raavana 1 satellite has been launched by the NASA-based International Space Station in America.

Continued on Page 02...

Milk Powder

That we drink

Now a days we can hear so many perspectives on drinking of milk powder. Would you be gained weight by drinking milk? Does it have less possibility to born fractures? does it have any tend to increase the cold? Will it cause to pimple? Does milk powder have poisons? These are the main problems which people are talking about the milk powder.

Continued on Page 09...



Another step forward by the Arthur C Clarke Institute for Modern Technologies under the purview of the Ministry of Science, Technology and Research.

What is the Artificial Intelligence?

Page 05

Sea algae in Sri Lanka

Page 11

Fruits ripen properly using ethylene gas are safe to eat, no fear

Page 06



First Satellite Experience in Sri Lanka Raavana 1 is Launched

Continued from page 01...

Nano Satellite Project Commences

Launch of this satellite is a part of the process started in 2014. In 2016, the Nano satellite planning project was approved by the National Planning Department. The work on the nano satellite project was undertaken on the basis of relations built with Countries such as Russia, Japan, China and India. It was understood that Russia and Japan which had successfully completed Nano satellite and its successful results are also interested in starting the nano satellite project.

Sri Lanka – Japan Sign agreement

Kyushu technical Institute in Japan has launched a project called BIRDS for countries where satellite technology is not yet available. With the request of Arthur C Clarke Institute for Modern Technologies, it was able to connect to their BIRDS-3 project. So, the cooperative Research agreement was signed by the Arthur C Clarke Institute for Modern Technologies and the Kyushu Japan Institute in 2017.

Two research engineers to Japan

According to this agreement, the Kyushu institute agreed to involve two Scientists for the BIRDS-3 project for Sri Lanka. Accordingly, Research Engineer at Arthur C Clarke Institute for Modern Technologies Ms. Dulani Chamika applied for the relevant scholarship. She was selected for this scholarship as per the proposal submitted by her, with the instructions of former Director General, Deputy Director General and Director (Communication Engineering) of Arthur C Clarke Institute for Modern Technologies.

Mr. Tharindu Dayarathne of Arthur C Clarke Institute for Modern Technologies applied for this project as a member on the basis of paying money in terms of the agreement. After examining his abilities, he was also recruited for the BIRDS-3 project. Both of these research engineers began the design of solid satellites along with their post graduate studies in Japan at the Kyushu technology institute in September 2017.

Sri Lanka Government allocates funds for nano satellites project,

According to the agreement, the Japanese yen 1.5 million (Rs. 21.5 million) was provided by the government of Sri Lanka. This money was transferred to Kyushu institute, Japan through several stages by the treasury of the Sri Lankan Government, to provide knowledge of Nano satellite, to create a nano satellite, to prepare the engineering research module, to set up the space, to take the satellite to the international space station and to release to orbit. So, they were assigned the task from the creation of satellite to releasing it into the orbit.

The first nano satellite in Sri Lanka – Raavana 1

The coordinator of this project was Mrs. Kamani Ediriweera, Deputy Director General (Technical Operation) of Arthur C Clarke Institute for Modern Technologies. Engineer Kavindraka Jayawardena (Director Communication) worked as the Project Manager. All these activities were carried out under the supervision of the former Director General of the Arthur C Clarke Institute for Modern Technologies Mr. Sanath Panawennage. Together with former chairman of Arthur C Clarke Institute for Modern Technologies he named the satellite Raavana 1.

First press conference in Japan

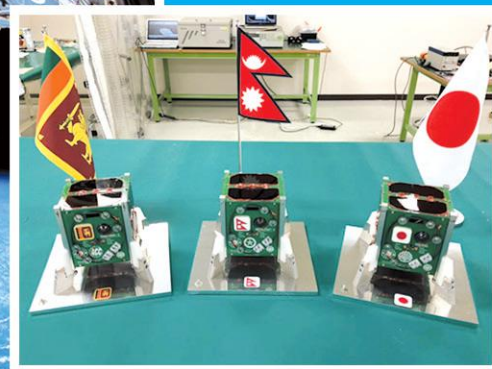
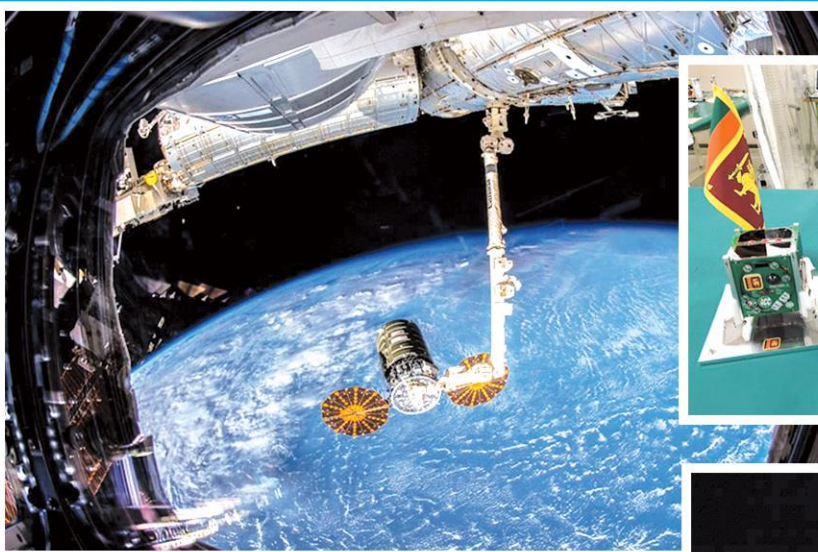
Under the BIRDS-3 project, three Nano satellites were created for Sri Lanka, Nepal and Japan. The Kyushu institute of technology held a press conference on February 15, 2019 to explain about these three satellites. On the 18th of February 2019 the satellites were handed over to the Japanese Aerospace Exploration Agency.

Raavana 1 to International Space Station

Data from this satellite will be received to the ground station, which has already been set up at Arthur C Clarke Institute for Modern Technologies.

This nano satellite named Raavana 1 designed and built by Sri Lankan engineers was boarded on to Antares rocket and its Cygnus II Spacecraft which was launched in to the space from the state of Virginia, USA, at 2.16a.m on the 18th of April 2019, Sri Lanka time.

It was handed over to the astronauts at the Japanese Space Centre of the International Space Station at



06.30pm on the 19th April 2019, Sri Lankan time.

This nano satellite is expected to be launched in to orbit 400km away from the earth, using the experiment module named KIBO, of the international space station, in June. It is expected to receive data from this satellite, by the Ground Station already established at the Arthur C Clarke Institute for Modern Technologies.

Raavana 1



Size – 1000cm³ (10*10*10)
Weight – 1.1 kg
Orbit – 400km
Carrying equipments
Transceivers (ORA) (low Power communication circuits)

MAGNETOMETER (Study the magnetic field of the orbit)

CAMERA (Take photo graphs of the path)

Ms. Dulani Chanika



Date of Joining to Arthur C Clarke Institute for Modern Technologies - 2016/03/29

Mr. Tharindu Dayarathna



Date of Joining to Arthur C Clarke Institute for Modern Technologies - 2017/07/10

Engineer Kavindra Jayawardana
(Director –Communication)
Arthur C Clarke Institute for
Modern Technologies

Our institute was originally established as the Ceylon Institute for Science and Industrial Research (CISIR) in 1955, and later became the Industrial Technology Institute (ITI) in 1994. We are under the purview of the Ministry of Science Technology and Research of Sri Lanka.

Over 64 years of experience blended with the efficient management, ITI has already

state of the art laboratory facilities along with well experienced and talented staff members. Eleven major sections within our organizations are sharing these facilities to generate innovative science based solutions to multidisciplinary industrial sector of the nations.

These represent:

1. Food Technology Section (FTS)

Branding Ceylon Cinnamon

Branding of Ceylon cinnamon is a key to certify its identity to the world market. This branding brings a premium price to the local cinnamon exporters. Our Scientists have been able to brand Ceylon cinnamon using DNA-based genotyping and barcoding techniques.

