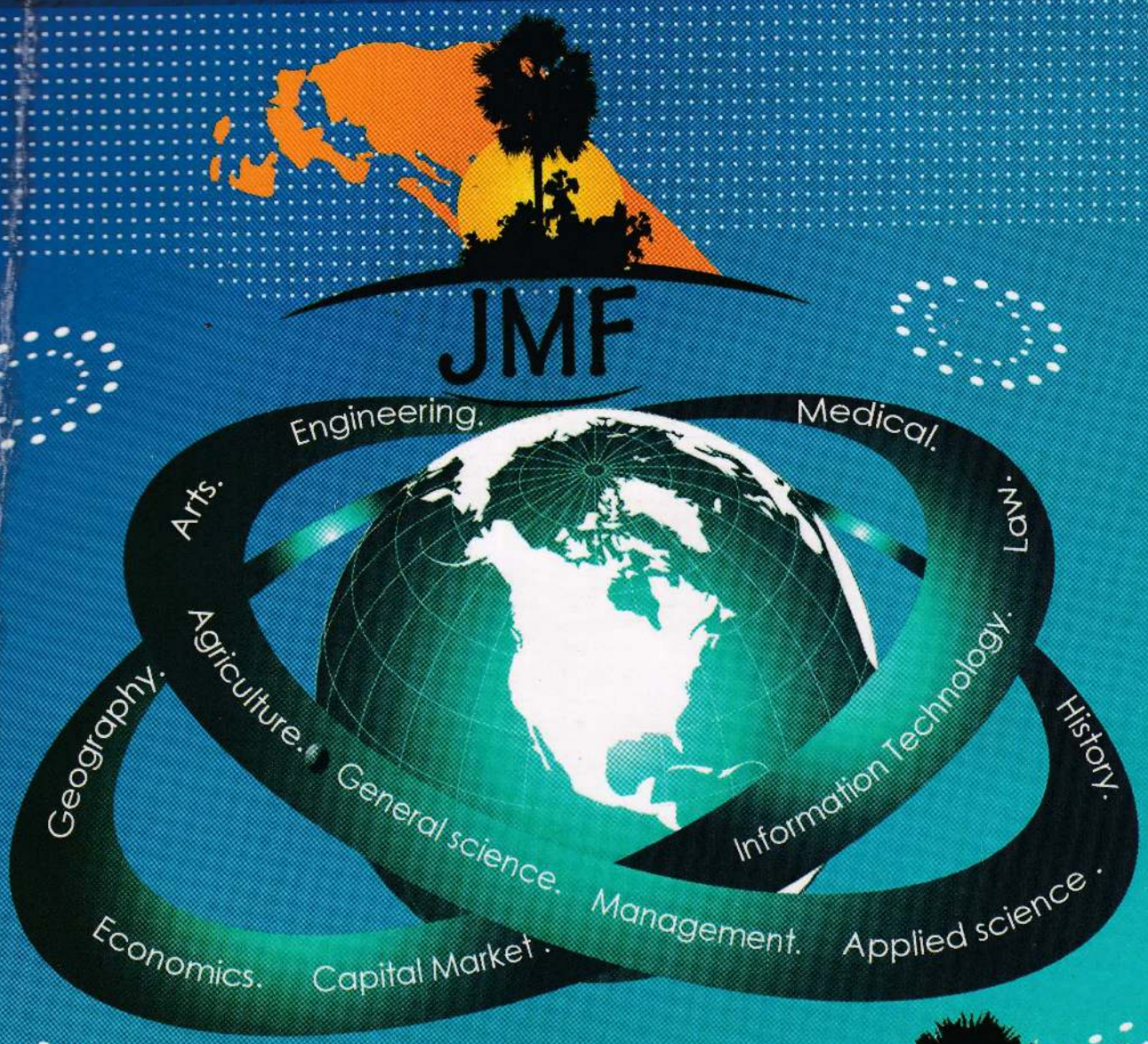
Voice For Change



JAFFNA MANAGERS FORUM

"WHEN EVERYTHING IS LOST FUTURE REMAINS"

We aspire

To arm people with correct and scientifically justified information so that people can take informed decisions. Knowledge arms whereas ignorance disarms people.

To promote widest possible democratic discussion and decision making among citizens.

To ensure gender balance in all our endeavours.

To empower people to make rational decisions based on science as opposed to obscurantism.

To find sustainable and environmentally friendly solutions to problems confronting humanity.

To seek unity in diversity, national reconciliation and equal opportunities for all Sri Lankans to reach their full potential.

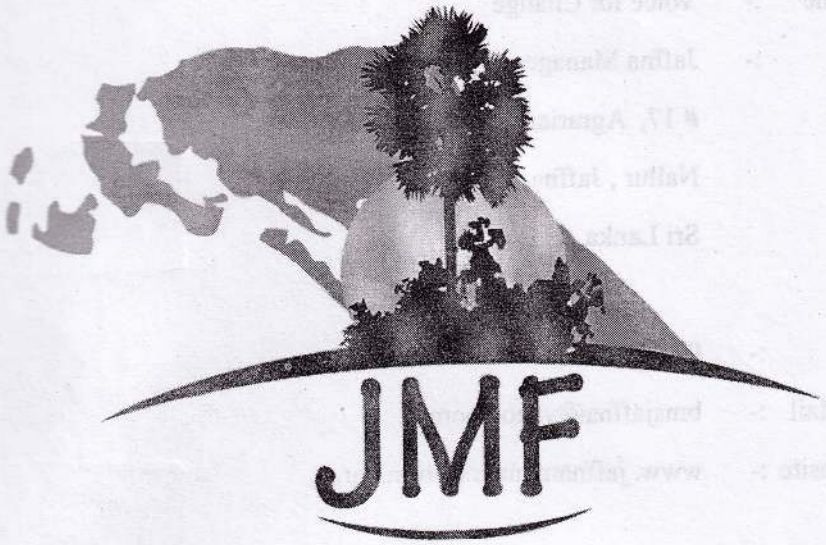
To eliminate corrupt practices and to promote good practices and good governance at all levels of society.

To eradicate poverty and ignorance through sustainable employment, wealth creation and education.

To create a healthy population through preventive as well as curative measures

Jaffna Managers Forum

Voice For Change



Jaffna Managers Forum

"WHEN EVERYTHING IS LOST FUTURE REMAINS"

Name of the Magazine	:-	Voice for Change
Published By	:-	Jaffna Managers Forum # 17, Agrarian Services Lane, Nallur , Jaffna, Sri Lanka.
Contacts Tel	:-	021 222 7012
E-Mail	:-	bmsjaffna@yahoo.com
Website	:-	www. jaffnamanagrsforum.com
Printers	:-	Guru Printers, Thirunelvely, Jaffna Sri Lanka
Cover Page Designing	:-	Euroville Investments (Pvt) Ltd
No of Pages	:-	203+vii
Editorial Committee	:-	Members of the Jaffna Managers Forum
Financial Assistance	:-	GIZ - Performance Improvement Project
Date of Release	:-	11 May 2013
ISBN	:-	978-955-4760-00-4

Contents

Volume - 01

Jaffna Managers Forum
An Overview

Mr. N. Sivaratnam (Founder Member of JMF)
BA(SL) AIB (SL), FIB (SL),
Post graduate Dip in Pub.Admin
(Retired Assistant General Manager,
Bank of Ceylon

During the 30 years of conflict in Sri Lanka, especially since the year 1990 civil administration in the Northern Province had been deteriorating and in the year 2000 it had almost collapsed. There were deaths and destructions and people were displaced and they could not engage in any income generating activities and depended largely on the handouts from governmental and Nongovernmental organizations for their survival. The government institutions including banks and other statutory bodies were just providing only basic amenities to the people and these institutions just existed.

The people were rudderless, the schools, health services, electricity supply, transport, food distribution and almost everything were disrupted. The institutions found it difficult to serve the public satisfactorily. People became voiceless. Freedom of speech and Intellectual life in this region did not exist. Migration and brain drain accelerated. The professionals and the intelligentia, who remained in the district were in a dilemma and felt helpless, even though they wanted to help the suffering people.

In this scenario, a small group of socially conscious professionals got together and brainstormed as to how they could contribute to alleviate the suffering of the people at least to a small extent. Very conscious of the fact that the prevailing democratic space is of a very limited nature they treaded cautiously into the public domain. After many sessions they agreed to form a "Think Tank" where they could deliberate and find ways and means of assisting each other in performing their duties to support the people in need.

This is how the Jaffna Mangers Forum was born. Managers in this context refer to persons who manage human and physical resources. Many professionals from the public, private and NGO sectors met regularly, informally of course, to pool their knowledge, experiences and aspirations to find evidence based and knowledge based solutions to the various problems encountered by the people in this region. We were seeking realistic and achievable solutions through engagement with like minded people. The Forum initially experienced many problems. However the teething problems were overcome with the management of Euroville offering the use of their conference Hall at No 17, Agrarian Centre Lane, Nallur to conduct the JMF seminars free of charge and the banking sector agreeing to sponsor the other running costs. In fact, Bank of Ceylon was the first to accede to our request.

A notable fact is the formal and informal collaborative work between JMF and IESL. **The forum conducted their first seminar on 24th March 2007 on ``Finance & Capital Market`` having Mr.N.Sivaratnam as the lead speaker.**

Objectives of the Jaffna Managers Forum:

1. To create awareness among the managers the importance and useful roles-played by the managers in their respective fields, and foster better relationships among them.
2. To promote better understanding among all managers.
3. To conduct meetings, seminars and workshops and to study, investigate the problems faced by management and industrial matters in Jaffna region.
4. To be involved professionally in development activities of the community whenever necessity arises.
5. To create awareness among the public through publications and seminars.
6. To initiate and or provide professional assistance for entrepreneurship and innovation 7. T o bring together managers from various professions and work towards the development of their managerial capacity and standard.
8. To serve as a "think tank" to the community.
9. To promote capacity building of human resources.
10. To suggest remedial measures for any shortcomings in the economic, social and administrative systems.
11. To provide professional services to any person or body of persons.

Activities

Considering the above objectives in mind, The Jaffna Managers forum (JMF) has been organizing seminars on various subjects such as

Science :- Medical, Engineering, Agriculture, General science Nano science etc...

Economics : - Banking, Finance, Financial market, Investment, Capital market and Insurance.

Arts : - Geography, History, Management, Commerce, etc...

Social Sciences : - subjects related to day to day life of the people

Developmental Issues – livelihood issues, affordable homes, human resources, employment, education, career guidance and research ,training & development issues, sustainability issues, land alienation, trilingualism and devolution of power to achieve equality etc.

Our aim was to initiate a sustainable and adequately justified process to address people's issues.

Achieve ıents

JMF was proud to have its hundredth (100th) seminar on Science and Development held on 12-12-12. The details of all the 100 seminars conducted so far are provided in a separate page of this magazine

Feedback

- **Have we achieved our objectives?**
  In so far as it is a process and a participatory process the answer is definitely "yes". It is a continuing process of dealing with issues through democratic discussion. Essentially it is a never ending process. However we have to respect the feedback from our stakeholders. Here are some.... with our responses!

- **Why these seminars and discussions are conducted only in English?**
  This is factually inaccurate. Often the resource persons spoke in English. Some spoke in Tamil while others spoke in both languages. Discussions are often in Tamil. We responded to the needs of the audience. There is no hard and fast policy established in this matter. We will arrange translations between languages to ensure no one is excluded in the participatory process.

- **Whether the benefits expected by the JMF by conducting these discussions have reached the targeted groups of public servants and the public?**
  Initially the attendance was limited to a dozen people only. Now it is often 100 and over. The trend or the direction is therefore encouraging. That is progress. We are encouraging more people to participate. We want more women and young people to participate. We cannot of course force people to participate. The initiative to engage in public affairs and social issues must come voluntarily from people.

- **Talented scholars have contributed and continued to share their experiences. Whether we are reaping the harvest?**
  The intellectual and democratic process, suppressed for so long in this region has recommenced. It is unrealistic to expect quick harvests. Even a very small impact has to be considered a success. The potential for good harvest in the coming is certain. Knowledge itself is a good harvest. The opportunity to share knowledge and experience is essential especially because of the immense brain drain that has occurred in recent times.

- **Other than the development issues, have we paid necessary and sufficient attention towards the day to day problems of the people?**
  Undoubtedly there are many issues we failed to address. However it must be understood that JMF is only an infant organization with limited resources and some of the day to day issues are sensitive and should be approached cautiously, otherwise it will lead to misinterpretations and disputes, but gradually such issues also could be approached in a professional manner so that JMF could contribute towards effective resolution of even such controversial issues.

I suggest that the forum has to discuss the above issues and try to take remedial actions. Yes! We do have to address them not as corrective steps but to time them to be most effective. Now that we are better known and widely respected and accepted we can include many more things in our agenda.

We look forward to a successful 2013!

Greater Inclusion - The Way Forward for A Stable and Sustainable Banking Industry

Mr.Chandula Abeywickrema,
Deputy General Manager – Hatton National Bank,
Chairman – Banking With The Poor Network,
Chairman – Splendor Media (Pvt) Ltd.
Chairman – Lanka Financial Services for Underserved Settlements (LFSUS),
Director – Thaneakea Phum (Cambodia) Ltd.
Director – Vision Fund Lanka,
Advisory Board Member – YouthSave Consortium, USA,
479 T B Jayah Mawatha,
Colombo 10, Sri Lanka.
chandua@hnb.lk

Across nations sustainability is a factor that is increasingly highlighted. Recent global financial crisis have caused alarm on the detrimental effects of deviation from the fundamental banking principles. Yet, the question remains on how to establish a stable and sustainable banking industry? Can we encapsulate the different interpretations given on a sustainable banking industry by many to just one single word or phrase? Whilst an investor interprets sustainability as consistent creation of economic value addition over time and building of products for consumer to consume, the society at large expects a value chain that neither destroys natural eco systems nor consumes resources. In such a situation how do we achieve a stable and sustainable banking industry?

Current banking industry status

Amidst the global economic meltdown and credit crisis, Sri Lanka and its banking industry stood resilient and have performed well to bring down non performing loan levels down post war era. Banking sector continues to dominate the financial sector by accounting for 52 percent of the total assets of the financial system. The government has intensified its investments on the infrastructure development and is working based on the five hub concept i.e. Port, Aviation, Energy, Knowledge and Commercial. Therefore, the banking industry has a vital role to play in this unique post conflict development to aggregate economic growth in providing financial services to those emerging market opportunities.

As per the Central Bank publications, Economic and social statistics of Sri Lanka 2011 and the annual report for the year 2010

Type of Bank	Number of branches
Licensed Commercial Banks (LCBs)	2,133
Domestic	1,917
Foreign	216
Licensed Specialized Banks (LSBs)	569
Registered Finance Companies (RFCs)	376
Specialized Leasing Companies (SLCs)	224

Number of	In use per 100,000 persons
Bank branches	14
ATMs	11
Credit cards	3,770

As mentioned on Lanka Business Online (LBO), the current banking industry is densely concentrated in the Western province with nearly 40 percent of the branches of LCBs and 31 percent of the branches of RFCs is present in this area alone. With respect to banks, the banking density (the number of bank branches per 100,000 persons) is 11.9 in the Western Province against a range of 5.3 to 8.4 in the other provinces.

Is the banking industry of Sri Lanka Evolving?

Although the island's banking sector was largely unaffected by the global credit crisis as it was not exposed to the risky practices that led to it, it does face structural challenges. The industry is over concentrated, over-banked and saddled with high costs, especially for distribution, that prevents the optimization of economies of scale. This in turn makes it difficult to attract new investments into the sector.

At present the Sri Lankan banking industry is heavily concentrated in the Western Province. Thus all banks are competing to capture the same customers resulting in having to slash down the rate of interest in order to retain them with the banks. This does benefit the few large corporate firms and neglects the Small and Medium Enterprises (SME). This is detrimental to the long run stability and sustainability of the bottomline of banks due to the high competition among banks to cater to the few large corporations, thinning interest margin as a result of price sensitivity and the high cost incurred in managing the portfolios, human capital and overheads.