Expansion of *Bacillus thuringiensis* to a commercially viable scale under controlled laboratory conditions.

Introduction of *Bacillus thuringiensis* is, a bio pesticide, to the natural environment where Dengue mosquito breeds is approach to control spreading of the dengue infection, deadly epidemic in Sri Lanka. Our Scientists have identified controlling conditions under which *Bacillus thuringiensis* can be expanded to a commercial scale. Intellectual rights of this process, have been granted to Bio Power Lanka PVT LTD for commercialization.

A machine to improve operator safety and the length of coconut coir in coconut coir production industry

Traditional process of coconut coir production requires manual feeding of coconut husks by an operator to rotating drums equipped with arrays of sharp needles. Our Scientists have automated the husk-feeding process not only to eliminate the potential risk to operators but also to increase the yield as well as individual bristle length. We proudly note that the chief engineer behind this technology earned a Gold Medal in an international competition.

A rainfall meter that communicates data in real time for safety assessment in areas prone to landslides.

In general, areas prone for landslides experience heavy rainfalls within a short period of time. This situation demands constant and remote monitoring of rainfall to quickly take precautionary measures. To meet this demand, ITI scientists have developed a rainfall meter that directly sends real time data via Internet to authorities.

An isotonic sport drink

Our scientists have developed an isotonic drink using lime juice. Upon receiving executive rights for production and marketing from ITI, this drink is being marketed by Gover Street Holdings under the trade name "SL Sport Light Blast".

KothalaHimbutu Biscuits.

With the intention to control blood glucose levels in diabetes, ITI has developed a special Biscuit based on KothalaHimbutu bark extract. ITI has transferred intellectual property rights for its production to Ceylon Biscuit Corporation (Munchee Biscuits). It is now being marketed.

A specialized filter made out of red clay to remove Fluoride, Arsenic and Cadmium

Drinking water contaminated with heavy metals has been attributed as a potential contributor to the onset of the chronic kidney disease that is rapidly spreading in Sri Lanka. Based on the research and development efforts of ITI scientists, a red clay filter has been introduced to effectively eliminate heavy metals such as Arsenic and Cadmium as well as Fluorides. More than thousands of these filters are currently being field tested to evaluate the performance of the technology.

Our proud history spans over sixty-four years



won international acclaim as a prestigious research and technology institute. Among others, notable achievements highlight its international recognition through premier certifications such as ISO 17025, ISO 9001 and accreditation.

Through 64 years of existence, ITI had made tremendous contributions towards national development, especially in the advancement of the local industrial sector by providing innovative solution through dedicated research and development activities. The new addition of Malabe Research and Development complex in to ITI is considered as memento of appreciation of not only its past contribution to the national but also as the trusted bestowed upon ITI 's future contributions to be delivered at an accelerated pace.

Our newly annexed Malabe research and development complex provides the laboratory facilities to model product manufacturing process from a small scale to a commercially viable larger scale. This will help entrepreneurs to gain complete of issues and challenges involved in the scaling up product manufacturing process at commercial scale. Our talented and experienced staff provides-services such as Technology Transfer, Consulting Services, and execution of projects under contracts customized research services and training services. We have an Information services that works in parallel with a well-equipped in-house library to enhance the knowledge base not only entrepreneurs but also to university and students well as to the general public.

Our Strength

Through globalization, ITI has already cemented relationship with the several other words' eminent research organizations to work together to achieve the status of par excellent, ITI is fortunate to have

2. Herb Technology Section (HTS)
3. Material Technology Section (MTS)
4. Environmental Technology Section (ETS)
5. Biotechnology Unit (BTU)
6. Electro Technology Laboratory (ETL)
7. Industrial Metrology Laboratory (IML)
8. Material Laboratory (ML)
9. Quality Assurance Department (QAD)
10. Engineering's Services Divisions (ESD)
11. Information Service Centre (ISC)

Our Success

A good measure of our success in contributing to uplift nation's industrial sector through research and development is the analysis of products and technologies that have been introduced to the market.

Discovery of nutritional and medicinal properties and value addition to Sri Lankan traditional rice

Comprehensive research conducted at ITI on traditional rice of Sri Lanka lead to discover immense nutritional and medicinal properties which were totally untapped earlier. Identified nutritional and health benefits can be effectively utilized for prevention and dietary management of major non communicable diseases including diabetes, cancer and inflammatory diseases in the country.

Omega-3- and healthy fatty acids-enriched chicken eggs

Omega-3 and certain fatty acids that contribute towards the improvement of overall human health can only be derived from consuming meat products. Based on waste products of the fish industry, ITI scientists have developed a special chicken feed formula that led to the enrichment of Omega-3 and certain healthy fatty acids in eggs.

It is seen that the society, exposed to the competitive modern world strongly embarrasses beauty culture as a part of their daily life style. May be we all like to be seen attractive, pretty or smart which we compelled to use various cosmetics from head to toe.

These include vivid cosmetics applied for face, lips, fingers, nails, eyes, eye-lashes, along with various other commercial products used in wider spectrums of beauty culture. All of these cosmetics can be mainly categorized under skin care, hair care, color cosmetic, personal care and with many other sub categories.

Though this trend could be observed around the globe, the rapid expansion of the cosmetic industry may have been the driving force to develop a trend as such. Globalization on the other hand, has a profound effect for the growing trend. For example France is the worlds' renown cosmetic producer which earns nine billion Yuan annually from cosmetic industry that stands only second to the aviation industry. More than 1100 cosmetics industries operate in France.

However, thirty five percent of the global cosmetic market supplied by Asia pacific region hitting at high. Western Europe and North America holds the second and third consecutively as global cosmetic suppliers. It should be emphasized that the emerging innovation economies in the Asian region constitutes for the expansion in the industry of cosmetics.

Extended Technology has open doors in producing cosmetics based on individual customer requirements (tailor made) instead of producing cosmetic by using same formula in common.

For example by extracting DNA data to analyze characteristics from the saliva of a particular customer who walks in to the cosmetic outlet, a tailor made anti-ageing product is able to be developed to match with the customer's health condition. This nature of technology is currently adopted by developed countries, for a cheaper price like LKR 500.

The leading problem we face currently is how to select the proper product which resides in the market since numerous products are available without any proper regulations. It could be adversely affected to our health unless we select the proper product.

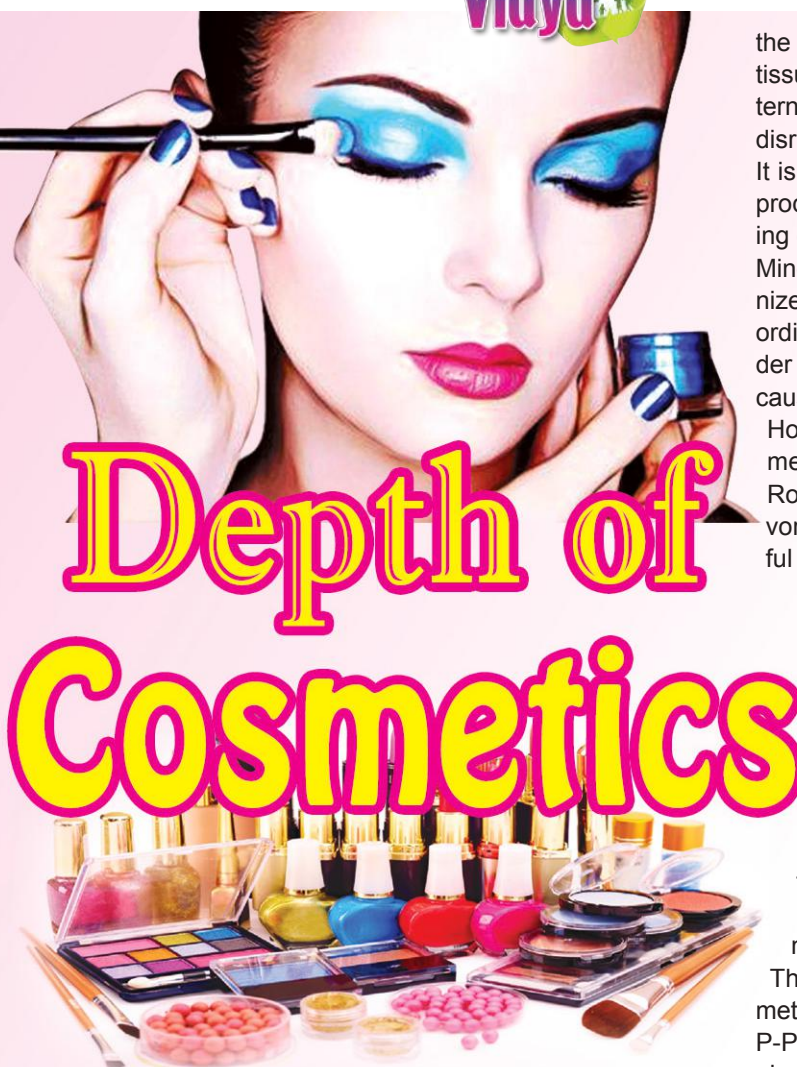
Wrapped in the open economic policy the synthetic cosmetics which flows into the country could create unfavorable health conditions unless regulations and strict market policies are adopted.

Customer awareness regarding the chemicals contained in perfumes, especially body sprays seen very poor in common basis. Many were proven with health risks. On the other hand expensive products too might be some times found unhealthy, so it is not the price that matters but the containing ingredient must be carefully monitored for.

How to choose suitable cosmetics.

Countries of the European Union banded 1373 of chemical compounds which are harmful to the production of cosmetic products. But most of other countries do not adopt such regulations which remains as an unaddressed world issue. Although the United States has a separate Authority, it is also reported to be lagging with productivity.

Out of vivid unsuitable poisonous compounds which creates health hazards let's consider key com-



Depth of Cosmetics

pounds proven with health risks.

"Formaldehyde" is a chemical that has a tendency to cause cancer in the human body. Especially the vapor of this also detrimental. Do you know that some cosmetic manufacturers use "formaldehyde" as a raw material for nail polish, hair gel, shampoo, conditioner and different type's body lotion? This

chemical compound carries adverse effects to our brain, kidneys and liver.

Some manufacturers use different other names for formaldehyde purposefully on the label of the product to conceal the reality and mislead their customers. For example some labels indicate the compound as DMDM Hydration urea; but these substances also release the formaldehyde.

Triclosan & paraben (eg: Methylparaben, Isopropylparaben, pentylparaben, isobutylparaben, phenylparaben & benzylparaben) has the ability to disrupt the hormone cycle of the human body. These chemical compounds could contain in deodorant and even on soap and face wash.

Perhaps you may be unaware that Brest cancer contains amounts of parabens. Parabens which are used for body lotion & Ointment has long – term adverse effects to the Human body: for example ethanolamine compounds such as MEA (monoethandamine) TEA (triethanolamine) has long-term effects to the Human hormone system. Ethylene oxide also is another toxic substance that causes cancer. Cosmetic manufacturers

use these chemical compounds to produce fragrance and shampoo. Some cosmetic products contain lead (Pb) levels which has severe effects on nervous system of

the human body that might cause damage to brain tissues, might change the human behavioral patterns and affects your studies as well as it might disrupt the thinking process.

It is reported that more than 650 types of cosmetic products such as Lipstick, Foundation and Whitening cream contain levels of lead.

Mineral oil & PEG (polyethylene glycol) are recognized to be carcinogenic. These are by-products of ordinary petroleum. Oils as such could deposit under the skin or internal organs in the body and may cause cancer.

However it should be appreciated that some cosmetic manufacturers use natural compounds from Rosemary Leaves and almond oil which are favorable to the human body, instead of using harmful mineral oil. These natural compounds contain Vitamin "A" & "E" that nourishes the human skin.

Products developed for remedies such as dandruff as well as dry skin can contain coal-tar which is believed to be carcinogenic agents. "Aloe" is a natural substance to replace coal-tar.

"Chemicals such as Sodium Lauryl Sulfate, Ammonium, Lauryl Sulfate are commonly found in cosmetic products that could cause diarrhea, eye deceases, skin deceases as well as mental depression.

Thousands of chemical compounds found in cosmetic products such as Triclosan, Hydro Quinone, P-Phenylenediamine, Duaternium-15, Talo, Titanium, Avobenzone are reported to be poisons to the human body. Cosmetics products which comparatively use less chemical compounds has less effects and the products which use natural products might be favorable to the human body. Chemicals may carry different properties when they appear as elements or compounds. Therefore it is important to know those effects by conducting long-term research and long term clinical trials.

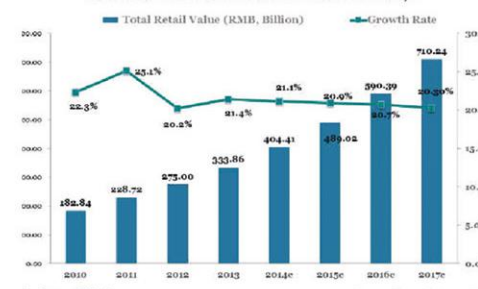
It is reported that, at least nine different chemicals are used by an average woman daily. If so what would be the long-term risk on them?

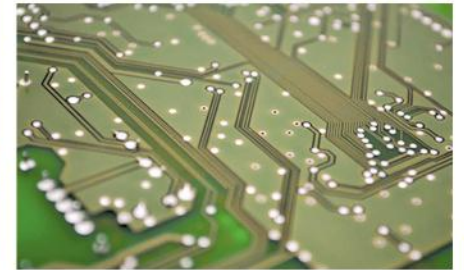
Therefore examining the ingredients of cosmetic products is vital to identify harmful cosmetics products. However it is high time to pave our attention on products at market shelves which do not indicate ingredients. These are mainly anonymous products imported from countries such as China & Thailand which an official mechanism should be implemented with means of regularity to save the domestic consumer.



Dr. R Chinthaka L De Silva
Senior Research Scientist/ITI
General Secretary
Sri Lanka Association
for the Advancement
of Science

China Cosmetics Retail Market 2011-2017e





What is Artificial Intelligence (AI) *and Why should you care?* ?

You must have heard about Artificial Intelligence or simply known as AI.

So, what is "Artificial Intelligence"?

To understand, we need first to understand what computers are.

The word "computers" means someone or something that can "compute". Years ago, before computers came to being, humans who did calculations were called computers. Now computers can carry out our calculations, data manipulations, or control equipment connected to computers as per our instructions. Humans can do all those things, but computers can do them faster. The computer can do more than 2-3 billion transactions per second while we can hardly do one. This disparity is evident if we change the time scales. If the computer takes one second to do a complicated calculation, keeping the same speed ratio, it will take a human 63 years to do the same calculation. Also, computers are much cheaper in the long term, compared to humans.

If you want to find documents that have the word "AI" among 10,000 documents or create 20 copies of the same document, computers can do it very fast. Therefore, computers are very good at calculating, storing and sorting through data, and finding relevant information among a lot of data. With these skills, computers have become ubiquitous and have already transformed the world.

However, there are many problems that computers can't handle. We already said that if we can tell the computer what to do, it can do it. However, with some problems, it is hard to tell what to do.

For example, let's consider driving a car. Remember how you learn to drive a car. Did someone write down what to do in all situations? If you think you can do it, try to write how to drive. You will find that it is virtually impossible. There are just too many cases. Instead, we learn by trying it out and getting feedback on how we are doing.

A lot of problems that need decisions, complex thinking, or intelligence have the same behavior. AI is a technology that can solve that kind of problems. You do not have to tell AI what to do. Instead, you have to give a lot of examples of what is right and what is wrong, and the technology is capable of learning from it, just like a

human.

When the technology learns how to solve a problem, it can solve it much faster, again and again. For example, it can recognize the voice, find what is in a picture, diagnose a disease, and detect fraud. These things could not be automated because one could not tell a computer how to do them. AI achieve these tasks much faster and cheaper than humans.