Another strategic management error the banks continue to ponder on is catering to the 20 percent of the market which used to contribute 80 percent of the revenue in the good old days. Nowadays the operating environment for banks has changed significantly, making the banking industry more competitive and price sensitive. As such the 20/80 rule is no longer valid. In essence, the 20 percent now amounts to more of the cost and time, in terms of recruitment of high skilled personnel, administration, documentation, continuous revision due to environment dynamics and approval process. In order to be sustainable in the future, the banks will have to rework and align their strategy to get the best out of the other 80 percent at a 20 percent cost.

Going by the five pillars of the marketing mix, it is sensible to argue that the products offered by the banks be available, accessible and affordable to those who require them. The present Sri Lankan banking inclusion rate is at 40 percent. Therefore there is clear indication of the potential and the gaps available for further inclusion. Commercial banks have to make financial services available, accessible and affordable to the segments in the market such as the youth, women, migrant population, rural agriculture sector and the SMEs. It is crucial to identify the needs of these segments to bring out

the potential long run sustainable banking business. Surviving the fierce competition and demanding customers is not possible by resorting to serving only one segment of the market. The SME sector in particular should be made and integral part of the banking spectrum. A 360 degree outlook is required and all possible avenues should be patronized and opportunities should be exploited in times of downturn.

Changing the Paradigm

Jumping at several small opportunities may get us there more quickly than waiting for one big one to come along. ~Hugh Allen

The time has come if not too late for banks to move away from traditional thinking of serving only the large corporations and take a more holistic view if the industry is to stably and sustainably move forward. Greater inclusion of the masses is fundamental for the future of the industry. Generally banks take from masses to lend to few. Nevertheless, if banks are to remain stable and sustainable they should break the frame and focus on taking from masses to lend to masses. Thus, facilitate enhanced banking inclusion.

By making financial services available for more people at more places the banks are able to create more access and greater inclusion. Banks are continuously slashing the rate of interest quoted to corporate sector to secure business. Yet, this cost leadership in the corporate sector is rarely able to provide a sustainable competitive advantage for the banking industry. In most cases firms end up in price wars. Therefore, one would suggest that by having a wide spread network that taps the remote locations with potential would give the banks a higher competitive advantage whilst, the society will benefit from the trickle down effects. However, in today's context, this can be done at a very low cost due to the technological advancement, its availability and accessibility retarding the concept of brick and mortar as an obstacle in extending financial services.

Savings, thrift concept, financial management and financial literacy should be made a part of every human being from childhood in order to have a financially savvy society. Banks should take a long term view with respect to inculcating minor savings without the enormous effort put forward to enticing the children and parents with the extravagant gift schemes.

Commercial banks have a responsibility towards the provision of financial literacy to the youth of the country and engage them in financial services. Youth unemployment rate is estimated to be 6 percent. Yet, the recent influx for the Korean job applications and other similar scenarios makes one wonder whether the reality states otherwise. The number of dropouts from schools and universities are increasing but the creation of jobs and job opportunities remain minimal.

The women of Sri Lanka are responsible and accountable segment of the society, with high literacy rate, entrepreneurial skills and great potential for employment. As such, women should be empowered to build their life and the families of those around them to better standards through the engagement in the economic activity.

A silent but integral part of the economic development is the rural community and farmers. Small holder agriculture related activities are a major contributor towards the Gross Domestic Production (GDP) of the country. The financial security of the farmer is crucial to ensure food security. Commercial banks have a major responsibility in facilitating the small holder famers in terms of access to finance, financial know how, capacity building and the management of finance.

Reportedly, 10 percent of the Sri Lankan population consists of migrant workers contributing US$ 4.1 Bn that is approximately 8 percent of the GDP. Yet, there is no improvement in their asset creation or lending due to the short term approach by financial institutions catering only for remittances and transfer of money.

The aging population of Sri Lanka is on an upward move and 10 percent of the population is estimated to be over 60 years of age. This is another segment that needs to be engaged in the productive economic activity. The experience and expertise possessed by the retired or pensioners should be diverted to contribute to the society by partnering them in the economic activity for revenue generation by the financial institutions.

The SME sector requires the banks to provide more cash flow based viable project financing instead of the collateral oriented financing. In addition, the technical knowledge sharing and capacity building programmes are vital to establish a strong SME sector in Sri Lanka. Hence, greater engagement by commercial banks in the facilitating Micro Enterprises island wide and graduating them to SME, commercial and corporate levels creating access to financial services is imperative to have economic benefits flow across the nation.

Mergers and Acquisitions (M & A) are an aspect of corporate strategy, corporate finance and management dealing with the buying, selling, dividing and combing of different companies and similar entities that can aid, finance or help an enterprise grow rapidly in its sector without creating a subsidiary. Through M & A, banks will be able to deliver several services to customer under the universal banking concept and also bring down the cost of transaction such as overheads, capital expenditure.

Technologies such as ATM networks are common to all banks in providing financial transaction. Therefore, it is prudent to share and make use of these platforms to provide better access to financial services to customers. A small country like Sri Lanka having a large number of small banks may not reap the same amount of returns it could otherwise earn if platforms are shared to expand service provision. Geographical inclusion could be better addressed if technology is used to its best potential.

Increasingly, businesses are expected to find ways to be part of the solution to the world's environmental and social problems. The best companies are finding ways to turn this responsibility into opportunity. It is believed that when business and societal interests overlap, everyone wins. However, it is important that banks not only look at it from a corporate social responsibility point of

view but have a corporate commercial responsibility point of view where the organization contribute to the society at large by way of new employment creation, development programmes, career guidance, financial knowledge and linkages. Last but no the least have financial schemes to support the entrepreneurial community.

Micro entrepreneurs are an indispensable segment that was left unnoticed by many financial institutions until recent times. Greater inclusion of the segment is essential for a strong, stable and a sustainable economy. Also subcontracting and cottage industries too assists promotion of financial inclusion particularly in countries engaged in agriculture and micro industries. It is a great way to earn additional income during the part of the year when there is no farming or one could do at home without having to move out. Companies could outsource or subcontract their production to these cottage industries and collect the produce and sell them to the market.

Development of banking industry and services should be integrated in order to achieve more progressive growth in order for the benefits of the inclusion to travel throughout the economy.

Stability, Sustain Ability and the Triple Bottomline

Sri Lanka having access to free education and health is benefitting positively with the high literacy and mortality rates. This results in more economically employable population. Sixty to seventy percent of this population is in the rural Sri Lanka and due to the communication gap and the lack of information flow; the valuable human resources are wasted. Although more than 70 percent of the population has access to information communication technology, media, mobile communication and the internet, the language barrier and the lack of direction has led to deprivation for opportunities. Therefore, it is of utmost importance that commercial banks take part in capacity building activities.

Sri Lanka was faced with significant challenges in the 1971, 1989 and three decade long terrorism. All these were unfortunate outbreaks of the frustrated and excluded youth from the economic activities and their continued marginalization. It is debatable that overtime; this marginalization will develop a gap which eventually could replicate another unfortunate youth up rise. Therefore, greater rural economic enrichment is required to withstand the mounting pressures of the youth as witnessed in the past. Those with a long term vision and prudent strategy will find ways to turn this responsibility into opportunity. And it is true that when business and societal interests overlap, everyone wins.

For any industry, sustain ability is a powerful and defining idea: a sustainable corporation is one that creates profit for its shareholders while protecting the environment and improving the lives of those with whom it interacts. It operates so that its business interests and the interests of the environment and society intersect. A sustainable business stands an excellent chance of being more successful tomorrow than it is today, and remaining successful, not just for months or even years, but for decades or generations.

The triple bottomline approach focuses on the three core elements i.e. profit, people and planet. Yet, the increased passion for corporate social responsibility should not be a mere exercise for the sake of opting for awards. It should deliberate on identifying the real need of the society and the country. The organizational hierarchy should focus on the triple bottomline approach. The discussions and the initiatives should be documented based on the impact created by organizations in reducing unemployment, poverty head count, initiatives on wealth creation and distribution to large societal segments infusing significant effects to the economic empowerment and enrichment of people. Moreover, the impact on preserving, sustaining and further replenishing natural resources and the dynamic engagement with the all stakeholder groups should be addressed. This automatically paves way for sustainable, responsible and accountable revenue generation.

Commercial banks should rethink on their strategy about making hay while sun shines if they are looking at sustainable banking business. A broader spectrum should be evaluated instead of the short term windfalls that concentrate on Year on Year Key Performance Indicators (KPI's).

With the end of the war, new avenues are opening up and there is need for greater outreach to those who yet remain unbanked. There lay far reaching potential if we only care to open our eyes and see beyond the limitless horizon. The question remains, are we going to eat the same cake or are we going to bake new cakes to eat? Being more proactive to changing market dynamics, scaling down for greater inclusion and catering to all segments of the market exceeding their expectations is the way forward for a stable future for banking industry and ensuring sustainable banking business.

Northern Province Economic Developments and Role of Financial Service Providers

S.N.Manikkasinghe
AIB (SL) MCIM (UK), Chartered Marketer
Operations Manager
(Northern Province)
Bank of Ceylon.
omnp@boc.lk

The Northern Province is an Agrarian and Fisheries based Province with a large number of middle class population. Over the past three decades, the civil war broke out and total economy of the Province has been destroyed. The younger generation starts to move to Western countries to save their lives and their family members.

Those days, the citizens of Northern worked hard and lived economically, especially spent on essential purchases and saved for their future needs. Today, especially Jaffna Peninsula youths enjoy their life with Diaspora's money. This is the comment made by in general, but this is not true or 100% correct. That is my view, because middle income family members are enjoying their life with Bank developmental/ scheme loans and borrowing also.

The last three years, rapid changes have taken place in the Province mainly infrastructure development and Retails Business Sector development as well, including Micro finance .But only very few Small and Medium Enterprises and industrial developments. In the same time Tourist Sector is in the infant stage. In retail market, before 2009, due to the scarcity of supply, our traders enjoyed high profit margin. But today shops are increased in large numbers and every corner of the road new row of shops are being built-up. Not only that but in the retail market other area traders also enter the local market and create high competitive environment and price cut.

This affects our local traders highly who are suffering for over three decades. After the opening of A9 road, everyone is interested in trading activities to earn quick return and profit margin, which creates big market for Southern Companies and Industries. But today, the stock level in the Northern Region is increased and movement and turnover has dropped and finally retail business suffers a lot including financial institutions.

A sound competitive financial service system is important to a market for economic vitality. Especially Banks/ Finance /Leasing Companies provide critical service through their branch network system as intermediary of funds, from savers to borrowers.

A common trend in our society is if one starts a business that gives more profit and operated in high level, everyone is ready to start the same, without any proper evaluation. This situation creates more supply than demand for each sector. Jaffna/ Colombo passenger transport operation is a very good example. At the same time, consumers are getting more benefits, comforts and demand for price cut too.

Our duty is to educate the youth to think in a different way to start business on their own ideas, to become an entrepreneur. Our Province needs more and more Small and Medium Entrepreneurs to

use local raw materials and create more employment opportunities. The banks are ready to cater to this segment with attractive credit packages.

First, our Province entrepreneurs should learn to use local raw materials which are available at very low cost. The experts of the different fields should educate/assist/advice our youth to improve their creative ideas and to commence their own business ventures.

We should focus on the following areas in a professional manner to capture local as well as export market.

a) Organic Agriculture products
b) Fresh fish market
c) Healthy palmayrah products and house hold items
d) Fresh milk and dairy products

Our regional resources are limited; we should focus on niche market with specialized products. For example hand made, Home made items with proper packing system. Still, we are not ready to pack our products with all the details (including date of manufacture/Expiry date/weight etc.) For the above products, we don't have any proper storage facilities or cool rooms for rent/hire.

Our entrepreneurs should come forward to start the support services for our regional producers.

Now our young entrepreneurs have very good advantages in Northern Province since Colombo based financial service providers are moving to Northern market which creates very good opportunities for our market and the entrepreneurs who are willing to start their entrepreneurship .For the Last three years or more, there are very comfortable finance services offered to our consumers. They have good market choice, to select what they want. The borrower can negotiate on amount, repayment period and Interest rates, etc.

The borrower's duty is to identify the projects and use the resources in a proper manner to generate income and to repay the amount borrowed from the financial institutions.

Our entrepreneurs should focus on small niche market rather than mass market. This helps them to improve their profit in a Comfortable manner.

The most important second area is to be considered as savings. At present the savings habit is declining and artificial savings systems are sponsored by the financial Institutions. This should be modernized and educated.

The traditional savings concept is Income – Expenses = Savings but that should be changed to Income-Savings = Expenses, entrepreneurs should be advised to build up savings for future risk. This could help them to improve their wealthy lifestyle in the future.

"Create innovative Ideas for better tomorrow"

Sampath

Sanhinda Saver

These are the benefits you receive:

- Earn interest TWICE a month.
- Free annual health checks.
- Opportunities to win local and foreign holidays.
- Special discounts and spectacular deals at the following merchants:

DSI

Earn interest TWICE a month!

Being 55 never looked this good!

Introducing Sanhinda Saver savings account from Sampath Bank for Senior Citizens. A Sampath Sanhinda Saver can be opened for as low as Rs. 2,500/-

Take a good look at our Real Benefits:

- A higher rate of interest paid for senior citizen's savings account.
- Additional interest for foreign currency savings (for USD).
- Based on your annual average balance from the 1st of July to the 30th of June following year, you will be eligible for the free medical benefits offered by Sampath Bank.

Annual Average Balance		Medical Benefit
Rs. 25,000	Rs. 99,999	Rs. 750/-
Rs. 100,000	Rs. 199,999	Rs. 1,000/-
Rs. 200,000	Rs. 299,999	Rs. 2,000/-
Rs. 300,000	Rs. 499,999	Rs. 3,000/-
Rs. 500,000	Rs. 999,999	Rs. 5,000/-
Rs. 1,000,000	Rs. 1,999,999	Rs. 7,500/-
Rs. 2,000,000 and above		Rs. 10,000/-

- Opportunities to win local and foreign holidays through an annual raffle draw.

From the 1st of July to the 30th of June the following year:

- Maintain Rs. 250,000 or above and receive opportunities to travel within Sri Lanka.
- Maintain Rs. 500,000 or above and receive opportunities to travel overseas.

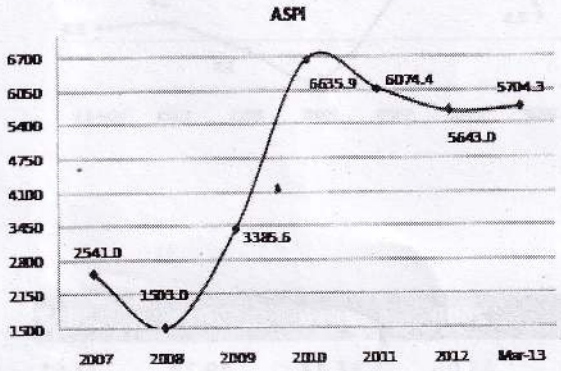
- Branded Passbook and activated VISA ATM Debit Card provided instantly.
- Special discounts and spectacular deals at the following merchants: Astri Hospitals, Oasis Hospitals, Nawaloka Hospitals, Durdans Hospitals, DSI, Gabo Travels, John Keells Hotels, Vision Cars, Amaya Resorts.

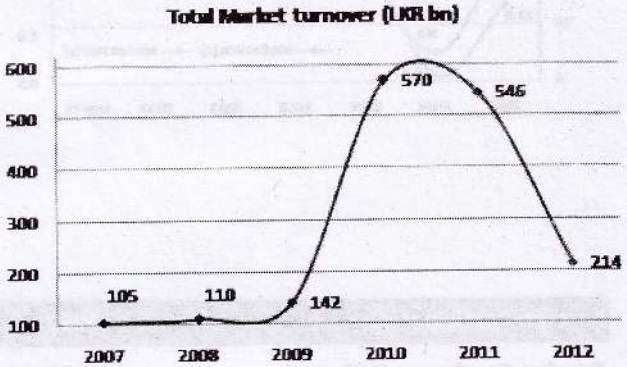
Subscribing the right credit card, cards or facilities, we bank reserves the right to vary terms and conditions applicable for the account from time to time, as it deems fit.