For example, let's say you plan to travel to Japan, but you will find most of the details are in Japanese. You can go to the google translator (<https://translate.google.com/>) and translate the information. Years back, to do the same, either you have to find someone who knows Japanese or hire a translator. However, now Google can afford to give it to you for free. This is one of the powers of AI.

In the last few years, for some problems, AI got closer to going beyond human performance. The famous example came in 1997 when Deep Blue, the chess-playing computer, defeated the world chess champion. Other examples are Alpha Go defeating world Go champion, and IBM Watson defeating the champion of jeopardy, a natural language quiz competition.

Those examples are of games. Among real-world examples are self-driving cars, Google photo search, language translation, and disease diagnosis. AI is taking over a lot of use cases. It is no longer a tool only at the hand of multi-million companies. For example, about a year ago, an AI program written by a teenager helped overturning more than 375000 parking tickets. IBM is trying to adopt their Watson AI engine to health, and if successful, it might let everyone get high-quality medical advice for a fraction of the cost. Furthermore, we in-



teract with AI daily by using applications such as Google search or Facebook. For example, McKinsey has estimated that up to 14% of existing jobs will be automated in the next 10-15 years.

Impact of AI on our lives will go much broader than suggested by the above examples. Let's consider self-driving cars as an example. Let's examine some of the nonobvious effects. If most cars are self-driving, it will cut down most of the accidents because if one accident happens all cars will learn from the accident. Cars will be able to drive much faster as a single convoy reducing traffic significantly. Most of the parking space can be released as you can get off the car and ask the car to park. Cars will look very different. You can eat, sleep, or watch TV in the car. Traffic police, insurance, and many related services may not be needed.

However, all impacts are not favorable. Some of the jobs will be replaced or redefined. People will have to learn new skills. The government has to help people transit between jobs. However, AI does not mean they will always replace humans. More often, AI will help humans make better decisions, do things more efficiently, and take over repetitive parts of their jobs.

It is likely that you have seen at least one movie that has killer AI. Indeed, that is possible, although we are likely 50-100 years away from that kind of AI. For example, a human can learn from 2-3 examples while AI needs billions.

Finally, before passing judgment on AI, we need to understand the current inefficiencies. For example, many in the world do not have access to top quality professionals like doctors, teachers, designers, and lawyers. Due to this many die daily. AI has the potential to make professional knowledge ubiquitous and save many lives. That means there is a cost of inaction as well. Is it fair to deny AI and let people die or disadvantaged? We have to measure positive impacts against negative ones.

What this means is the world as we know is changing very fast. Our children will live in a different world and do very different jobs. Challenges they face will be very different. Nevertheless, I am hopeful, humans have adapted to many changes environmentally and technically, and we will adapt to this as well.



Fruits ripen properly using ethylene gas are safe to eat, No fear

The consumers scare to eat artificially ripened fruits due to ongoing debates point out some poisons are being added to fruits through artificial ripening. As a result of scientific research on post-harvest loss reduction, a decade and a half ago Industrial Technology Institute (ITI) had introduced a safe fruit ripening technology aiming to provide good quality fruits to the market. However, the currently used malpractices in artificial fruit ripening can be a threat for the quality and safety of fruits. Therefore, it is important to re-emphasize the safer use of artificial fruit ripening technology.

How do fruits ripen naturally?

The natural fruit ripening occurs due to ethylene, a chemical compound (plant hormone) produced by fruits when they reached their optimum maturity. The produced ethylene can make changes in the chemical composition of fruits. Thus, the starches available in fruits convert to sugars making the astringent or sour taste of fruits into delicious sweet taste. The chlorophyll, green pigments in mature fruits convert to carotenoids, anthocyanin and lycopene like pigments with the ripening by giving inherent fruit colours such as yellow, red or orange. Therefore, fruits become softer, tastier and suitable for consumption through ripening process. Based on the ripening behavior fruits are classified into climacteric and non climacteric groups. The climacteric fruits show a climacteric rise in respiration during ripening and it response well to exogenous ethylene. The fruits such as Apple, Mango, Banana, Papaya, Passion fruit, Tomato and Guava are included in this group. When these fruits are harvested at optimum stage of maturity, they continue to ripen naturally. Otherwise, a small dose of exogenous ethylene can induce the ripening of these climacteric fruits.



Picture 1: Expose of fruits only to the ethylene gas produced from the reaction of ethephone and sodium hydroxide.

The other group, non-climacteric fruits do not respond to exogenous ethylene and no increase in respiration is observed during ripening. Fruits of Citrus family (oranges, mandarin etc.), Pineapple, Grapes, Rambutan and Watermelon are belongs to this group. These fruits should be harvested at the correct stage of maturity. If harvested before maturity it will not ripen after harvest since these fruits do not respond to exogenous ethylene. Therefore, the changes in fruit chemical composition will not occur except some colour changes in the fruit skin or shell. This phenomenon is used in de-greening of oranges using ethylene.

Why need to ripen fruits?

In commercial trading it is unable to wait until fruits ripen naturally. Therefore, production of natural ethylene in mature fruits can be stimulated by providing a little amount of exogenous ethylene. On the other hand, high postharvest losses could occur



if ripe fruits are transported. Therefore, it is important to harvest mature fruits, transport them to required destination, even to a foreign market and then artificially ripen before dispatch to the market. By doing this, good quality fruits can be distributed with less postharvest losses. Besides, the dormant spores of fungi and bacteria will start germinate with the increase of nutrition in fruits during ripening. Since natural fruit ripening takes time, the rate of disease development may occur faster than the rate of fruit ripen resulting high postharvest losses. Therefore, ripening of mature fruits exposing to small quantity of ethylene could help to protect the fruits from disease incidence while reducing high postharvest losses.

Different methods use to ripen fruits

Smoke is used to ripen fruits from ancient time to date. The acetylene (mimics ethylene gas but not the natural ripening agent) gas generated in smoke induces fruit ripening. Smoke can be used to ripen banana and papaya like commodities though uneven or irregular ripening is observed with this technology. Furthermore, in domestic conditions ripe fruits also used to induce ripening as ethylene releases from ripe fruits may be sufficient to produce ethylene in mature fruits.

In recent past, Calcium carbide (industry by-product) was commonly used as an artificial fruit ripening agent. The Acetylene gas liberated when calcium carbide comes into contact with moisture is used for fruit ripening. The chemical structure of acetylene gas is quite similar to ethylene gas, therefore it mimics ethylene and induce the natural ripening process of fruits. However, irregular ripening may observed in fruits ripened using calcium carbide as it is not the ideal ripening agent. Moreover, some malpractices done by mixing calcium carbide powder with fruits to be ripened could contaminate them with the toxic, carcinogenic residues such as Arsenic and Posphene. There-

fore, use of calcium carbide in fruit ripening is prohibited by a gazette notification, No 788/7 of the Government of Sri Lanka on October 12, 1993.

Apart from the above methods, ethylene gas cylinders, ethylene generators and chemical compounds such as Ethephon to produce ethylene are being used to induce fruit ripening. Most of the fruit sellers of Sri Lanka are currently being used chemicals to induce fruit ripening. However, the most important point to be considered is, whether they use proper technique that does not harm the environment and human being.

A safer method to induce fruit ripening

The artificial ripening agent used here is a liquid chemical, 2-Chloroethylphosphonic acid which is commonly known in a trade name of Ethrel or Ethaphone. Ethylene gas can be simply produced from this by adding a base compound like sodium hydroxide (NaOH).

The ethylene liberated from the chemical reactions between the above chemicals, natural ripening process of fruits is induced and thereby accelerate the ripening process. By utilizing this method, it is easy to supply the required quantity of ripe fruits on market demand. This method is similar to the natural fruit ripening phenomenon and there is no way of contacting chemicals with the fruits. Therefore, it is a safe and inexpensive method of artificial fruit ripening. As there is no chemical contact, no need to scare to eat the fruits ripened using this method.

Ethaphone spray on to fruit or dip treatment should not be carried out at any instance as it may leave toxic residues on fruit surface. Higher dosage of ethaphone use as a spray treatment to ripen fruits which is practiced by most of the local fruit vendors made the fruits unsafe and not consumable. Artificial ripening is not a bad practice if it is done for mature fruits in a safer way.

Dr. (Ms.) Ilmi Hewajulige
Senior Deputy Director,
Food Technology Section
Industrial Technology Institute



Vidya



Moulding future research leaders in Sri Lanka

National Science Foundation (NSF) which is functioned under the Ministry of Science, Technology & Research promotes research, development and innovation to create a knowledge economy. It is mandated to popularise science amongst the people by funding and executing programmes for the purpose. Enhancing an appreciation of science among school children and the general public while strengthening science education in schools are important functions of the NSF. School Science Society Programmes, organizing training workshops for teachers and students, conducting national level science competitions, taking initiatives to improve laboratory facilities of under privilege schools are some of the activities undertaken by the NSF to popularise science among school children and to facilitate STEM education in the country.

Science Research Projects Competition (SRPC) is one such activity annually organized by the Science Popularization Division of NSF, with the objective of enhancing innovative thinking, creativity and investigative ability of school children in the country.

Students of grades 09-13 of schools registered with NSF are eligible to apply for the above competition and they may enter the competition by submitting research proposal/s on a field of their interest. The

selected projects are continually guided and improved under the supervision of experts in the relevant field assigned as principal supervisors and NSF monitor their progress in regular intervals.

The best ten projects of SRPC get the opportunity to participate in the Intel ISEF.

Students of grades 09-13 of schools registered with NSF are eligible to apply for the above competition and they may enter the competition by submitting research proposal/s on a field of their interest.

participate in the "Sri Lanka Science and Engineering Fair" (SLSEF), along with the top ten finalists of the "Junior Inventor of the year" competition, conducted by the Institution of Engineers Sri Lanka (IESL). NSF organizes the SLSEF with the cooperation of IESL, Intel and the Ministry of Education. The top three winners of SLSEF are eligible for participating the Intel International Science and Engineering Fair (Intel ISEF) representing Sri Lanka.

The Intel ISEF is the world biggest annual pre-college science competition which is organized by the Society for Science and the Public, USA. Each year, approximately 1,800 high school students from more than 75 countries, regions, and territories get the opportunity to present their independent research and compete in Intel ISEF.

The SLSEF 2019 was successfully held on

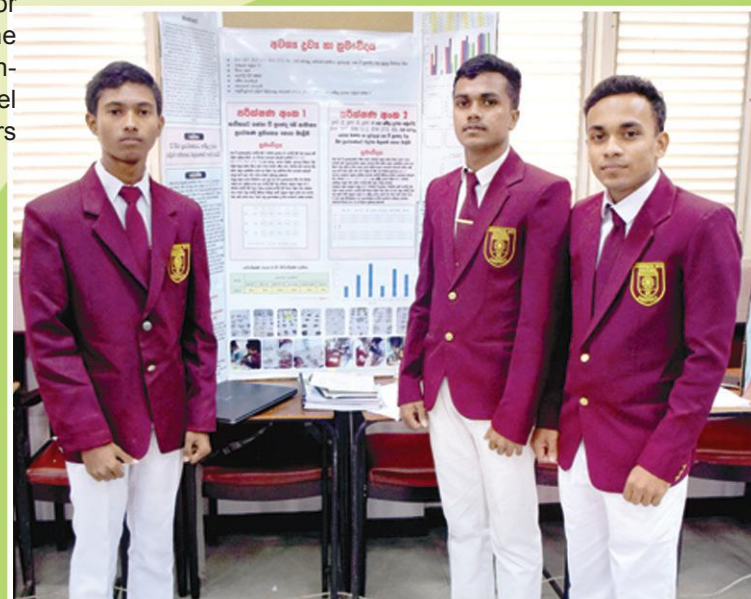
Senior Lecturer at Department of Plant Sciences, Faculty of Science, University of Colombo.

This project team will be participating at the Intel ISEF which will be held from 12th to 17th of May 2019 at Phoenix, Arizona, USA and will have opportunity to compete with around 1800 student coming from 75 different countries in the world.

The NSF has now called applications from the schools for the SRPC 2019, continuing its mission to empower young research leaders of the country and any school not applied yet to participate the Science Research Project Competition encourage to contact Science Popularisation Division of the NSF soon for more information (www.nsf.gov.lk)

Research team of Gnanodaya Maha Vidyalaya, Kalutara selected to participate Intel Science and Engineering Fair 2019 scheduled to be held in May 12-17 in Arizona, USA.

Prepared by
Abhimani Ranatunge & Lakshan Warnakula
Science Popularisation Division,
National Science Foundation, Sri Lanka.



11th of February this year at the Wimalasundera auditorium of IESL, Colombo. One SRPC Project "Effect of acidity on seed germination of selected varieties of paddy" was among the best three winners of SLSEF 2019 and won the opportunity to take part in Intel ISEF 2019.

This project was conducted by the students of Gnanodaya Maha Vidyalaya, Kalutara. Mr. R.S.R. Senavirathna, Mr. H.L.C.D. Hashela and Mr. S.S.R. De Silva under the direction of their science teacher Ms. Sanjeewani Udawatte. This project was guided and supervised by Dr. Sudheera Ranwala, an expert in plant sciences and climate change who currently works as a

Authentication and conservation of endemic species in Sri Lanka



Sri Lanka hosts large amount of genetic resources which accounts for high genetic diversity. Therefore Sri Lanka is categorized as one of the 25 most biodiversity hotspots in the world. Most of these genetic resources which consist of plant and animal species are endemic to Sri Lanka. These species contain invaluable medicinal, cosmetic or economic properties and collective knowledge gathered around these species by local communities add further value to these genetic resources. Due to these fortunate incidences, unfortunately endemic species living in Sri Lanka are facing the bio piracy by international pharmaceutical/cosmetic companies which are trending more towards developing natural biological products for the market. The products made are being sold to very high prices worldwide but no benefit to the country of origin is given. With the increasing demand for such products bio piracy enhances the threat of illegal trade of plants and animals. This in turn increases the depletion of number of animals or plants in the specific species and sooner they will become endangered or threatened. Furthermore, we will be losing our important genetic resources while some other country is becoming rich in our genetic material. This could disrupt the stability of the local ecosystems. Extinction of important species is another effect of it. This leads to biodiversity reduction and ecosystem disturbances, with consequences for the environmental imbalance and the way of life of rural or indigenous peoples causing depletion of



traditional knowledge and uses.

Bio piracy has been happening in Sri Lanka for decades. There are large numbers of Sri Lankan endemic plants subjected to patency in other countries such as U. S. A., European Union, Japan, Australia and India. Some of the well-known examples are *Salacia reticulata* (wight) (Kothala Himbutu), *Hortonia floribunda* (Wight) (Wewiya), *Exacum* sp. (Binara) and *Puntius titteya* (Cherry Barb). There are existing rules and regulations locally to prevent bio piracy, but there are gaps and routes of escape in doing so. Therefore, according to the experts in the field, it is the time to prepare laws and regulations such as Mutually Agreed Terms (MAT) and Prior Informed Consent (PIC) for access and benefit sharing of genetic resources. For this we should have a legal method of getting authentication and legal rights of ownership of the endemic species to the country. Presently morphology based taxonomy is used by the respective authorities for identification of species and justification of the origin of species. The limitations of morphology-based taxonomy are; characters/features employed for species recognition could be subjected to phenotypic plasticity which leads to incorrect identifications; Morphologically cryptic species are often unnoticed; lack of taxonomic keys to identify immature specimens of many species; difficulty in identification when minute amount of sample is available; traditional taxonomy requires high levels of expertise in any given group and is therefore restricted to specialists and lack of specialists in some given areas has led to crisis of taxonomy. According to the intellectual property act no live form can be patented. But sequencing the gene pool or specific genes of endemic animals in Sri Lanka will enable to uphold scientific and genetic authenticity in the international arena thereby to preserve the rights of ownership to the country. Therefore, it is the time for Sri Lanka to move towards scientific methods as most of the other countries follow in order to avoid bio piracy. With the improvements in molecular genetics in the past decades, genetic tools are considered to provide more reliability for the authentication of herbal/animal biotechnology and materials at the DNA level.