Sri Lankan Stock Market- an Overview

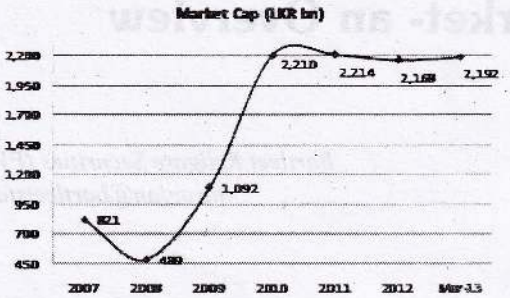
Bartleet Religare Securities (PVT) Ltd.
niranjan@bartleetstock.com

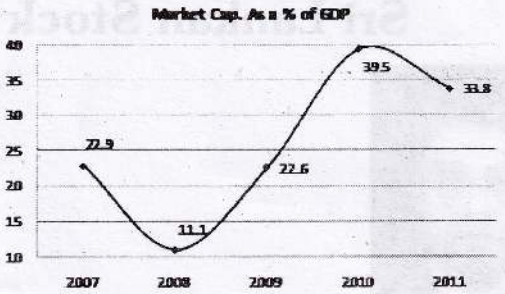
The Sri Lankan equity market witnessed a rapid growth in the period following May 2009. The cessation of the 30-year armed conflict coupled with improvements of vital economic signs such as low interest, rates, low inflation, and stable currency acted as chief driving forces of the equity market. Further, a stable political environment provided the market with necessary confidence. Thus the market recovered from the dreary war time lows, and the ASPI gained 125.2% by end 2009, and 96.0% by the end of 2010. The stock exchange which was long stifled by uncertainty, finally yielded gains as stocks factored in the expected economic growth and peace dividends. Market capitalization which was LKR 488.8bn in 2008, increased to LKR 1,092.1bn by end 2009, and LKR 2,210.5bn in 2010. With such striking growth recorded, it was no wonder that the CSE was named the second best performing stock market in the world in 2009, and the best performing stock market in 2010. Institutional and High Net Worth Investors increased their positions in the stock market with Banking, Hotels, and Diversified counters attracting interest.



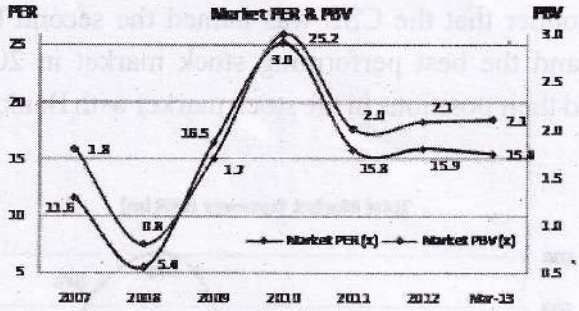


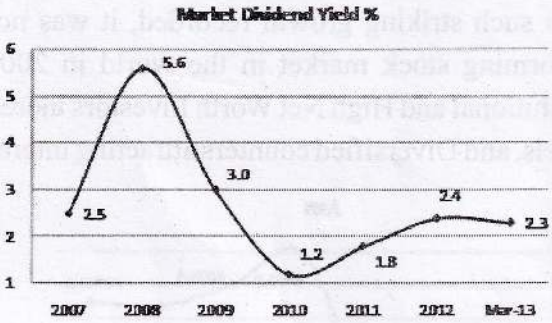
Healthy company earnings and encouraging government policies such as the reduction of taxes on motor vehicles in 2010, the lowering of corporate income taxes from 35% to 28% in 2011 also boosted market activity. Globally commodity prices recovered in 2010 leading to healthy tea and rubber prices, which benefitted the plantations sector. The 2011 budget reduced the VAT on financial services from 20% to 12% which boosted this sector. The Banking and Finance sector witnessed a higher number of new listings, due to the Central Bank's regulation to list all registered finance companies.



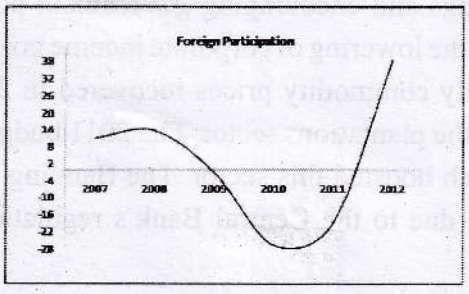


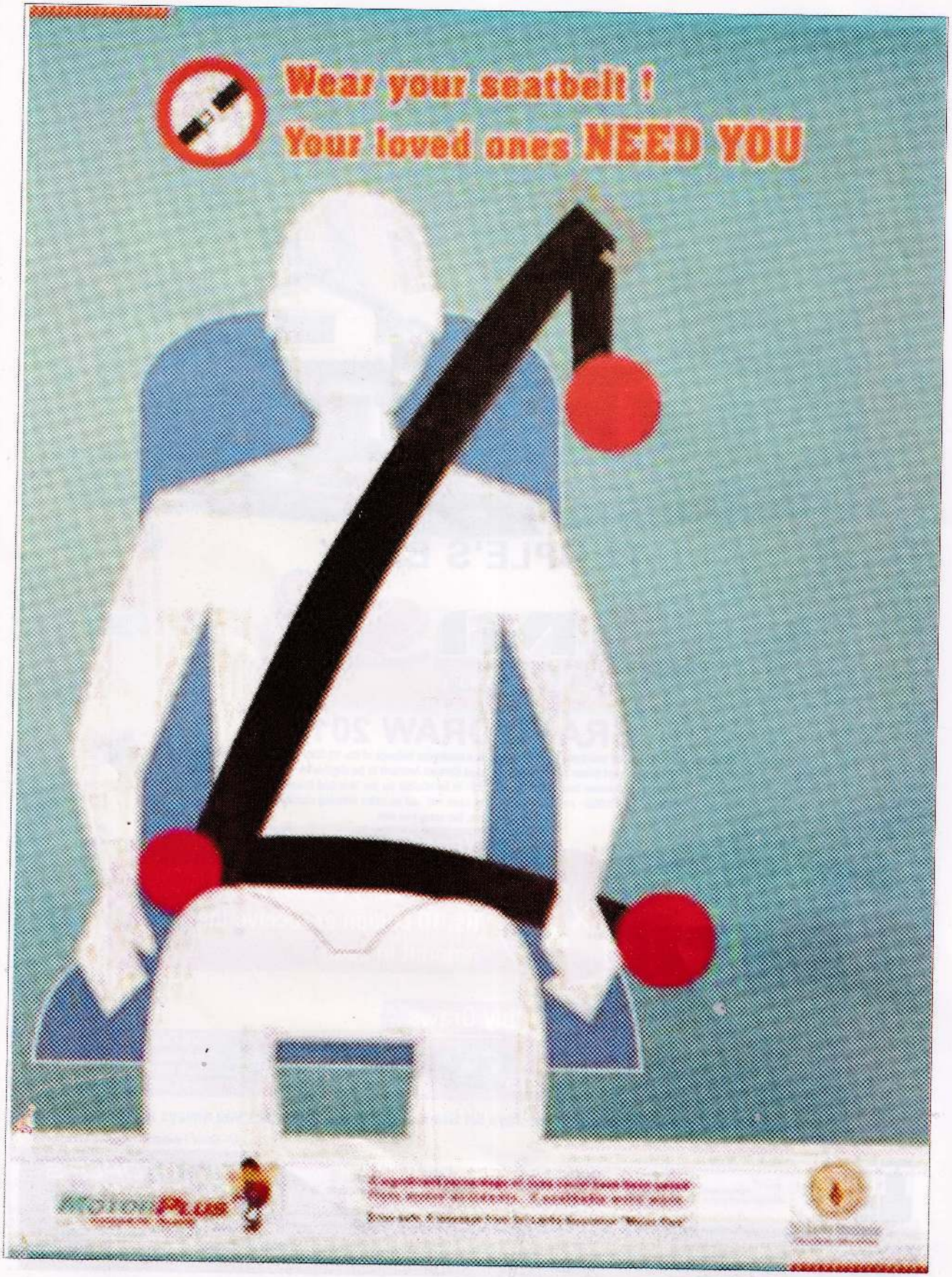
The positive sentiment and the vast gains made, encouraged market participation, evidenced by the turnover and volume levels in the CSE. The 2008 turnover and volume of LKR 110.5bmn and 3.2bn shares, rose to LKR 142.5bn and 4.8bn shares by December 2009, and LKR 570.3bn and 18.5bn shares by December 2010. This also paved the way for new listings via initial public offerings, which were rare before 2009. Public interest in IPO's were high with most of them being oversubscribed. Significant IPO's to enter the CSE were Laugfs Gas, raising LKR 2.5bn, Softlogic Holdings, raising LKR 4bn, Textured Jersey Lanka, raising LKR 1.2bn and Expo Lanka, raising LKR 2.4bn.





Foreign Participation	2007	2008	2009	2010	2011	2012
Foreign Purchases (LKR mn)	46.80	66.63	43.06	92.43	49.78	72.61
Foreign Sales (LKR mn)	35.54	52.68	43.85	118.76	68.82	33.95
Foreign Inflow/Outflow (LKR mn)	11.25	13.95	-0.79	-26.34	-19.04	38.66



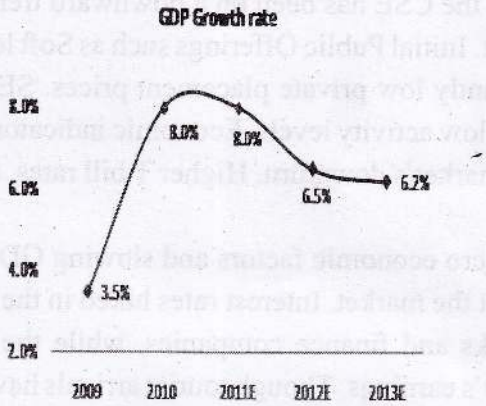


Since 2011 however, the CSE has been on a downward trend due to low liquidity levels and dampened investor sentiment. Initial Public Offerings such as Soft logic suffered on account of higher IPO valuations and significantly low private placement prices. SEC regulations on clearing broker credit also contributed to the low activity levels. Economic indicators such as higher interest rates and inflation contributed to the market's downturn. Higher T bill rates, also affected company valuations rendering them over priced.

In addition to the macro economic factors and slowing GDP witnessed in 2011-2012, sector dynamics also played against the market. Interest rates hiked in the first quarter of 2012 affecting the net interest margins of banks and finance companies, while the increase in motor vehicle taxes affected the motors company's earnings. Though tourist arrivals have seen continuous increases since 2009, we believe that much of the optimism hoped for the sector was factored in early to the stock prices. Wage hikes in the plantation sector dragged down the sector's profitability, while higher energy costs, inflation, LKR depreciation and global economic uncertainty also took its toll on corporate earnings.

For 2013 the ASPI has gained 0.8% year to date. Sentiment has remained unexciting, though foreign buying is seen, as evidenced in the end 2012 foreign inflow of LKR __mn. The IMF has reduced the 2013 GDP growth forecast for Sri Lanka from 7.0% to 6.2% signaling a challenging year ahead. We believe that the CSE, still holds value counters which provide selective buying opportunities.

SECTOR	PER	PBV	DY %
BANKS FINANCE & INSURANCE	**9.8**	**1.7**	**3.1**
BEVERAGE FOOD & TOBACCO	19.3	5.8	2.3
CHEMICALS & PHARMACEUTICALS	**7.1**	**1.1**	**2.7**
CONSTRUCTION & ENGINEERING	13.7	1.6	1.6
DIVERSIFIED	**24.7**	**2.3**	**1.1**
FOOTWEAR & TEXTILES	-	1.6	1.5
HEALTH CARE	**35.7**	**2.3**	**0.9**
HOTELS AND TRAVEL	34.6	2	2.1
INVESTMENT TRUST	**23**	**1.6**	**0.8**
IT	12.9	1.1	0.0
LAND AND PROPERTY	**7.7**	**0.8**	**2.3**
MANUFACTURING	10.1	1.7	4.0
MOTORS	**4.5**	**1.4**	**3.9**
OIL PALMS	89.3	7.2	1.3
PLANTATIONS	**8.8**	**1**	**4.7**
POWER AND ENERGY	11.9	1.3	5.4
SERVICES	**7.1**	**1.9**	**3.8**
STORES AND SUPPLIES	6.7	0.6	0.5
TELECOMMUNICATION	**15.5**	**1.6**	**2.0**
TRADING	12.7	1.5	1.5



Sectorwise statistics

SECTOR	LKR (bn)
BANKS FINANCE & INSURANCE	510.54
BEVERAGE FOOD & TOBACCO	390.10
CONSTRUCTION & ENGINEERING	39.78
CHEMICALS & PHARMACEUTICALS	17.86
DIVERSIFIED	483.04
FOOTWEAR & TEXTILES	10.24
HOTELS AND TRAVEL	145.16
HEALTH CARE	38.66
INVESTMENT TRUST	32.28
IT	1.77
LAND AND PROPERTY	32.60
MANUFACTURING	96.14
MOTORS	21.04
OIL PALMS	102.86
POWER AND ENERGY	30.71
PLANTATIONS	24.11
STORES AND SUPPLIES	4.90
SERVICES	6.12
TELECOMMUNICATION	152.35
TRADING	24.99

NAME	Market Cap (LKR bn)	as a % of market cap
JOHN KEELLS HOLDINGS PLC	202.74	9.17
CEYLON TOBACCO COMPANY PLC	151.73	6.86
NESTLE LANKA PLC	88.32	3.99
CARSONS CUMBERBATCH PLC	86.35	3.91
COMMERCIAL BANK OF CEYLON PLC	85.88	3.88
SRI LANKA TELECOM PLC	75.98	3.44
DIALOG AXIATA PLC	73.29	3.31
THE BUKIT DARAH PLC	72.02	3.26
DISTILLERIES COMPANY OF SRI LANKA PLC	51.69	2.34
HATTON NATIONAL BANK PLC	49.55	2.24
AITKEN SPENCE PLC	47.91	2.17
SAMPATH BANK PLC	38.10	1.72
CARGILLS (CEYLON) PLC	33.82	1.53
DFCC BANK	31.81	1.44
ASIAN HOTELS & PROPERTIES PLC	30.55	1.38
COMMERCIAL LEASING & FINANCE PLC	28.06	1.27
THE LION BREWERY CEYLON PLC	27.20	1.23
CHEVRON LUBRICANTS LANKA PLC	26.26	1.19
LANKA ORIX LEASING COMPANY PLC	26.14	1.18
NATIONAL DEVELOPMENT BANK PLC	25.70	1.16

Stock Market in Jaffna.

During the Norwegian peace initiative in 2002 Colombo Stock Exchange (CSE) and Securities and Exchange Commission (SEC) of Sri Lanka had taken steps to open a Branch of CSE in Jaffna. The CSE and SEC conducted several seminars on the capital market mainly in Jaffna and Nelliyady to create awareness among war affected people in Northern part of Sri Lanka. Subsequently a CSE branch was opened at Hospital Road Jaffna. Some of the member firms of the CSE also took the initiative to set up their operations. I have associated with Bartleet Mallory Stockbrokers (Pvt) Ltd (BMS) now known as Bartleet Religare Securities (Pvt) Ltd (BRS), to promote capital market activities in the Northern Province and was instrumental in appointing Euroville Investments (Pvt) Ltd as a local agent of BMS. The agency agreement was signed between two companies to promote stock market activities in Jaffna. Later due to the recommencement of the war and the closure of the A9 Road resulted in the closure of CSE Branch in Jaffna. Despite several challenges, I'm happy to say that Euroville Investments (Pvt) Ltd continued the investment advisory services under the guidance of its Principal Bartleet Mallory Stockbrokers now known as Bartleet Religare Securities in Jaffna during war time. The end of the war saw CSE setting up its 5th branch in Sri Lanka in Jaffna at the same location. Currently CSE Jaffna Branch is making necessary arrangements to shift its branch to a more spacious location in the heart of Jaffna City giving better facilities to all its stakeholders. My direct association with the stock market for more than two decades provided me competency and experience. It was very interesting for me to serve the people in Northern Province more than a decade. During the war time and after the war I have opened several CDS accounts as well as deposited several share certificates of leading listed companies to the respective CDS accounts of the investors based in Jaffna. I was also successful in attracting colossal amount of funds to be invested in the capital market of Sri Lanka. We have collectively conducted Initial Public Offering (IPO) Meetings prior to respective IPOs. Our next aim is to introduce one or more companies from Northern Part of Srilanka to be listed on the Colombo Stock Exchange. I think this is the time we should make an effort and the Tamil Diaspora should actively get involved and support this endeavor.