Barcoding of animals/plants is one the currently accepted scientific method followed worldwide for authentication of species. Sequencing a species specific short DNA sequence of the relevant endemic species would enable to identify and authenticate the original species endemic to the country, prove the origin of the species, distinguish between different species and prevent adulterations and substitutions of species. This method is successfully functional in authentication of plants and animals in China, Germany, Japan, France, U. S. A. and India. Even though the technology is developed and published, Sri Lanka is not making use of it so far to identify and authenticate the endemic species. Presently morphology based taxonomy is the most common



method used in main species monitoring and identifying places in Sri Lanka such as Sri Lanka customs, Royal Botanical Gardens, Peradeniya and Department of Wildlife Conservation. As described above there are several disadvantages in the traditional morphology based taxonomy that hinder its progress, which in turn drives us to move towards molecular methods. While Barcoding provides a legal scientific certificate for each species, it will also aid morphology based taxonomy to clarify some of the problems associated with it. Therefore, instead of "morphology versus DNA", "morphology and DNA" will heighten the steps towards integrative Taxonomy.

Implementing a project to start DNA barcoding and establish a national reference centre to house the barcoded data

of all the endemic animals and plant species in the country would impose a massive contribution to uphold the genetic authentication to the country, thereby avoid bio piracy and illegal trading of endangered endemic animals and plants in the country. It will also help to preserve ownership of these species to the country and thereby conservation of biodiversity. Endangered species that could benefit from a DNA barcoding approach include commercially hunted wildlife, wildlife consumed for the traditional medicine trade, rare species collected for private living collections, and unsustainable harvesting for other wildlife products. Trade of endangered timber species may also be halted by using barcodes to identify processed wood and lumber products.

Challenging patents is another option to control gene piracy. India's Turmeric case and Taxamathy rice case in Thailand are such examples that can be used. Since the website carries all the scientific facts, it could pave the way to challenge patents legally or to set up a mechanism for fair and equitable sharing of benefits.

An open access website containing a taxonomic data with access to the barcode information created for each endemic animal/plant could also act as an opportunity to prevent biopiracy. Since all the scientific data is collected in one place it will be easy for government authorities to compare, analyse and identify species related to controversy. Further this website could be expanded to collect DNA barcoding information of endemic species in Sri Lanka from other research groups in Sri Lanka as well. The credits should be given in the website for each contributor. This will be a promising and innovative initiative that could set an example for other countries prone to biopiracy. A standard-



ized library of barcodes will enable more people especially young generations to identify species, whether abundant or rare, native or invasive, stimulating the appreciation of biodiversity locally and globally.

At the same time this could create awareness among general public about the importance of natural resources to the country and motivate the public to act with real patriotism towards protection of these natural heritages.

Dr. Maheshi Athapaththu,
Senior Research Scientist,
Biotechnology Unit,
Industrial Technology Institute,
Sri Lanka

People commonly use full cream milk powder, non fat or skimmed milk powder. Full cream milk powder contain more fat while nonfat or skimmed milk powder contain low fat. We can consider milk as a whole food which we can use as a main meal out of twenty two essential nutrients, eighteen essential nutrients are contained in milk. For example, Ca, Mg, Zn, Protein, Fats, Carbohydrates, Vitamin – D.

People used to drink milk to overcome the hunger as well as to fulfill the need of Ca, Vitamin and Protein etc.

1.3g of Ca are recommended to the people who are in age limit of 19-50 years old. Other than milk powder we can obtain Ca from leafy greens, such as Spinach, Cabbage & Broccoli. A cup of boiled cabbage or bean contain 0.25g of Ca. Fatty fish like Tuna & Salmon and Soya milk, Cheese, Egg yolk contain vitamin - D other than milk powder.

Milk powder is a substitute for liquid milk. Milk Powder is made by removing water from liquid milk. Milk treatment, Evaporation and spray drying technologies can be used to make milk powder from liquid milk. Due to affordability and profitability milk powder is most popular in society.

Some people consider a cup of tea with milk powder as a concentrated sugar solution. Because we used to use additional sugar to prepare tea. Milk powder itself contains disaccharides naturally. 25g-30g of full cream milk powder or a cup of full cream milk contain 150 of calories, 6g-9g of fat, 6g of protein and 10g-12g of Carbohydrates. A cup of non-fat milk contains 80g-90g of calories 0.2g of fat, 13g of Carbohydrates. You can read the bar-code in the label using calorie measuring software. E.g.: My Fitness pal. According to the BMJ (a peer-reviewed medical journal) if you drink 3 or more cups of milk per day, the risk of bone fractures is higher, because of lactose & galactose which are naturally contained in milk. According to the research using women done by the journal of bone & mineral research, drinking of milk does not have decrease the bone fractures.

Additional Ca has high risk to prostate gland cancer. Ca also causes to increase the risk for heart disease as well as nephrolithiasis in kidney (kidney stones). You should keep in mind that, a person older than one year should take only 1g of Ca per day.

Have you ever noticed that, skimmed milk or non fat milk is not suitable for babies under 2 years old? Because fat is an essential thing for infants' growth. Skimmed or non fat milk has only a low amount of fat. High protein and more minerals are also not suitable for infants.

According to the data, about 2/3 of Indian population are using this type of milk powder.

Because of DCD (Developmental Coordination Disorder) or precursor of melamine incident in Sri Lanka, melamine is recognized. But they think it is because of cattle food. Therefore fertilizer companies of New Zealand decided to avoid melamine to produce fertilizers which are using for

Milk Powder That we Drink...



The milk or milk powder is poisoning because of Milk Adulteration process. Milk Adulteration is a fraudulent activities. Liquid milk/ milk powder manufacturers use Milk Adulteration to increase their profits and have economic benefits. In this cause various chemicals especially high nitrogen compounds are added to the milk to show that their products contain high concentration of protein. But it is very harmful to the human body. Many examples can be seen worldwide for this. In the year 2008, 8 children in China died because of Milk Adulteration.

Water, Dairy whey powder, Vegetable oil, Melamine, Rinse, formalin, urea etc. are commonly used for Milk Adulteration. This milk can be easily identified by using LC, (liquid chromatography), ELISA (Enzyme Linked Immunosorbent Assay), LIBS (Laser Induced Breakdown Spectroscopy) method. Web link mentioned below will help you to do some small research to identify Adulterated Milk.

cattle food fields.

We use to drink milk, mostly as a habit than for nutrition requirement. We would like to say to people who are asking "is milk powder cause to increase the body weight?" if you exceed the intake of calories to your body than you burn, your weight will be definitely increased. Milk/ milk powder may be cause to allergies or pimples for some people.

Although there are many opinions on milk / milk powder, people use milk/ milk powder as a habit or consider as it is easy to use. Milk is not necessary for adults. If you can drink pure cow milk is better. But breast feeding is must for babies.

Pabasari Arundhathi Koliyabandara
Research Scientist



Check your Science Knowledge

Is your science knowledge really up-to-date? If so, read the newspaper and write the answers to the 10 questions given below and send them to us. One hundred winners will receive valuable prizes from the Ministry of Science, Technology and Research.

1. What is the importance of the smart city concept?
2. What are the adverse effects to the human body by using cosmetics?
3. What is the natural process of fruit rippen? Give a brief introduction about natural fruit rippen process.
4. What are the advantages of Artificial Intelligence?
5. What is Nano satellite?
6. What are the diseases that can be occurred by ingestion of calcium (Ca) in human body?
7. What are the special features of endemic genes of flora and fauna?
8. Give five products introduced by

- ITI to the local market.
9. What are the pioneer national and international institutes to launch the Raavana-1?
10. Give three harmful chemicals which are used for producing cosmetics.

Send your answers to reach the following address on or before 25th May 2019. With your name and personal address. Please mentioned as "Science knowledge" on the upper left corner of the envelop.