The following pictures and documents depict our genuine effort to promote capital market activities in the Northern part of Srilanka.

SECURITIES AND EXCHANGE COMMISSION OF SRI LANKA

29th July 2009

Ref: SEC/CH/09/07/14

Mr. V. Niranjan
Co-ordinator
Jaffna Managers Forum
17, Chemmany Road
Nallur
Jaffna.

Dear Sir,

Visit to Jaffna – Uthuru Wasanthaya Programme 2009

On behalf of the Securities and Exchange Commission of Sri Lanka (SEC) I would like to sincerely thank you for all your untiring efforts in facilitating and making all the fine arrangements for our visit to Jaffna on the 21st and 22nd July 2009 for the Uthuru Wasanthaya Programme which was a resounding success.

We truly appreciate your untiring efforts in organizing and coordinating a very productive seminar for the members of your forum, other professionals, entrepreneurs and members of the business community. We are of the opinion that the response received from the gathering was very positive and encouraging giving much hope in motivating the northern community to effectively engage in the capital market to generate tremendous financial prospects and employment opportunities to the masses in the north.

The SEC would also like to thank you for extending your fullest support and co-operation towards the successful completion of the Capital Market Information Center Launch at the University of Jaffna.

We will endeavour to take necessary action in order to expedite the matters raised at the seminar. It Was Indeed a pleasure meeting you and the other members of the forum and the rapport that was created would definitely strengthen our bonds to forge closer ties with the northern community. The SEC intends carrying out many more capital market development initiatives that have been already mapped out and we solicit your Forum's unstinted support in future as well.

Thank you.

Yours faithfully

Udayasri Kariyawasam
Chairman

Newsline

Moves to draw Northern interest in capital markets

The Securities and Exchange Commission has implemented key measures in Jaffna to attract people in the North to capital markets.

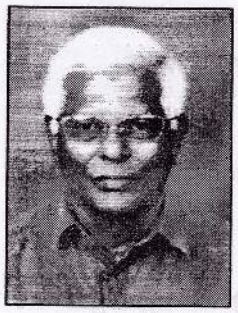
The SEC met with the Jaffna Managers' Forum (JMF) to highlight the advantages of them tapping the capital markets for better return for their investments, as well as explore listing. Over 100 members of the JMF such as businessmen, entrepreneurs, professional managers participated in the discussions.

In a parallel endeavour to strengthen the knowledge and resource base towards creating future investors in capital markets, the SEC opened a fully-equipped Capital Markets Information Centre at the University of Jaffna, whilst signing a Memorandum of Understanding to reward the top students of Capital Market Activity, said SEC Chairman Udayasiri Kariyawasam.

The SEC will request the Colombo Stock Exchange to explore the opening of a branch in Jaffna, a move which the Colombo bourse had in its plans in the aftermath of the 2001 ceasefire.

As part of its overall thrust to open up the capital markets to reach the masses, the SEC has decided to issue five more stock broking licenses, and expects the new entrants to ensure opening provincial branches, including in the North and East.

National Reconciliation and Nation Building Through Schools and Universities



Eng.M.Sooriasegaram, Bsc, Bsc (Eng), Msc,
Consulting Engineer.
soori1942@gmail.com

The most important task facing us today in Sri Lanka is nation building and national reconciliation, which is inadequately addressed. The fact that the government has set up a Ministry dedicated to this task indicates its commitment to achieve national reconciliation. Appointing Vasu Theva Nanayakara, a staunch and passionate believer in national reconciliation, equal rights for all and tri-lingual public service is a further boost to push through these difficult tasks – full credit to the President for the creation of a dedicated ministry with Vasu as the minister in charge. Making Sinhala, Tamil and English as official languages of the country and promoting the teaching and learning of all 3 languages in the government departments is a noteworthy effort towards national reconciliation and nation building. It begins to address one of the root causes of inter- communal conflict. Through tri-lingualism and meritocracy the likelihood of language based discrimination in employment and other fields can be minimized or even eliminated.

We recognize that the government has initiated some good work in these areas but there is a lot more to be done.

While welcoming these initiatives, we must now formulate a national strategy to mobilize our youth in the task of nation building and national reconciliation. The youth are our future and are going to be our ambassadors capable of these tasks. Their minds are fertile, less biased, more open to friendship and love, more energetic, more intelligent and more resourceful than the largely insular and prejudiced mindset of the older generation, who in any case has repeatedly and totally failed in the nation building task. We must therefore aim to harness the full potential of our youth by trusting them with this responsibility and providing the necessary resources and guidance. If we make this investment in our youth now, when they grow to become our future generation they would have already laid the foundation for national unity and nation building. This will be a sure and sustainable way to break the impasse created by politicians of the past. Let us therefore explore new ways and new approaches with fore sight and positive thinking.

Children are born free but cultural and religious labels are attached to them immediately after they are born in their cradle itself without their knowledge or consent by their parents. This is how we get our so called identity, the preservation of which is claimed as a fundamental right. We never

became Buddhists, Hindus or Muslims or Christians or Tamils or Sinhalese out of our free will and choice. We did not self determine our identity and who we are but still Tamils do fight like mad for the right to Tamil Self Determination and separation while the Sinhalese fight like mad to resist. Till we die we will carry these identification labels, and we will stick on our children these same labels, which have inflamed all the conflicts we have witnessed in Sri Lanka and elsewhere in the world.

Such identities by themselves are not the causes of conflict but they produce "siloised" communities, which provide the fuel to inflame conflicts, which are primarily caused by institutionalized inequalities among ethnic, religious and linguistic groups. Inequalities and a lack of equal opportunities provide a fertile ground for conflicts to develop.

We have to therefore address two issues:

1. Creation of equal opportunities for all: Meritocracy, barring some allowances for the very under privileged and the very disadvantaged communities, must be strictly enforced as the criteria for employment - not only for ensuring fairness but to select the best person for the job, which is vital for the economic development of the country. Positive discrimination needs to be carefully devised in a wholesome manner - taking into consideration the level of qualification and skills achieved in spite of depravity and the potential of the candidate and not on the basis of political patronage. Recently introduced tri-lingual policy by the government must be strengthened in all government departments and also in the private sector. Meritocracy and tri-lingualism are not only fair and democratic but are vital for economic development and social integration.

2. Start dismantling or transforming all institutions, which "siloise" communities. This is a much harder task requiring a sensitive approach. A gradual, step by step and incremental approach is the only way to dismantle these monumentalized institutions through a planned educational programme. Some radical reforms in our educational curriculum will be necessary.

Mono cultural, mono lingual and mono religious education in schools does divide and compartmentalize people producing what is known as "sylo effect", producing the fuel for inflaming conflicts. Such siloised education develops a closed mind set, suspicion, fear, hatred, hostility, ultra –nationalism, inability to communicate, exchange views, develop cross-cultural friendships, appreciate the best aspects of different cultures and to develop a Sri Lankan identity. It does not permit to get an understanding of the "whole", instead it only allows a tunnel vision and a lopsided understanding of the "part". It produces a very fertile ground for the "we and they" phobia, separatist tendencies, wars and killing fields, all of which we have witnessed, including the burning down of Jaffna public library.

Catholic schools for Catholics, Hindu school for Hindus, Buddhist schools for Buddhists and Islamic schools for Muslims will siloise the different religious groups and act as a catalyst for conflicts, wars, hatred and even make people kill one another as we have seen in many countries in Europe, Asia, in the middle East and even in our own country. reported to be the second most religious country in the world! It does not promote openness in people; instead it promotes ignorance and

intolerance, more so in some Religions than others. Dr.Amarthir Sen, Nobel Prize Winner for Economics from India criticized British Prime Minister Tony Blair's policy of encouraging religion based schools in the UK precisely for the above mentioned reasons, recommending the gradual phasing out of mono-religious schools.

The same results are produced in mono cultural, mono lingual and mono caste schools. Mono-caste schools do not exist in Jaffna at present except may be unofficially in some pre-schools but if we do not stop this process mono-caste schools may also emerge. Monosex schools, particularly in Islamic schools, require a separate national debate.

Segregation is the anti-thesis of national unity, national reconciliation and Sri Lankan identity and therefore must be phased out.

We now list below a set of proposals for public debate. They are practical and achievable. They are not costly either but are very effective for nation building and national unity and harmony.

1. To begin with start teaching Sinhala, Tamil and English in all National Schools. Then, in light of experience gained, extend it to all schools in Sri Lanka.
2. Instead of the present religious education in schools, introduce a new subject called "Religious and moral education" under which teach Buddhism, Hinduism, Islam and Christianity to every child so that every child is given the same information to get a full understanding of all religions. This practice has been introduced over 20 years ago in all state schools in the UK with very good effect. They discourage ultra nationalist propaganda. We can learn lessons from this openness in education.
3. Through 1 and 2 above, promote oneness and a Sri Lankan identity while at the same time preserving the sub-identities for those who need them. Aim is to achieve unity in diversity.
4. Encourage inter –provincial exchanges between schools, universities and families, especially between North and South
5. Encourage young people to travel, explore, make cross cultural friendship and love and experience a sense of adventure. Government must consider providing 2 bus or train travel vouchers each year to every young person between the ages of15 and 18 and ensure safe means of travel for young people with the provision of safe, clean and affordable youth hostels. Schools must consider including a travel/exploration project as part of the GCE curriculum.
6. Use sport s to promote national identity and pride
7. Encourage twinning of villages and cities of different parts of the country to promote Tamil-Sinhala – Muslim friendship and dialogue.
8. Promote hospitality to visitors from other provinces and make them feel safe and welcome to your home town and your province. Establish hospitality centres with multi-lingual volunteers.

If we can do the above we will become the envy of the world and can become a true paradise island and put behind all the controversies confronting us. Some of the proposals may appear to be a little ahead of times and futuristic in nature but we have to be ambitious and forthright in putting forward such ideas for widespread democratic discussions among all communities.

Resolving Sri Lanka's Conflicts in Class– Psyche Kennett

Team Leader
GIZ-Performance Improvement Project
psyche.kennett@giz.de

The war may be over in Sri Lanka but the issues behind the conflict remain unresolved. Language is one of them. In the aftermath of the fighting, victims of conflict, military authorities, civil servants and international relief agencies communicate together in English.In the past, English was considered divisive. The Sinhalese called it kaduwa– the sword that cut between the classes. But English continues to be used as the language of management in public service and of international aid… and people in Sri Lanka still want to learn it.

Recognising this fact, the Northern and Eastern based Performance Improvement Project, funded by the German Government and implemented its aid agency, GIZ, works with the Northern and Eastern Provincial Councils to encourage English as a link language and a tool for conflict transformation.It may seem unusual that the Germans are funding English, but the German-English cooperation mirrors the Sinhala-Tamil cooperation they want to promote through their STEPS programme. STEPS stands for Skills Through English for Public Servants, a suite of courses from post elementary to lower advanced that GIZ has designed and contracted the British Council to deliver. As a content and language integrated learning (CLIL) programme, it combines good governance and development topics with skills in critical thinking, cross cultural communication, conflict resolution and English.In many ways critical thinking is at the core of it. Government and non-government staff gain confidence in problem solving, distinguishing factual information from media hype, finding ways of achieving equity and diversity in a deeply divided society and understanding the value of dissent. In this way the project builds a critical mass of like-minded change agents.

STEPS works towards removing traditional barriers within a largely hierarchical, seniority based management system. A placement test is used to group participants according to their English language needs alone. This throws together people from diverse backgrounds - from Sinhala, Tamil and Muslim communities, rural and urban districts, central and devolved government structures, and from different age groups and management positions. English works here as a connector, encouraging people who would never normally meet, to sit down together and share ideas in an environment that inspires them to work together towards a more tolerant and diverse society.Using British Council teachers to deliver the course isn't only about their methodology and native English language skills. The very fact that the British Council teachers are not Sri Lankan allows them to create a neutral space

in the classroom – something that iskey to conflict resolution. People need to feel safe if they are going to discuss the conflict. The atmosphere has to be non-judgemental and the teacher needs to be a skilled facilitator to ensure the participants' beliefs and experience are heard and respected.

This approach has resulted in the growth of informal networks between participants who have followed the course. A 2012 impact study showed that 22% were still using their network contacts and their English,more than five years after their courses had finished, to solve problems between departments and to communicate between Sinhalese and Tamil speaking organisations.

But addressing conflict transformation through the STEPS programme is a delicate business. During the war years many people were reluctant to talk about the violence and now that it's over there is pressure to sweep difficult issues under the carpet. Taking advice from several Sri Lankan and international conflict transformation experts, the course designers used a progression from conflict at home andbetween men and women, to conflict with neighbours and in the work place, to armed conflict and the rehabilitation ofchild soldiers. The emphasis in each case is on using conflict resolution skills.Participants learn how to use active listening to become less judgemental, how to recognise bias in the media,how to be assertive without being aggressiveand how to promote discussion on emotionally or politically sensitive topics. Throughout this process it was really important not to make the material too confrontational or heavy-going. Conflict transformation is a big subject so a variety of approachesare used to motivate learners. The last thing the course designers want is to have participants coming out of class feeling depressed or disempowered.An on-going storyline based onconflict in the workplace at a fictional NGO looks atmiscommunication between national and international staff. Throughthis, participants deal with cross-cultural conflict in a more dramatised, light-hearted way. A short film, The Slipper, about children who step on mines, is in stark contrast. Produced by the NGO ScriptNet for a project called Reel Peace, the change in tone gives learners the opportunity to consider the media as a powerful tool for peace and reconciliation.

Participants also learn how to deconstruct messages in print and, using similar discursive and persuasive text types, write their own project proposals to international donors in a bid to capture some of the post-conflict rehabilitation funds presently flowing into the war-ravaged Northern Province.

So far, over 3,600 public servantsand NGO staff working to support vulnerable, conflict affected communities in the North and East of Sri Lanka have successfully completed at least one of the four-week intensive courses in the STEPS suite.GiZ's target is to double that number by 2015. In the Northern Province, 40% of places on STEPS courses are now being filled with English language and English medium Maths and Science teachers. In this way STEPS supports the government's tri-lingual policy through teachers who work with English in schools as well as public service managers who work with English in governance. Through them, STEPS reaches out to children and citizens alike.

Trilingual Proficiency for the Public Servants in the Northern Province

S.Krishnananthan
Deputy Secretary (Rtd),
Management Development Training Department,
North East Provincial Council
krishsri46@yahoo.com

Sri Lanka is a multi ethnic island nation. The Island has Sinhalese, Tamils and Muslims as main communities and their mother tongue is either Sinhala or Tamil. This means that every citizen of Sri Lanka is able to communicate in either Sinhala or Tamil. During the colonial era especially during the British period the Official Language was English and hence Sri Lanka has only three languages to deal with. This was the situation just before and after Independence.

But with the dawn of independence the country wanted to give the native languages their due place at the expense of English since English was not a native language, but a language imposed by a foreign invader. This resulted in controversies and conflicts because there were two native languages and English. The controversy was due to non unanimity as to which language or languages should replace English or share with English. The country toyed with various permutations and combinations since there were no unanimity. However subsequently the country succeeded in resolving these issues to the satisfaction of almost all concerned and the outcome was proudly incorporated in the Constitution of Sri Lanka.