**Director (Research),
Science and Research
Development Division, Ministry
of Science, Technology and
Research,
3rd Floor, Sethsiripaya (Stage 1),
Battaramulla**

**Win
100 valuable
Prizes**

Due to school vacation, replying for the answers of last issue was extended till 25th of May 2019.

Are you interested in scientific writing?

So, here is a great opportunity for you....

Please send your any scientific article or scientific fiction to the following address.

Please mention as "Scientific Writing" on the left upper Corner of the envelop.

Name :
.....
Address :
.....
Contact no:

Corrections

In the interview under the article titled "shilpasena" published on page no 03, in the last issue was held with the Prof. Ajith de Alwis, the designation of the Prof. Ajith de Alwis was mentioned as 'Coordinating Secretary and Director Projects of the Ministry of Science, Technology and Research' which should be corrected as Project Director -COSTI

Payment of Research Allowances as per the Management Services Circular 2/2014

Who can apply: State officers permanently appointed for a "Senior" level post according to the definition given in the Management Services Circular No. 06/2006 and officers in the category of Academic and Research (AR),

Application forms can be found at download page of <http://www.mostr.gov.lk> or Inquires E-mail srd.mostr@gmail.com or Telephone- 0112879374

Manager (MM) or higher level posts as defined in the Management Services Circular No.30 who are serving in the permanent cadre of Government Corporations, Statutory Boards and Fully owned Government Companies.

With the development of technology and its advancements over the past two decades, the lifestyle of humans has drastically changed. Many people started to migrate to major cities worldwide due to the highly available resources and infrastructure. In order to facilitate the rising demand in services, smart city concept was introduced.

What is a Smart City?

A smart city is an urban development concept that incorporates information and communication technologies to enhance the services like energy, infrastructure, transportation, utilities and housing thus improving the quality of lifestyle and sustainability.

Several cities in countries like Japan, Spain, Greece, India and South Korea have already implemented smart city concept.

Pros of a smart city

A smart city provides numerous services to residing citizens and businesses. With the introduction of household and commercial solar panel systems, the use of petroleum and coal based energy has reduced. This results in low greenhouse effect which eventually benefits a livable environment.

The core of a smart city is its' interconnected streets system. This enables easy access to the services and businesses in the city thus reducing the waiting time of a person. In addition to that, as a smart city provides a better structured public transportation system throughout the city, it reduces the traffic congestion and air pollution.

Future of Sri Lanka Smart City Concept



©Amanda Balasooriya

In this concept, the whole city is continuously monitored using sensors and camera systems installed on street lights and at public places. When an accident or a crime takes place, a signal is transmitted to the central system through this system which will eventually enables public safety.

Another pro of a smart city is the proper waste management system. Segregated smart waste collection bins are placed at various locations throughout the city. When a bin is full, a signal is sent to the relevant collection company to be exhausted. This prevents environmental pollution and will keep the city clean and habitable.

In addition to the mentioned advantages, another pro of a smart city is the availability of digitalized services. A smart parking system notifies drivers about available nearby parking slots. A smart bus halt concept provides passengers about the arrival time and mobile charging units.

Why does Sri Lanka need smart city concept?

As a country Sri Lanka needs to implement smart city concept island wide to facilitate increasing demand in services and urban population. Sri Lanka has a poorly maintained public transportation system which resulted in increased use of personal vehicles thus high traffic

congestion during busy hours. This issue can be resolved by introducing the public transportation system of smart city concept.

The annual electricity consumption of Sri Lanka is about 12 billion kWh. The carbon emission due to energy consumption is 16 million Metric Tons. Even though this can be reduced by using solar power systems, the electricity generation from renewable sources in Sri Lanka is around 3.6% of total energy sources. This can be addressed by implementing solar power systems in smart city concept.

Rate of accidents and crimes in major cities of Sri Lanka is high. Automatic notification of such occurrences to the relevant authorities (police stations, hospitals) has not implemented beforehand. With the introduction of smart city concept this issue can be easily addressed as there are tracking systems enabled, which are connected with both police stations and hospitals.

Conclusion

As the number of internet users in Sri Lanka is increasing day by day, it is easy to implement smart city concept to reap and facilitate its benefits to the community. Even though the initial cost of implementation is high, it is easy to maintain a smart city. A smart city also provides quality lifestyle and luxury for its' residents and businesses.

B.M. Amanda Balasooriya
Undergraduate,
Wayamba University of
Sri Lanka

Industrial Technology Institute (ITI) being one of the organizations established in 1955 catering to the economic development by providing Technology to elevate Science and Technology of the needy in the society. ITI has further strengthen this activity during last couple of years by offering group technology training workshops by elevating the technology know how of various social representatives;

Traditional Ayurvedic Medical practitioners are one of the important social group who deliver Traditional Knowledge to the society and some of them wanted to come up with value added herbal preparations such as conventional hot infusions into ready to serve tea bags, also some wanted preservation techniques for such products as ready to serve drinks (RTS) such as Aloe vera, drinks, Tamarin drinks etc. Traditional herbal oil transformed as easily applicable balm/ ointment etc. In addition, ITI Herbal Technology Section has come up with following training programmes to come up as an entrepreneur for any unskilled individual.

Incense stick, joss powder, air freshener, hand wash, laundry soap, toilet soap, paper soap, virgin coconut oil, value added coconut oil, medicinal

ITI Programmers Catering Entrepreneurship Development

plant cultivation, post harvest technologies for medicinal plants and herbal raw material supply.

Since our ideology is to drive the nation through technology we not only support grass root level entrepreneurs but support SMES' and already established industries to come and cater local consumer market by providing value added herbal and cosmetic products such as herbal teas, balm, shampoo, hair oil, hair tonic, hair lotion, skin creams and lotion, cologne, herbal soap, syrups, herbal drinks, herbal plasters and value added coconut oil based cosmetic products.

The technology acquisition may be obtained by following 10 days workshop on Herbal drugs and cosmetic value addition techniques and this workshop not only support technology acquisition but also machinery exposure visits, meeting with locally made machinery suppliers, packaging solutions, marketing solutions, registration solutions and finally compliance with standards.

Human resources of ITI is well trained

with the modern technology and closely worked with local industries.

Therefore, people should make use of the valuable resources of ITI for the country's economic development thereby alleviating poverty.

Entrepreneurship development is a key indicator of countries economic prosperity. Very recent example is Vietnam, the country that has come up from the

ruins of war history. It is forecasted the Vietnam will eradicate poverty by 2020. How this could be happened? Which is prosperity? The lessons learned by Vietnam can be adapted to this country as well because we also had a recent war history and challenges could have been similar to Vietnam and adaptation of Science and Technology to strengthen the blue green economy is not a miracle.

Dr. Chandima Wijayasiriwardena,
Principal Research Scientist,
Herbal Technology Section



The ocean is the huge saline water body which covers two-thirds of the planet of earth. It is considered as the largest ecological system in the world. The marine ecosystem represents a vast and dynamic array of bio-resources attributed with its huge diversity. Over the last decades of the last century, the ocean has been identified as a sustained source for the requirements of human beings.

According to our knowledge, the origination of life of the earth has begun from the ocean. The oldest fossil evidences showed that rise of environment oxygen by oxygen producing eukaryotes and cyanobacteria were appeared over 2.32-2.45 billion years ago. Afterwards, many of organisms or evolutionary forms have been evolved. Marine ecosystem is a home to a large group of organisms including planktons, zooplanktons micro-organisms, sponges, algae (macro or micro), crustaceans, mollusks, fish and small vertebrates. Many species rely on marine ecosystem for both food and shelter.