Language policy is enshrined in the Constitution of the Democratic Socialist Republic of Sri Lanka. The constitution especially after the sixteenth amendment had broadly given both Sinhala and Tamil almost equal status as languages of administration in the country and English as a link language which necessitated implementation of a trilingual policy among public servants- the service providers for the entire island. But there were problems in implementation of these constitutional provisions. Speedy non implementation caused a lot of heart burn and dissatisfaction mainly among the minority communities.

To overcome this discontentment the government has embarked on an ambitious **10year (2012 - 2022) National Plan** for making Sri Lanka trilingual at the end of the plan period. The main objective of this plan envisages acquisition of trilingual skills and competencies by all sections of the country as a major step towards national integration and harmony, accompanied by a drive to remove language prejudices to establish a culture of language learning. This plan if successful even partially will transform Sri Lanka into a more democratic, cohesive nation and facilitate development. For the success of this programme firstly the government should concentrate more on making Public Servants trilingual in the short term rather than addressing trilingualism among the total population. Secondly different strategies have to be adapted to the different target groups.

The Government adopts different strategies for different categories of people. Public Servants and the rest of the population are dealt with separately and priority is given to trilingual competency of Public Servants since for effective service delivery it is essential that Public Servants should be at least bilingual if not trilingual.

This paper concentrates on the trials and tribulations faced by the Government and offers appropriate strategies in making Public Servants trilingual.

Various circulars were issued for the effective implementation of this language policy, for example the 2007 circulars which require all public service officers recruited after July2007 to gain competency in the second official language - Tamil for Sinhala officers and Sinhala for Tamil officers - within five years of their recruitment. The circulars are however silent about the proficiency in the link language.

Moreover public servants are encouraged to gain competency in the second language before commencing on English learning. This is because if left to their discretion they will opt for English rather than the native second language for their career development, and English being an international language has an added attraction. But the ground reality is that Public Servants should be competent firstly in Sinhala and Tamil as the general public in Sri Lanka is proficient in at least in one of these languages of administration. Hence despite the trilingual policy framework, the main focus is given to the Sinhala and Tamil language proficiency to public servants.

As far as the language skills in the second and the third languages are concerned Public Servants are not homogeneous. While the majority are monolinguals, a significant minority has different skill levels in the second and third languages. Those who are from bilingual areas are somewhat competent in oral communication in the second official language.

English is an exception. Almost all public servants are exposed to English from their school days, but with little success. English Language is invariably one on the subjects at school level throughout the country. Even though much emphasis is not placed on English at the school level, some of the elite school in urban areas has brought English competency almost to the level of the first languages.

However the trilingual language policy for public servants puts emphasis more on Sinhala and Tamil than on English because internally almost the entire population is competent in either Sinhala or Tamil. Hence for transacting business in the government institutions it is sufficient if public servants are proficient in both Sinhala and Tamil. This means that the priority is proficiency in both Sinhala and Tamil for individual Public Servants and English has low priority. This is a general observation for the entire country.

How relevant is bilingualism or trilingualism for the linguistic minority Public Servants especially in the Northern and Eastern provinces? Even though being a minority language counterywise.Tamil is the first language for majority of the population in the Northern and Eastern Provinces and learning the language of the majority and an international language will boost their personal development and offer them confidence to face the outside world. Whatever the language policy and the efforts being made by the government to implement such a policy, the minority public servants cannot afford to wait patiently for the government to provide facilities to gain competency in the other two languages. They need short term solutions and even a crash course is preferable to provide them with sufficient communication skills thereby giving them a comparative advantage over and above the monolinguals in career development. In this way trilingualism will open a new vista for them.

Language competency means competency in all aspects of the language skills -listening, reading, speaking and writing and of course it is not necessary for all of them to gain equal competency in all skills. For some oral communication may be adequate, for others other skills may be necessary.

However what are the opportunities available to the present day public servants especially to those in the Northern and Eastern Provinces? This study will provide an overview of the facilities presently available to Public Servants in gaining trilingual competency with more emphasis on the Sinhala language.

Presently the Official Languages Commission, the Department of Official Languages and the National Institute of Language Education and Training function as facilitators for the effective implementation of bilingual and trilingual training of Public Servants. These institutions are responsible for developing syllabi, curricula, designing courses, identifying and training instructors, printing books and producing CDs, conducting oral and written examinations and releasing funds to the provinces for conducting classes.

The Department of Official Languages along with other actors was in this business of language education for Public Servants for a long time with minimal results.

Further there are many private institutes in addition to SLIDA and the Universities conducting these classes and those who are following classes in these institutes also could sit the same examinations conducted by the Department of Examinations.

A variety of actors are in the business of imparting knowledge on the second and third languages, but there is hardly any controlling or guiding mechanism.

Public Servants are expected to complete the examinations within a short time and gain the required level of competency to implement the trilingual language policy in the public sector effectively.

But the outcome of all these efforts is not impressive. Unless corrective measures are taken as a priority, the future of this trilingual policy is bleak. As I had already argued. trilingualism is crucial to those whose mother tongue is Tamil rather than to others. the majority of the population in the Northern and Eastern regions of the country have Tamil as their mother tongue.

Since all efforts are centrally sponsored and the results are rather unimpresive, it is inevitable for the Northern and Eastern Provincial Councils to look at fresh initiatives in this regard.

Now let us look at a novel experiment being carried out in both Northern and Eastern Provinces. It is the STEPS course. The Public Servants in both the Northern and Eastern Provincial Councils were the beneficiaries of the ambitious Skills Through English for Public Servants (STEPS) Programme being funded and implemented by GIZ since 2005 under the Performance Improvement Project. The STEPS Programme has a hierarchical course structure for participants to go from elementary to higher levels depending on their needs and capabilities.

The result since the year 2005 when this programme was launched is astounding. The main partner in this initiative is the British Council and the native teachers of English from the British Council are involved in designing, testing and implementing the series of STEPS courses. When English is taught by native speakers themselves the impact among the Public Servants is amazing. But perhaps more importantly, the introduction of a **Task Based Participatory Approach** methodology as a novel experience for Public Servants in the learning of a second language, effects the greatest change in their language improvement.

These experiences and lessons learnt could be easily duplicated with necessary modifications in the learning of Tamil and Sinhala also.

The Northern Provincial Council could design a Project in line with the blended methodology of course delivery, obtain necessary funds from a willing donor and implement a crash Sinhalese programme and thus speedily transform Northern Province Public Servants into trilingual speakers.

I hope that this report will reach the eyes of the decision makers in the Northern Province and function as a catalyst for the well beings of the people in the Northern Province.

Pearls of Investments Towards Green Development

Mr.R.Jeyamanon
Senior Deputy Director
Board of Investment
Jaffna.

While the BOI has been identified a vital point in the policy framework of defines, many growth opportunities also have transcended to the surface, with Sri Lanka engaging in large-scale reconstruction and development projects following the end of a three decade long civil war that suppressed the development of the country.

The BOI is structured to function as a central facilitation point for investors with a high powered Cabinet Sub Committee set up to strengthen the BOI, clear all bottlenecks and ensure speedy clearance of investment approvals, investors can implement projects in a hassle free atmosphere. Investment climate monitoring is also being improved to ensure the nation's competency profile. They provide assistance and advice throughout the investment process. The BOI currently facilitates investors on a sector-focused approach. These sectors (together with special units to handle high profile projects and regional initiatives) cover all vital areas of the economy. The identified vital target sectors are:

- Tourism & Leisure
- Agriculture
- Knowledge Services
- Infrastructure
- Utilities
- Education
- Apparel
- Export Manufacturing
- Export Services

BOI is fully recognizes the growing international consensus that monitoring and evaluation is an essential aspect of good governance of investment facilitation to improve development efficiency and effectiveness, transparency, accountability and informed decision-making. In the recent past, globally monitoring and evaluation expanded and diversified in many contexts with many uses such as **Decision-Making, Organizational Learning, Knowledge Base, Programme Improvement, Policy Development, Impact/Outcome Assessment, Improved Service Delivery, Accountability, Performance Audit, Empowerment of Investors' and even Transformation of Investors' boost Economy.** Ambitious BOI systems with multiple stakeholders needs tend to achieve most of these desired uses. Perfect Monitoring and Evaluation system goes beyond institutional boundaries to cover national, sectoral, programme and project level to ensure results orientation in government.

Facilitation to Investors

- Providing information and guidance before submission the project application and coordinating approvals from other agencies, if required.
- Evaluating applications and providing concessions, where applicable to the project
- Providing assistance during the start-up of the project: site selection and clearance, advice on factory buildings and other technical matters, arranging support services such as water, power, waste treatment and telecommunications.
- Making recommendations to Immigration Authorities for issuing resident visas
- Facilitating import/export clearance and customs procedure for import of capital goods, raw materials and the export of the final product.
- Advising investors on environmental norms and facilitating environmental approvals
- Assistance when necessary in the maintenance of good industrial relations and in the formation and operation of Employee Councils.

Greater Achievements

In the early years, investment interest in Sri Lanka was tipped heavily in favour of manufacturing and apparel today, and thanks to the BOI's aggressive marketing strategies and one stop-shop investment window concept, investors express interest in a wide variety of non-traditional sectors – such as services and infrastructure – as well. Bearing in mind that Sri Lanka boasts a literacy rate of over 90% and the second largest pool of British-qualified finance graduates in the world, next to the UK, the BOI has identified Knowledge and Business Process Outsourcing (KPOs and BPOs) as areas of growth. One of the main thrust areas to boost Sri Lanka's economy in recent years has been the telecommunications sector. The entry of international players such as NTT of Japan, Telekom Malaysia and Bharti Airtel, the number one cellular operator in India, is testimony to this. Another profitable sector in Sri Lanka today is infrastructure. Sri Lanka has embarked on a number of colossal infrastructure and real-estate projects since 2002. In a strategic move, the BOI invited investors to invest in Sri Lanka and benefit from the rising demand for commercial and residential projects in Colombo and its suburbs – which paved the way for kick-starting a number of world-class property development projects in recent years. The BOI is adopting a new approach in facilitating investments and investors – the Public Private Partnership (PPP) – to bridge potential gaps in capital spending. This partnership is a new strategy, defined as one between a public-sector institution and an appropriately qualified private-sector entity or group of entities to finance, design, construct and/or operate infrastructure or provide services that would otherwise have been provided by means of traditional public channels. The strategy also plans to leverage Sri Lanka's natural advantages. Sri Lanka is ideally located to become a major logistics hub in the region. The objective is to make Sri Lanka the logistics and investment gateway to South Asia. Realizing the growing importance of knowledge-based economies, the BOI is seeking to attract projects in the sphere of education as well.

The BOI maintains and operates 12 zones in economically important centers at present and they are equipped with the necessary infrastructure to facilitate uninterrupted operations. In addition,

the BOI is developing a further 12 zones to bring in different industrial sectors to rural areas as well. Even in post conflict areas there are 29 projects covering Jaffna, Vavuniya, Kilinochchi, Mullaitivu & Mannar in Northern Province also, which are in apparel, tourism based (star class hotels), agriculture, fisheries, power & energy generation industries etc.,

Many sectors have benefited enormously due to the path-breaking efforts of the BOI. For example, it has played a critical role in the development of a world-class apparel industry in the island. Sri Lanka was able to achieve the status of a preferred garment-manufacturing centre without the existence of a major textile manufacturing industry because of the BOI's proactive partnership with the industry. Despite the twin challenges of a protracted civil war and comparatively high energy costs, the BOI has assisted companies based in Sri Lanka to remain competitive world wide. To date, around 1,500 entities that have signed agreements with the BOI are in commercial operation, while companies registered under the BOI employ in excess of 430,000 workers. These companies account for nearly 70% of Sri Lankan exports and 86% of the country's industrial exports – impressive figures that speak volumes for the impact that the organization has had on fast-tracking the national economy. The BOI's greatest contribution has been its role as an agent of change that has radically transformed Sri Lanka, both economically and socially, placing the country in a position from which it can compete in an increasingly globalised world. Accordingly Northern Province also benefitted from garment factories which were established in Vavuniya, Mannar & Kilinochchi districts.

Product of BOI

The BOI occupies a unique niche, for the services it performs as an investment facilitator cannot be provided by any other state or private organization – it is a statutory body in nature. These services can be categorized into three main areas: pre-investment facilitation, investment facilitation and post-investment facilitation. At the pre-investment stage, the BOI participates in investment seminars, high-profile delegations, direct marketing and other efforts to attract potential investors to the country. The body also engages in promoting joint ventures through a matchmaking process between Sri Lankan companies and foreign counterparts. BOI offers investors three main benefits: tax incentives to priority sectors; duty-free importation of capital goods, and in the case of export-oriented projects, raw materials too; and easy repatriation of earnings. During the investment period, the BOI guides investors through the application process. Each specific element of the investment process is facilitated by specialized departments within the organization. Easing bottlenecks and resolving difficulties after implementation of projects, assistance with Customs, etc. fall into the category of post implementation assistance. Many investors who have set up businesses in Sri Lanka have moved on to other projects with the collaboration of the BOI. The BOI's Investor Services and Monitoring Department deals with investors during this post-investment period.

One of the qualitative advantages Sri Lanka holds is its transparent and independent judicial system. Coupled with the nation's reputation for respecting intellectual rights/patents, this proves to be a draw card for overseas investors who are serious about protecting their trade secrets. As for the

future, the BOI is placing emphasis on knowledge-based sectors: the services industry: infrastructure; value-addition of natural resources: logistics and structured projects.

Investment Promotion

One of the primary functions of the BOI is to promote Sri Lanka as a profitable destination for local and foreign investors. It identifies strategic sectors and target countries, and utilizes a variety of tools to promote Sri Lanka as an investor haven. In an attempt to access pre identified sectors and entities in a given country, the BOI engages in outbound delegations and business forums/round tables, which are followed up by one-on-one meetings. The BOI coordinates these activities with Sri Lanka's diplomatic missions overseas and the Sri Lankan Diaspora visits to foreign countries by the President of Sri Lanka prove to be an ideal platform for the BOI to gain access to new investors in these countries. The BOI also hosts inward delegations from overseas that are exploring the market in search of investment opportunities or are on fact finding missions. Among the other marketing tools is the BOI website through which investors can access investor and country information. The website also offers streamlined applications and payment facilities online. In addition, the organization employs e-mail communications for its direct-marketing efforts, targeting specific organizations in different sectors. The BOI also leverages on established rapport with existing investors and organizations to conduct network marketing. The main thrust of the BOI in the coming years will be to accelerate FDI inflows (green field investments) and facilitate the growth of existing BOI approved entities through expansion. Sri Lankan diplomatic missions abroad, the Sri Lankan Diaspora, foreign missions based in Sri Lanka, and the various chambers of commerce and industry will be key vehicles through which the BOI reaches potential investors. An additional area for the focus of the BOI is the expansion of local investments in priority sectors such as in Agriculture & Fisheries.

Value of Services

The BOI has persevered on the right track when it comes to projecting Sri Lanka's image in a positive manner. In an increasingly globalised world, the BOI is committed to playing an important role in driving Sri Lanka's Investment and Economic development agenda. It is working with other Government agencies, the Sri Lankan private sector, the Sri Lankan Diaspora and the other likeminded groups in a combined effort to make Sri Lanka a preferred location for investing in South Asia. One of the primary aims of the BOI is to brand Sri Lanka as an ideal location for investment in South Asia. It says that it recognizes the fact that investors are not attracted by investment incentives alone, but also consider macroeconomic indicators in investment destinations. Keeping this in mind, the BOI has covered tremendous ground in building an image of Sri Lanka. Although its efforts may have been diluted to some extent by its functioning in the **Northern Province namely as Northern Regional Office at Jaffna located at 1st Floor, NHDA Secretariat, Kandy Road, Jaffna** which is covering Jaffna, Vavuniya, Mullaitivu, Kilinochchi & Mannar Districts.

Reference:

"Sri Lanka is the next destination for Investment"

Sustainable Development for Sri Lanka – Alerting People to Support Development Efforts with Awareness of Their Rights and Responsibilities and of Health and Environmental Hazards

Eng.M.Sooriasegaram
Bsc, Bsc (Eng), Msc, Consulting Engineer,
soori1942@gmail.com

Post war infrastructure reconstruction is now taking place in Sri Lanka in a socially and politically unacceptable and unsustainable climate with little or no decision making voice for the people. Every Sri Lankan must begin to think and question the direction we are moving and what kind of society we want to create in this beautiful island of ours. **The key question before us is good governance, sustainability in politics and economics as well as sustainability in development, which are all intertwined. Let us now look at some of the development efforts in the North. Although the observations made here are equally applicable to the rest of the country, the southern development requires a separate investigation and critique. Looking at sustainable development in the country as a whole is necessary for the long term health and prosperity of our people.**

Everyone accepts that development is fundamental to providing livelihood, employment, self esteem, and better quality of life for all. Ironically not everyone is aware that **unsustainable** development is suicidal in the long run. Development must not aim to give short term benefits at the expense of long term disasters. We have to carefully plan all our development efforts with full knowledge of science and with sufficient understanding of definite as well as likely adverse consequences of the chosen method of development. It is always possible to design out adverse consequences at moderate extra cost and sometimes at no extra cost. This is a challenge our engineers are quite capable of, if politicians take the advice from engineers rather than taking decisions unilaterally. It appears that politicians themselves are not aware of the need for sustainable development and therefore the correct directives are not percolating downwards.

The infrastructure development in the country focuses at present mainly on rebuilding our road transport network, which is necessary but not sufficient. For the first time since independence we are engaged in major road improvements in Sri Lanka and for the first time in 100 years or so we are widening our roads in the North. In doing this, RDA and CEB are making serious encroachments into peoples' homes and private properties, without any consultation in most cases, without adequate consultation in some cases. often with no consultation at all. with the affected people. particularly the most down trodden communities.

There are no established consultation processes to consult affected people. People are not notified in advance. They have not been given any information or warning about the impending encroachment. They are caught with their pants down! So they are powerless to deal with the situation.

There are endless organizations called NGO's, who receive handsome funds from donors to help victimized people. Government also allocates substantial funds for free legal aid to unaffordable people. But none of these funds reach the needy people. They are largely misused by the privileged classes, who only do a good job in showcasing. So the people are too helpless to resist such encroachments. They succumb to the pressures from the big brothers – RDA and CEB.

This article is a small attempt to create public awareness among such bulldozed people throughout Sri Lanka.

It appears to me that most, if not all, of the road improvement projects in Sri Lanka, are commenced without carrying out proper feasibility studies, a standard practice adopted throughout the world.

RDA, RDD and Pradesa Sabas have been managing the road network with highly qualified engineers for over a hundred years. They will therefore know their road networks like the palm of their hand. But the type of maintenance work they carried out before did not warrant the levels of feasibility studies and public consultations needed now.

The nature of work, being carried out now, is much more complex, involving many issues. Road widening, relocation of H.V Power lines and other services, drainage, flooding of homes as a result of vertical and horizontal road re-alignments, encroachment into private lands and homes, tree felling, traffic management, prevention of road accidents, pollution control (mainly dust control) and also sometimes serious long term health and environmental hazards. It is therefore incomprehensible why and how they end up starting such ambitious and intrusive road improvement projects without feasibility studies and public consultations in advance of construction. Often the argument given is that there was insufficient time given to undertake such feasibility studies because of constraints imposed by the funding agents. This is a false argument because projects commenced without feasibility studies and public consultations are ridden with avoidable engineering, design and construction problems, and unpleasant confrontations with residents and public, consequently resulting in unacceptable delays and claims. The net result is a poor quality product at high cost, which is paid in the final analysis by all the Sri Lankan people.

I wish to give the following information for the benefit of the public. Road authorities are obliged to follow what is called good practice (they may be even legal requirements in Sri Lanka as in many other countries) as follows:

1. Carry out conceptual design
2. Pre-design feasibility study, which includes detailed surveys, list of affected homes and private properties, historic sites, buildings, temples, mosques, churches, schools etc., relocation of public utilities, preparation of cost estimates and viability studies. This must

include implications of not only road widening but the implications of raising the finished road levels above the DPC levels of houses and buildings and the damning, impounding and the possibilities large scale submerging of villages and towns during periods of rain storms especially events like Nisa.

3. Detailed Public Consultation – letter drops, meetings, news paper advertisements on the intended projects, gazette notifications, setting up help lines for affected people, advice on compensations, provision of alternate homes for the affected people etc.
4. Detailed design, preparation of tender documents, traffic management guidelines, traffic diversion routes etc. These are usually done by the road authority or by consultants appointed by the road authority.
5. Tender processes and awarding the tender
6. Notifying the public full details of the project, start date and finish date and how they will be managing the construction work with minimum disruption to residents, businesses and the travelling public.

Likewise, it is equally important for citizens, particularly those living adjacent to any road improvement schemes, to know their rights, duties and responsibilities, some of which are given below:

1. They must fully understand what a "road reservation area is and what their rights and responsibilities are within it". Road reservation area is the area where the road authority has the legal power to encroach into private property for road widening, relocation of power lines or other essential public works. Road Reservaion Area (RRA) is defined as the area between the existing property boundary fence and a line either 50 feet or 40 feet or 33 feet or 25 feet away from the centerline of the existing carriageway, depending weather the road is Class A or B or C or D. This information is gazetted and citizens can get this information from the Municipal Council, Town council or Pradesa Sabas. The plan and section attached show typical road details, reservation areas and the likely issues faced by people.
2. The land in the reservation area belongs to the property owner, who is fully entitled to negotiate and receive compensation if this area is taken over by the road authority for road improvement
3. The road authority has the legal power to issue the necessary notices and start working in the reservation area provided it is in the larger general interest and welfare of the community and is proved to be essential for the development of the country. So it is incumbent on the part of the citizen to co-operate with the road authority while still reserving the right to compensation for the loss of use of the land. Obstructing the work of the road authority is not recommended provided they issue proper notices, advance notification letters and gazette notifications.

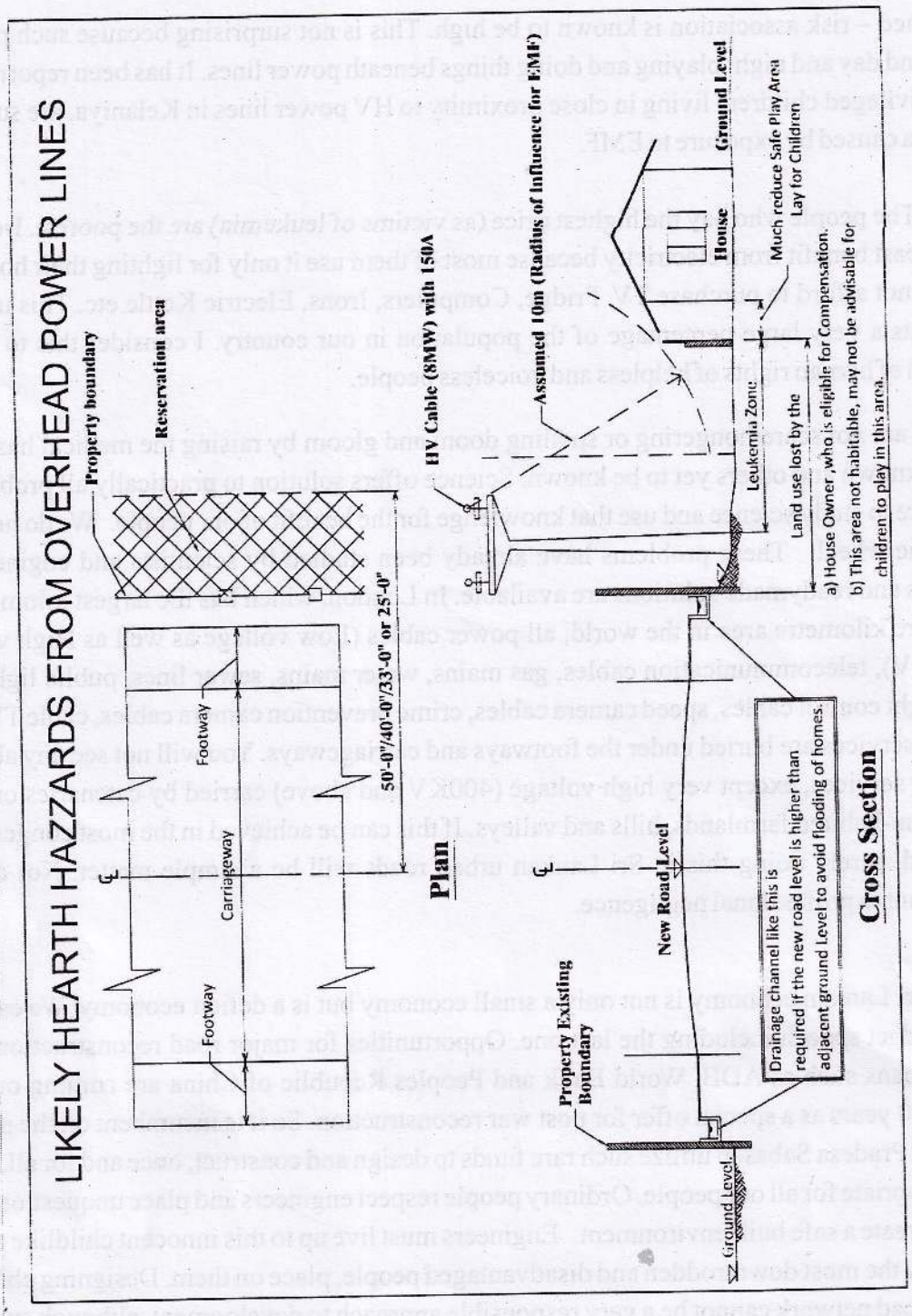
4. Within this reservation area they must not build any permanent structures such as temples, houses, wells etc. But they can cultivate in these areas. It is not advisable to plant large trees unless their benefits can be reaped within a short period, 10 years or so.

5. The citizens/residents/home and building owners have the right to request the RA to construct drainage channels if his or her home becomes vulnerable to flooding as a result of road realignment and other measures. They must verify if the finished road levels are going to be higher than the DPC levels (Damp Proof Course Levels). If this is so their homes will get flooded, which will become unlivable and dangerous to life. or wet and damp. which will become uncomfortable to live and cause serious health problems to occupants.
6. It is strongly advised that communication with the Road Authority is always done in writing in the language of their choice, in Tamil, Sinhala or English and keep copies of all such correspondence safely. No need to go to a lawyer for this, which is unnecessarily costly and also time consuming. Remember the poorest, not being equipped to fight such injustices, are likely to suffer the most.

Relocating statutory public utility services is often a very complex and very expensive part of any road works. So are land acquisitions from private land owners. Here we may enter into uncharted territories and areas where multidisciplinary expert advice may be necessary. It is important not only to educate the public but also to educate CEB, Water Board, Sri Lanka Telecommunications and others on their rights, duties, responsibilities and privileges. It is incumbent on the part of statutory authorities, in particular CEB to engage in detailed consultations with the local people living near the line of proposed overhead high voltage power lines. There are many hazards which may not only be unknown to the lay persons but also to the alleged experts, CEB and RDA.

The major roads radiating from Jaffna (A9, Point Pedro Road, Palali Road & KKS Road), which are being widened and their finished levels raised substantially, effectively form damns enclosing villages and towns with low lying houses. During heavy rain storms, which happen during most rainy seasons, and especially during incidents like Nisa, the enclosed land between these road dams may become large reservoirs or lakes, submerging tens of thousands of homes. The small culverts and the occasional roadside drains will certainly not prevent the formation of such lakes during heavy storms. There is no evidence that these possibilities have been feasibility studied. Also now there is evidence that the finished levels of roads are higher than the DPC levels of most or many houses. As far as I am aware people living in such houses have not been consulted or advised of the dangers of flooding. Fit for purpose, environmental impact and sustainability studies appear to have been ignored except at very superficial levels such as prevention of dust pollution and protection of flora and fauna. In a relatively flat terrain like Jaffna Peninsula the effect of such incidents can be catastrophic indeed and the life saving exercise during an incident like Nisa storm can be astronomically expensive and the saga of displacement and refugee camps will return.

HV power lines are known to cause many health hazards on people living near or underneath power lines. Vast amount of research has been done on the adverse effects, mainly health hazards.



originating from ELF -Extremely Low Frequency (0 to 300Kz) HV overhead power lines and the Electro- Magnetic Fields (EMF) generated by them. All our overhead power lines are of 50 to 60 Hz frequency. So any one living underneath or nearby (usually a lot of poor children, not having access to playing areas. play underneath such power lines and develop leukemia. which is a kind of blood cancer. I believe. are vulnerable to become leukemia victims. (see attache sketch which demonstrates this phenominon) The association between EMF and child leukemia is scientifically fairly well

established – risk association is known to be high. This is not surprising because such poor children may spend day and night playing and doing things beneath power lines. It has been reported that many underprivileged children, living in close proximity to HV power lines in Kelaniya, are suffering from leukemia caused by exposure to EMF.

The people who pay the highest price (as victims of leukemia) are the poorest. Ironically they get the least benefit from electricity because most of them use it only for lighting their homes because they cannot afford to purchase TV, Fridge, Computers, Irons, Electric Kettle etc. This unfortunately represents a very large percentage of the population in our country. I consider this to be a serious violation of human rights of helpless and voiceless people.

I am not scaremongering or spelling doom and gloom by raising the medical hazards – some already known and others yet to be known. Science offers solution to practically all problems as long as we care to study science and use that knowledge for the benefit of our people. We do not have to re-invent the wheel. These problems have already been studied by scientists and engineers in other countries and readymade solutions are available. In London, which has the largest kilometres of road per square kilometre area in the world, all power cables (Low voltage as well as High voltage up to 400,000 V), telecommunication cables, gas mains, water mains, sewer lines, public lighting cables, traffic light control cables, speed camera cables, crime prevention camera cables, cable TV cables and all other services are buried under the footways and carriageways. You will not see any above ground cables or services, except very high voltage (400KV and above) carried by catenaries on tall pylons through un-habited farmlands, hills and valleys. If this can be achieved in the most congested roads in the world, surely doing this in Sri Lankan urban roads will be a simple matter. Not doing this is tantamount to professional negligence.

Sri Lankan economy is not only a small economy but is a deficit economy. We can see this in every budget speech including the last one. Opportunities for major road reconstruction, funded by foreign loans such as ADB, World Bank and Peoples Republic of China are coming our way after nearly 100 years as a special offer for post war reconstruction. So it is incumbent on the part of RDA, RDD and Pradesa Sabas to utilize such rare funds to design and construct, once and for all, what is safe and appropriate for all our people. Ordinary people respect engineers and place unquestionable trust in them to create a safe built environment. Engineers must live up to this innocent childlike trust people, especially the most downtrodden and disadvantaged people, place on them. Designing child leukemia into our road network cannot be a very responsible approach to development, although such roads can of course be very useful to transport child leukemia sufferers speedily to hospitals for their survival or for their last journeys!

CEB power cables crossing above peoples' homes, gardens and habitable areas

CEB power cables crossing over peoples' gardens and habitable areas – note the foliage removal

The Impact of Teacher Quality on General Education in Northern Province

Mr.K.Bratley
B.Sc (Jaffna), PDPA (Sri J.), MPA (Sri J.), SLEAS
k.bratley@yahoo.com

Introduction

General Education is a devolved subject in Sri Lanka. The 13th amendment to the 1978 constitution paved the way for the establishment of provincial councils to which the central government delegated the powers on certain subjects including general education; and also they handed control of all schools except the large and popular ones to the provincial councils. This created three types of government schools in this country; National schools, Provincial schools and Privenas which are special schools for Buddhist priests. Other than these there are nongovernmental schools which fall into two categories; Private schools and International schools. In Northern Province, there are 1050 schools out of which 14 are national, 1027 provincial, 6 private, 2 international and 1 privena. The authority to manage the curriculum implementation process in all government schools including the national schools has been vested to the Provincial educational authorities, even though the general management of National schools comes under the direct control of central Ministry. Therefore, all the stakeholders of the provincial general education system bear the responsibility of ensuring its productivity.