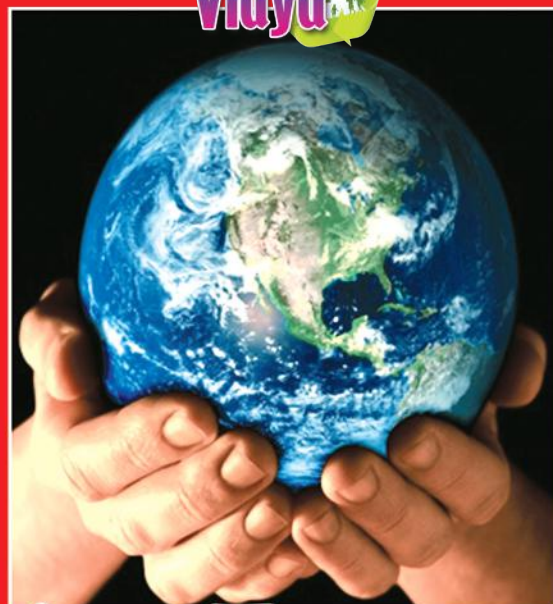
Habitats for marine organisms may be varied on the marine waters like fully saline, brackish or nearly fresh. Abiotic or physical factors such as light intensity, temperature, nutrients and salinity levels make much more influences for their biological function.

However, the evolution of the diverging forms with respect to their biochemical and morphological traits are still being taking place with the adaptive establishments in the ocean.

Marine diversity and its productivity also important for humans. Balance ecosystems merely help to sustainable use and development of natural resources. It is important to understand that in order to keep the overall health of both marine and land ecosystems with the abiotic systems for healthy planet. Increases human activities such as overfishing, pollutions and coastal developments have significantly caused to damage and threatening over to the conservations plans which we have implemented.

What are meant by seaweeds?

Seaweed (marine macroalgae) is a term defines to multicellular organisms which are large enough to be seen by the eye, haven't been developed as higher plants, thus belong to members of the kingdom Protista meaning they are not Plants. They do not have the vascular system of plants and do not have roots, stems, leaves and flowers or



Marine Ecosystem; Marine algae in the Sri Lankan water and Future Prospects

cones. Seaweeds are varying with morphology and structure. Some can grow up to 60 m in length. Like plants they use the pigment chlorophyll for photosynthesis but also contain other pigments which may be colored red, green and brown, such as red seaweed (Rhodophyceae), green seaweed (Chlorophyceae) and brown seaweed (Phaeophyceae).



Dr. Kalpa W. Samarakoon
Senior Scientist

Marine Seaweeds (Macroalgae) in Sri Lankan Water

Sri Lanka is an island located in the northern Indian Ocean with coastline of approximately 1700 km. Despite the small island, it got 200 nautical mile of maritime zone with exclusive economic zone declared United Nations Convention on Law of the Sea (UNCLOS). Sri Lanka enriches with marine fauna and flora along the coastline.

In the case of Sri Lankan marine algae, earliest marine algae collections have been reported in early 19th century by Barton (1903). However, Baldwin (1991) has reported about 440 taxa of marine algae, belonging to 148 genera. More recently, a comprehensive study of marine seaweeds of Sri Lanka has been carried out by a group of scientist in year 2009. Among the Sri Lankan seaweeds, Sarragassum species (brown algae) are the most abundant type of algae found in the coastal area. Ulva

lactuca, Chaetomorpha antennina, Caulerpa racemosa, Halimeda gracilis, Acanthopora spicifera, Gelidium acerosa, Gracilaria salicornia and Gracilaria edulis are also commonly found marine algae species in the Sri Lankan water.

Habit of consumption of marine seaweeds in the world has been identified long time ago. It is expected that certain health promoting benefits and human longevity by consuming sea foods. Having the experience from European, Asia Pacific and some of South Asian countries for the consumption of seaweeds also implicated that the steady enhancement of life expectancy and long term health effects, quality and care could be rendered by the marine functional ingredients. Moreover, consumption of marine algae is considered as a preventive

strategy against lifestyle diseases and fruitful solution for the prospective health challenges. Substantial scientific evidences have been shown that direct consumption of algae or food

supplements may contribute for the health promoting effect. However, consumption of marine seaweeds in Sri Lankan context have not been really reported. Though small group of fishing community of Sri

Lanka in Northeast province are reported to be used a particular type of species of algae for their consumption. In particular, Gracilaria species are the most popular seaweeds used for the preparation of local jelly among the fishermen in Puttalan Lagoon area and it has been practicing over the many decades.

Marine Algae Biotechnology towards the Good Health and Well-being

Marine bio-resources can be utilized to obtain different health benefits for humans, directly or after processing. Most of the bio-molecular components, including secondary metabolites and functional ingredients can be extracted from these marine bio-resources in large scale using the modern and advanced biotechnological approaches, are in one hand suitable drug candidates for the pharmaceutical industry, on the other hand functional food materials for the food industry.

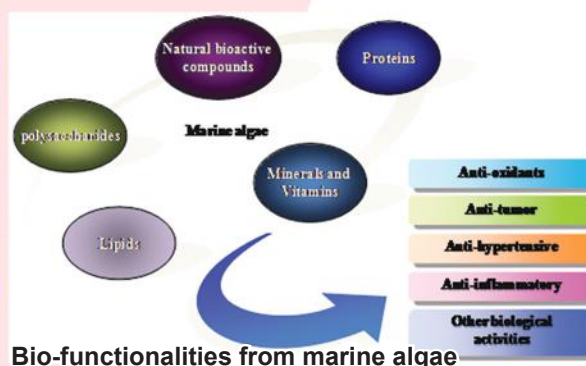
Thus, the marine environment has an enormous biodiversity and is the source with huge potential for the recent scientific applications particularly with respect to the biotechnology and pharmacology. Globally, the marine living sources have been undertaken for numerous research works and accomplished their importance for the mankind and other prospective organisms.

Future prospective for Sri Lankan marine algae

There is an increasing trend towards the nutrition and health effects due to the advancement of marine bio-resources technology. Emerging prospects and outstanding scientific research strategies would be encouraged for harvesting the marine algae functional materials for targeting the development of pharmacological and biotechnological products. Therefore, the current trend on the marine biomasses will not be changed for next few decades and would be expecting to serve for the future sustainability.



Some Selected Bioactive Sri Lankan Marine algae



ශ්‍රී ලංකා තාක්ෂණ විප්ලවය
இலங்கையின் தொழில்நுட்பவியல் கண்காட்சி
Sri Lanka Technology Revolution

ශිල්ප සේනා சில்ப சேனா SHILPA SENA

4 Major Clusters

12 Thematic Disruptive Technologies

Innovations

Identifying Innovators from the Universities, Schools and Society ~600 inventions

Careers / Job Fair & Entrepreneurship

Opportunities for ~3000 jobs in each district; One-to-one meetings with the youth and private sector
Involvement of Vocational training centres – to train the youth
1000 Technology Packages - complete with five product levels and packaging, services, advertising, advice and delivery (financing) arrangements Business Registration and loan facilities

Edutainment

Commercial stalls, Food, Mind games and Fun activities, Musical shows, fireworks, laser show, hologram, Sci-films, Science Community Radio and many more!

We will be coming every month to cover each district in the country!

Ministry of Science, Technology and Research



Advice

Chinthaka S. Lokuhetti
Secretary
Ministry of Science, Technology and Research

H.M.B.C. Herath
Additional Secretary
(Technology & Research Development)

Guidance

P.M. Dharmatilake
Director
(Science and Research Development Division)

Dilrukshi Pathirana
Assistant Director-(Marketing)
(National Engineering Research & Development Centre)

Dr.Kalpa Samarakoon
Senior Scientist
National Science & Technology Commission

K.N.K. Disanayake
Scientific Officer
(National Research Council)

Jayasamara Gunarathne
Asst. Director
(Technical Assessments)

Dhammika Rathnayake
Ishara Sudarshani
Madhuka Subhashini Amarasinghe
Kaushalya Ganegoda
(Science and Research Development Division)

Official Photographs
Dulip Nayanapriya
Ministry Media Unit



Government Relations Dept.

Coordination/ Graphics and Creations Supervision
Samantha Karunasekera
Managing Editor – Government Relations
(Lake House)
0112 429297 / 077 3493785

Translators

Ishara Sudarshani
Dhammika Rathnayake

Creations

Danushka Bandara
Ashani Jayawardana

Photo Editing

Lake House Production Graphic Department

Printing

Lake House Printing Department