The school education structure is divided into four levels; primary, junior secondary, senior secondary and collegiate. Primary education lasts five years and at the end of this period, the students may sit a national exam called the scholarship exam. Based on the achievement in this exam they are given admissions to better schools. After primary education, the junior secondary level follows. This covers 4 years and it is followed by 2 years (Grades 10-11) of the senior secondary level which is the preparation for the General Certificate of Education (G.C.E) Ordinary Level (O/Ls). According to the Sri Lankan law, it is compulsory that all children go to school till grade 9 (age 14) at which point they can choose to continue their education or drop out and engage in apprenticeship for a job or farming. However, the Ministry of Education strongly advises all students to continue with their studies at least till the G.C.E Ordinary Level. Students who are pursuing tertiary education must pass the G.C.E O/Ls in order to enter the collegiate level to study for another 2 years (grades 12-13) to sit for the G.C.E Advanced Level (A/L). On successful completion of this exam, students can move on to tertiary education, therefore the GCE A/Ls is the university entrance exam in Sri Lanka. Hence the students' performance in Grade 5 scholarship examination, GCE O/L examination and GCE A/L examinations are considered very important.

Academic achievements of the general education system, in Northern Province, especially after the cessation of conflicts, particularly in terms of student's performance on public examinations such as GCE (O/L) of 2011 and Grade 5 scholarship examination of 2012 have been much commented since many stake holders were not satisfied with the statistical reports of examination results, although many reasons associated with the past emergency situations have been proposed to explain the outcome. Even though organized studies on the performances of the school education system of this province are rare, for the purpose of relying on the explanations given for the setback, the study carried out by David Carroll in 2010 with the support of UNICEF gives some indication of the possible causes for this consequence. This special assessment on the competency levels of children affected by continuous displacements in Northern and Eastern Provinces pointed out that there was a significant achievement deficit associated with the form of displacement: about three years deficit for those who were still in IDP camps or in schools which had restarted, one and a half years deficit for those who had been displaced but found places in schools which had continued to function normally and that the impact of displacement was greatest amongst the younger learners. In fact, students who sat for GCE OL exam in 2011 were severely affected by the continuous and unexpected displacements during their grade 06 to 09 period that is from 2006 to 2009. Even though this batch was not covered by the assessment conducted by David Carroll it could be presumed, based on this study, that these students too might have experienced the learning-hours-deficiency. Likewise, students who sat for grade-5-scholarship-examination in 2012 had been enrolled to grade one in 2008 and could not go through their key stage one (Grade 1 & 2 education) properly due to the same reasons. At the ground level many efforts were taken by the schools and the educational authorities to alleviate the effect of the lost learning hours. For an instance, additional classes were conducted by the schools for secondary students and a special project called 'Accelerated Learning Program' (ALP) was launched by the Provincial educational authorities with the support of UNICEF for primary students.

Despite many remedial measures taken by the schools and the educational authorities, the statistics of the examination results still revealed the traces of the past deep distress. Perhaps the approaches administered to alleviate the effect and to enhance the academic achievements might not have been effective enough to remedy all possible causes because Student achievement is affected by multiple variables of which individual and family background variables, school variables and teacher variables are very important. This paper discusses only the teacher variables with the interest of drawing attention of all stakeholders to make valuable contributions to enhance not only the teaching quality but the whole system as well. Teacher availability, subject mastery, pedagogical skills, experience and attitude are touched as the parameters of teacher quality which is one of the important factors that should be considered primarily with the view to enhance the performance of general education system.

Teacher Availability

In Sri Lanka, there is no school based teacher recruitment culture; teachers are recruited either by central or provincial authorities and deployed in all government schools. Since most teachers prefer urban schools to rural schools due to lack of facilities in rural areas, it is a matter of concern

weather teacher resource is equitably distributed among all zones of the province; for educational administrative purpose Northern Province has been divided into 12 educational zones of which some are very inaccessible rural areas. Schools in difficult areas suffer with lack of enough teacher resource to give quality teaching. Teacher availability in a school can be assessed by the information of student teacher ratio and the school carder position.

Student teacher ratio (STR) for a school is the number of students attending the school divided by the number of teachers in that school. This indicator gives the information of individual attention each student receives in the classroom. Low STR is desirable as smaller classes benefit all pupils because of high individual attention and at the same time, it is necessary to think of financial efficiency in determination of STR since teachers are paid from public funds; hence the optimal STR is preferable. The average student teacher ratio of the country is 19 and, hence, let us assumes it to be the optimum level for our schools. In Northern Province 81% of schools have achieved this level. Table 1 gives the percentages of schools in each zone fall into the different ranges of STR.

STR	JAFFNA	VALIKAMAM	VADAMARADCHY	THENMARADCHY	ISLANDS	KILINOCHCHI	MULLAITIVU	THUNUKAI	MADHU	MANNAR	VAVUNIYA NORTH	VAUNIYA SOUTH	PROVINCE
1 TO 19	77%	66%	77%	91%	88%	68%	83%	88%	98%	85%	92%	84%	81%
20 TO 30	18%	32%	21%	9%	12%	31%	17%	10%	2%	14%	7%	15%	18%
31 TO 40	4%	2%	2%	0%	0%	1%	0%	2%	0%	1%	1%	0%	1%
41 TO 50	1%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	0%

Table 1: Percentages of schools in different STR range.

The Valikamam Zone has the lowest percentage of schools that have achieved the optimum STR of 19 whereas the Madhu Zone has the highest percentage. The STR of 28% of schools is less than 10. Anyhow, only 56% of schools have achieved the provincial average STR of 16. As teacher deployment is managed by Provincial and Zonal education authorities, in order to regulate the distribution of teacher resource among schools, there is a national circular numbered 2003/38, which specifies the approved teacher carder for schools based on the number of students in the classroom. This circular has some drawbacks in allocating teachers to the small schools with less than 50 students where the carder provision is lower than the subject based requirement.

Subject Matter Knowledge

Subject matter knowledge is an important factor of teaching effectiveness. Studies have found out that students achieve higher levels and are less likely to drop out when they are taught by teachers with certification in their teaching field or by those with Masters Degrees (Knoblock, 1986; Sanders, Skonie-Hardin, & Phelps, 1994). It has also been observed that teachers who have training in science

teaching are more likely to use laboratory facilities and to emphasize conceptual applications of ideas, whereas those who do not have place more emphasize on memorizing. This indicates that a subject can be taught efficiently only by a teacher who has mastery in it.

In this regard if we consider the education qualification of the teachers of this province it is generally either GCE (AL) or Degrees in various subjects. Table 2 shows the percentages of graduate and non graduate teachers in every zone. Those who enter teaching profession with GCE (A/L) qualification can become professionally qualified through the trainings offered by the National Colleges of Education or Teachers' Training colleges; in this Province 61% of teachers are of this category. Some of them have completed their degrees through external modes while in service.

ZONE	Science Degrees	Arts Degrees	Commerce Degrees	Non Graduates
ISLANDS	3%	23%	4%	70%
JAFFNA	8%	36%	5%	51%
KILINOCHCHI	3%	24%	3%	70%
MADHU	1%	25%	3%	71%
MANNAR	3%	24%	5%	68%
MULLAITIVU	3%	34%	4%	59%
THENMARACHCHI	5%	47%	4%	44%
THUNUKKAI	2%	16%	4%	78%
VADAMARACHCHI	9%	35%	6%	50%
VALIKAMAM	7%	39%	7%	47%
VAVUNIYA NORTH	3%	23%	3%	71%
VAVUNIYA SOUTH	1%	4%	1%	94%
PROVINCE	5%	30%	4%	61%

Table 2: Percentages of graduate and Non Graduate teachers in every zone

As per the carder data there are shortages for subjects such as Science, Mathematics, English, Information and Communication Technology and Second National language whereas excess for arts stream subjects such as first language, history, geography and aesthetic subjects. For the science stream subjects the total demand is 2054 but the availability is 1883; for the arts stream subjects the total demand is 3186 but the availability is 4323; for English 1608 but availability is 832. In many schools English and ICT are taught by teachers who do not have any certification in the subject.

Pedagogical skill

Many studies have verified that there exists a significant positive relationship between the pedagogical knowledge and teacher effectiveness and that teacher skill at presenting class material is likely to influence student achievement. Successful teachers are those who use a wide range of teaching strategies and a range of interaction styles and those who are able to adjust their teaching to fit the different learning styles of the students and to the demands of different learning goals, topics and subjects. Researchers have linked student learning to variables such as teacher clarity, teachers' abilities to structure materials, ability to ask higher order questions, use student ideas, and probe student comments. (Rosenshine & Furst, 1973; Darling-Hammond, Wise, & Pease, 1983; Good & Brophy, 1986) In Sri Lanka only the graduates of National Colleges of Education are those who are recruited with necessary professional qualification for teaching; others earn their professional qualification while in service. Those who are recruited with GCE (AL) qualification become professionally qualified either following the courses offered by Teachers Training colleges or through the distant learning mode offered by National Institute of Education; and those recruited with degrees follow Post graduate Diploma in Education offered by Universities and National Institute of Education. In Northern Province 84% of teachers are professionally qualified teachers.

Teaching experience

Studies on the effects of teacher experience on student learning have found a relationship between teachers' effectiveness and their years of experience (Murnane & Phillips, 1981; Klitgaard & Hall, 1974) but not always a linear one. Many studies have revealed that inexperienced teachers are typically less effective than more senior teachers, (Rosenholtz, 1986) the benefits of experience appear to level off after about five years. It is also possible that older teachers do not always continue to grow and learn and may grow tired in their jobs. Table 3 shows the percentage of teachers that fall into different intervals of service periods. In this province 18% of teachers are below 5 years of service and 26 % are below 10 years of service; these teachers are abound in particular zones which are difficult or very difficult in terms of access, infrastructure and other social welfare facilities; whereas 26% of teachers who are over 20 years of service are abound in few convenient zones.

Years of Service	Percentage
1TO5	18%
6TO10	26%
11TO20	30%
21TO30	22%
31TO35	3%
36TO40	1%

Table 3: Percentage of teachers fall into different intervals of service periods

Attitude

The socio economic changes that took place during armed conflicts have left some invisible attitudinal and behavioral changes in everyone who lived in affected areas, especially Northern and Eastern Provinces. Teachers are not exceptional for it. It is commonly believed that the quality of the student teacher relationship has also affected by the above changes. The leadership qualities of the present teachers are also believed to have gone down compared to that of then teachers; for an instance, now teachers are very nervous of moving to a new place or being transferred to a new school. It may be true that the past traumatic experiences have greatly affected the psychosocial well being of teachers. Studies should be conducted on the attitudinal aspects of teachers which may have impacts on student achievements.

Summary

As the powers on general education has been devolved to the provincial governance and the situation has returned to normalcy, It is the time when all the stake holders of the general education system of Northern Province should ponder over the ways and means of enhancing the productivity of the system especially in terms of student achievement in public exams such as grade 5, GCE (O/L) and GCE (A/L) examinations since they determine the future of the student; even though the fact being that the goal of education is not achievements in examination. The present education policy demands that the school education system should be transformed to meet the objectives of future knowledge hub of Sri Lanka. In this respect, attention should be focused on enhancing the teaching quality while ensuring the equity and expanding the opportunities. This province has sufficient number of teachers of whom 84% are professionally qualified; therefore there is room for development.

Z-score Fiasco

Dr. S. Arivalzahan
Department of Mathematics and Statistics,
University of Jaffna.
arivu90@gmail.com

Z-score, as a ranking method, has failed two times in 2011 G.C.E. Advanced Level (A/L) results. Therefore, in recent days much attention has been focused on the Z-score calculation. This article examines the Z-score calculation fiasco and the need for further research in developing a more appropriate scaling method.

Z-score Method

Since year 2000, the Z-score has been used as the ranking method to rank students at the G.C.E. (A/L) examinations for university admissions. The Z-score is considered a better scaling method than the previous use of the aggregated marks for comparing student performance in different subject combinations. However, Z-score method received a high public criticism since the inception. One reason for this criticism might be the lack of understanding and transparency about the method. For an A/L student, Z-score looks like a magic black box; it should not be the case.

A student who sat for an A/L examination will get the grades for each subject and the average Z-score of his/her three subjects as the results of his/her examination. However, the unfortunate thing is that there need not be a strong positive correlation between the grades and the average Z-scores among different subject combinations. For instance, a student with 3 'B's in a subject combination might get a good Z-score than a student with 3'A's in another subject combination. Thus, the innocent students used to get confused with their two sets of non related results. But, when aggregate marks were being used as tool for ranking it was not the case as there exists a linear relationship and a strong positive correlation between the grades and aggregate marks. As long as the raw marks are not considered for ranking the students, the grades which are based on raw marks make no sense. On the other hand the above grades make non- necessary confusions too.

Department of Examinations could consider one of the following suggestions as the solution to alleviate the unnecessary confusion:

1. It would be better to release the Z-scores of each subject rather than grades.
2. Otherwise, the grades of the subjects should be based on Z-scores rather than raw marks.

For instance, for a particular subject, the Grade 'A' can be given for a student who gets a Z-score of 1.0 or above in the subject.

There is no perfect scaling method available and Z-score is a widely accepted scaling method. However, there are some drawbacks in the Z-score method. Therefore, further research is needed in finding a better scaling method. Let us examine this in detail.

For the calculation of Z-score, we do not need to assume any particular probability distribution for the raw marks of a particular subject. The formula for the

Z-score is Z-score = (raw marks – measure of location)/ measure of dispersion,

Here mean and standard deviation are being used as measures of location and dispersion respectively. Mean is a good measure of location and standard deviation is a good measure of dispersion for unimodal symmetric distributions. However, for non-symmetric distributions mean is no longer a good measure of location and standard deviation is not a good measure of dispersion either. Therefore, we have to be careful in using Z-score for scaling, when the raw marks follow any non-symmetric distribution.

In order to have a unimodal symmetric distribution for particular subject's marks, the entire Island has to be considered as a homogeneous population. Otherwise there will be a possibility of having a multimodal non-symmetric distribution. Still we have district quotas for university entrance, thus, we believe that all the districts are not in the same standard. If so, how can we assume the Island wide examination marks of a subject as a homogeneous population?

2011 A/L results and the Z-score method

In the year 2011, two different G.C.E. (A/L) examinations were conducted for old and new syllabuses. While the repeat candidates sat for the old syllabus examination, fresh candidates sat for the new. Consequently for a particular subject, the Department of Examinations had two different sets of marks, one for the old and new syllabuses. Thus, when there was a need to calculate the Z-score to rank and enlist both candidates to find a common cut out for University admissions, the Department of Examination was in a dilemma. First, the means and variances of the two different examination marks have been pooled for the calculation of the Z-score of a particular subject. Let us consider the same pooling problem in a more convenient scenario. Suppose a person (say A) has 80 Canadian dollars and 70 British pounds and another person (says B) has 75 Australian dollars and 65 Euros. Suppose we want to compare the wealth of person A and B. Then in order to measure the person A's wealth we usually convert Canadian dollars to US $ and then convert British pounds to US$ separately. Instead of doing this will we pool (add) the number of Canadian dollars and the number of British pounds together and then convert that amount to US$ (using an average exchange rate of Canadian dollar and British pound)? Everyone knows that such pooling is wrong in the above case. Similarly, two different examination marks should also be considered as pertaining to two different populations. Therefore, it is obviously invalid to pool the parameters of two different examinations for the calculation of Z-Score.

Prof. R.O. Thattil, the person who introduced Z-score as a tool for ranking A/L students in Sri Lanka, strongly opposed the pooling method. Later the Supreme Court's verdict has also proved that pooling method is not an appropriate method. Therefore it is clear that, if the Department of Examinations wants to use the Z-score as a scaling method, they should not pool the means and variances of the different examinations. If the Department of Examinations feels it appropriate to pool the means and variances of the different examinations they should use some other scaling methods (not the Z-score) for ranking purpose.

However, it is interesting to note that Z-score calculations have become controversial even when they were calculated separately following the court's verdict. It seems there are clear evidences that the repeat students were affected of this separate Z-score method. In recent past on average 58% of the Medical seats were filled by repeat candidates. But as per the 2011 separate Z-score results only 26% (less than half of the past average) of the medical seats are being filled by repeat candidates. For Engineering and management fields also repeat candidates got affected. It shows that the separate Z-score is also not a good scaling method. However, note that pooling is not a solution to this problem.

Why the repeat Bio science students are being affected heavily in the new (separate) Z-score results? Since the historical data shows that majority of the medical seats were filled by repeat candidates, there could be two groups among Bio science repeat students. One group aims for Medical seats, those are clever students, and another group wants to merely qualify the A/L exams. Thus, there could be a high possibility that marks of the bio science repeaters might follow a bimodal distribution. Thus the distribution would not be symmetric and Z-Score method fails as a ranking method.

Median Centered Score

For non-symmetric distributions, Median (which is the 50th percentile) is the better measure of location, and Inter Quartile Deviation (IQD) is a better measure of dispersion than standard deviation. Inter Quartile deviation is the half of the difference between the 75th and 25th percentiles.

We could define a new scaling method, Median Centered Score (MCS) as, MCS = (raw marks – median marks)/IQD of the marks. The above MCS is robust to extreme values, as median and IQD are less sensitive to extreme values compared with mean and standard deviation respectively. However, MCS is yet to be validated using some real world data set. Moreover, further research is needed in developing a scaling method for non-symmetric distributions.

Essential Skills for Engineers of the Future.

Dr. H.H.J.Keerthisena

B.Sc Eng, PhD,CEng FIE(SL) Int PE(SL).

keerthisena@cee.ruh.ac.lk

Engineering is an activity that is essential for meeting the needs of people, economic development and the provision of services to society. In a knowledge-based economy, the creation of knowledge implies the creation of wealth. The source of wealth in many modern economies is science and technology. Higher the value-added to the products made by engineers, more is the wealth they bring to a society.

As a result of the emergence of the Internet, knowledge has been communalised enabling rapid sharing of knowledge and technology know-how across the globe. Computers have revolutionised our ability to deal with information and data and changed the way we live and work. The availability of global communication means that engineers can work without borders. The training of talented human resource and capital has become a resource which can be tapped to reshape our economy. Engineering education can thus be viewed as a source of wealth for the nation.

The competitiveness of a country and the general standard of living hinges on the ability to educate large numbers of sufficiently innovative engineers. Given the kind of environment that engineers of the future will be working in, engineering faculties of the universities can make a strong contribution to the economy of the country by training engineers to international standards, so that they can fit into the global market.

In addition to developing excellence in technical skills the graduate's value can be enhanced through exposure to business, marketing, finance, and manufacturing. Engineers of the future also need to be sensitive to diversity issues and be comfortable working in multicultural environments. In today's industry and trade the outward appearance, behavior and attitude of an engineer counts as much as the technical competence for career advancement and success in life.

Because of globalization and changes in technology job structures and employment conditions are becoming more flexible. Thus engineers need the education to be flexible and multidisciplinary, to adjust to constant change, face the stress of competing in the fast-paced world of change, and to make complex decisions on the economic and social life.

Engineers of the future should be trained as thinkers, leaders, and creators of knowledge and technology. Engineering education should be broad based, with strong emphasis on the fundamentals, which helps to improve the problem solving and reasoning ability of an engineer. With the emergence of the world economy, there is a real need to develop a global awareness in the minds of today's

engineering students. With the skill becoming a commodity, the engineer of the future not only needs to be knowledgeable in the chosen discipline, but also needs new competencies in social and professional skills. They also need the ability to innovate and help it to become a reality.

Hence in addition to imparting broadbased engineering knowledge the engineering curriculum needs to equip the students with people oriented skills to enable them to fully participate in the emerging social, economic and cultural environment. These skills include the way engineers deal with matters emotionally with feelings, interests, attitudes, appreciation, enthusiasm and motivation.

The need for the right mix of technical knowledge, attitudes and skills is now recognized by all professional engineering institutions and are embodied in the generic graduate attribute profile stipulated as an accreditation requirement of engineering degree programmes.

Among the essential skills are the following:

1. **Communication skills** incorporating the ability to communicate effectively across a range of contexts and audiences; ability to present information and express ideas clearly, effectively and confidently through written and oral modes; ability to actively listen and respond to the ideas of other people; ability to negotiate and reach agreement; ability to make clear and confident presentations appropriate to the audience; and ability to use technology in presentations.

2. **Team working** incorporating the ability to work with other people from different backgrounds to achieve a common goal; ability to establish good rapport, interact with others and work effectively with them to meet common objectives; ability to comprehend and assume the interchangeable role of leaders and followers; ability to recognise and respect the attitudes, actions and beliefs of others; ability to contribute to the planning and coordination of the group's endeavour and ccommitment to collective decisions.

3. **Problem Solving** incorporating the ability to think critically, logically, creatively and analytically; ability to define and analyse problems in complex, overlapping, ill-defined domains and make well-supported judgments; ability to visualise and conceptualise; ability to look for alternative ideas and solutions and ability to think outside the box.

4. **Adaptability** incorporating the ability to respond readily to changing situations and priorities; ability to recognisese potential for improvement; ability to apply known solutions to new situations; ability to initiate and implement change; ability to work and remain effective under pressure; ability to comprehend and adapt to the culture of a new community and work environment; ability to be resilient and persistent, and stay focused on the task.

5. **Lifelong Learning:** incorporating the ability to continue learning independently in the

acquisition of new knowledge and skills; ability to seek relevant information from a variety of sources; openness to new ideas and capacity for self-directed or autonomous learning; and passion for learning.

6. **Self esteem incorporating** positive thinking; commitment to uphold dignity and honour; self-confidence; assertive qualities; emotional and spiritual balance.

7. **Ethics and Integrity:** incorporating the ability to apply high ethical standards in professional practice and social interactions; act ethically, with integrity and social responsibility; understand the economic, environmental and socio-cultural impacts of professional practice; analyse and make decisions to solve problems involving ethical issues

University learning today embodies complex mixtures of knowledge, understanding, broad capabilities, skills, attitudes, values, and behaviours.

The challenge for the University engineering faculties is to develop strategies to sustain these essential skills among their graduates.

Sri Lankan Experience in Ground Improvement

Dr. (Eng). Udeni P. Nawagamuwa
Department of Civil Engineering,
University of Moratuwa.

Introduction

Very frequently, the infrastructure development activities, especially highways, railways, water supply schemes, etc, and related structures are now constructed on land with poor ground support conditions, basically due to unavailability of good ground for infrastructure constructions. Further, the countries like Japan, Singapore, Malaysia etc., where the developable areas are scarce, reclaim land from the sea where the underground conditions are very much unfavorable for construction. Sri Lanka is now facing this similar situation in par with the world and most of the structures and other related constructions are being constructed on improved grounds, previously considered as "not good" for any construction.

Where poor ground conditions make traditional forms of construction expensive, it may be economically viable to attempt to improve the engineering properties of the ground before building on it. This can be done by reducing the pore water pressure and the volume of voids in the soil, or by adding stronger materials. In earlier times, poor ground areas have usually been avoided or structures with deep foundations such as a bridge supported roadway have been constructed over the top of the loose deposits. Many types of site improvement techniques are now available that allow constructions such as embankment and interchanges to be constructed directly on improved ground.

Soil which is highly compressible is prone to volume change when a load is applied. This leads to settlement. Fine-grained soils which have been compressed and then allowed to swell, experience a smaller volume change when re-compressed. Loosely-compacted coarse-grained soils may exhibit little change in volume under static loads, but become unstable and exhibit large volume changes when either vibrated or flooded and then drained.

Different Soft ground improvement methods

Soil improvement in its broadest sense is the alternation of any property of a soil to improve its engineering performance. This may be either a temporary process to permit the construction of a facility or may be permanent measure to improve the performance of the completed facility. The techniques described below are some successful applications of such methods in Sri Lanka, especially in Southern Transport Development Project (STDP).

Preloading

Preloading refers to the process of compressing foundation soils under applied vertical stress prior to replacement of the final permanent construction load. If the temporary applied load exceeds

the final loading, the amount in excess is referred to as surcharge load. When a preload is rapidly applied to a saturated, soft clay deposit, the resulting settlement can be divided into three idealized components, namely: immediate, primary consolidation, and secondary consolidation. Settlement due to an applied pressure occurs over a period of time. A proportion of the final settlement can be achieved prior to construction by pre-loading the soil. The larger the pre-load, the less time it will take to achieve the final settlement. Pre-consolidation may be a cost-effective way of reducing the settlement due to lightly distributed loads from roads or warehouse or supermarket floors provided that material is readily available to provide the pre-loading.

Prefabricated Vertical Band Drain

The consolidation settlement of soft clay subsoil creates a lot of problems in foundation and infrastructure engineering. Because of the very low clay permeability, the primary consolidation takes a long time to complete. To shorten this consolidation time, vertical drains are installed together with preloading by surcharge embankment or vacuum pressure. Vertical drains are artificially created drainage paths which can be installed by one of several methods and which can have a variety of physical characteristics. In this method, pore water squeezed out during the consolidation of the clay due to the hydraulic gradients created by the preloading, can flow a lot faster in the horizontal direction toward the drain and then flow freely along the drains vertically towards the permeable drainage layers. Thus, the installation of the Vertical drains in the clay reduces the length of the drainage paths and, thereby, reducing the time to complete the consolidation process. Therefore, the purpose of vertical drain installation is twofold. Firstly, to accelerate the consolidation process of the clay subsoil, and, secondly, to gain rapid strength increase to improve the stability of structure on weak clay foundation. Vertical drains can be classified into 3 general types, namely: sand drains, fabric encased drains, and prefabricated drains.

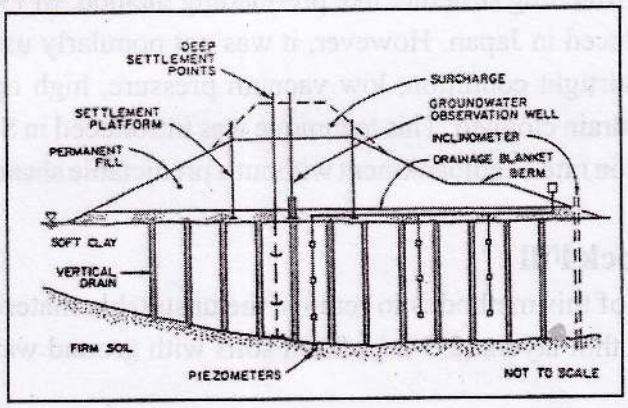


Figure 1. Typical Vertical Drain Installation for a Highway Embankment (Rixner et al, 1986)

Heavy Tamping

The objective of the dynamic compaction (DC) method is to stabilize and densify granular soils deposited both above and below the groundwater table. It is aimed to improve the soil bearing capacity, decrease the amount of settlement, and decrease the potential of liquefaction. Dynamic compaction was first popularized by Menard in the early 70's (Menard and Broise, 1975). The Process

consist of essentially of dropping large weight, 10 to 20 tons, up to 150 tons, into the ground to be compacted. The height of drop generally ranges from 10 to 20 m, up to 40 m. High technical knowledge and experience is required to densify the ground of various characteristics below the water table uniformly to a desired density. Unless properly guided with technical management, simple tamping with a heavy hammer may result in non-uniform ground densified only in a few meters below the ground surface or other defects in the ground treated by tamping. Properly planned tamping work based on technical management is therefore important for success of DC method. Heavy tamping is activated by dropping a weight (W) through a height (H) repeatedly on a predetermined grid. The tamper will cause the platform soil and subsequently filled soil into the craters to compress and force the underlying soft soil vertically and laterally. The volume of compressed soil compacted during this operation (by the in-filled soil) is directly related to the enforced settlement within the base area of operation.

Mechanically Stabilized Earth (MSE)

Mechanical stabilization of soils by reinforcement with foreign materials is not a new idea, but has been used since time immemorial. Recent Days, MSE consists of reinforcing the soil using polymer, steel, or natural materials. The reinforcement which is strong in tension effectively combines with soil which is strong in compression, forming a semi-grid composite material (Vidal, 1969; Chang et al, 1977).

Compact Vacuum Consolidation (CVC)

Compact Vacuum Consolidation (CVC) is a soft ground improvement method for the soft cohesive soil by using the application of vacuum pressure to speed up the consolidation process without disturbing the surrounding structure like pre-loading method. In 1960 vacuum consolidation method was firstly introduced in Japan. However, it was not popularly used due to many problems such as imperfection of airtight condition, low vacuum pressure, high operation cost due to long vacuum pumping period, drain clogged. This technique was introduced in STDP due to the advantage of having faster construction rate of embankment without a predictable shear failure.

Replacement with Rock Fill

The main purpose of this method is to remove the unsuitable materials and replacement with rock fill materials. When thin layers (2-3 m) of soft soils with ground water table were found, this technique was used..

Geotextile

A geotextile is defined as any permeable textile material that is used with foundation, soil, rock, earth, etc to increase stability and decrease wind and water erosion. A geotextile may be made of synthetic or natural fibers. This layer was used as a separator between the embankment and the existing soft soil to avoid any collapse of the filling material. Geogrid

The key feature of all geogrids is that the openings between the adjacent sets of longitudinal and transverse ribs, called "apertures". These are large enough to allow for soil strike-through from one side of the geogrid to the other. Geogrid was selected in STDP due to its high tensile and bearing capacity.

Sri Lankan Observations of Different Ground Improvement Techniques

Figure 2 shows a typical load and settlement variation with time at a particular location. The flatter part of the settlement curve after 200 days indicate a possible completion of consolidation settlement and this kind of situation is now ready for the removal of surcharge. However, once 95% or more degree of consolidation is achieved, it was decided to remove the surcharge as the applied surcharge load is good enough to compensate future possible settlements.

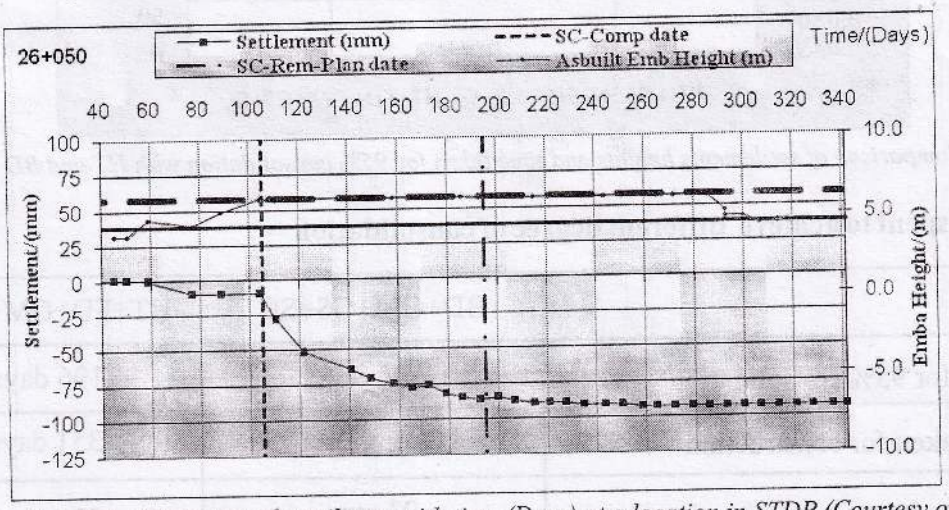


Figure 2. A typical behavior of a soil type with time (Days) at a location in STDP (Courtesy of STDP).

A comparison of predicted surcharge (SC) and actual surcharge height for two different techniques such as prefabricated band drains (BD) and heavy tamping (HT) is shown in Figure 3.

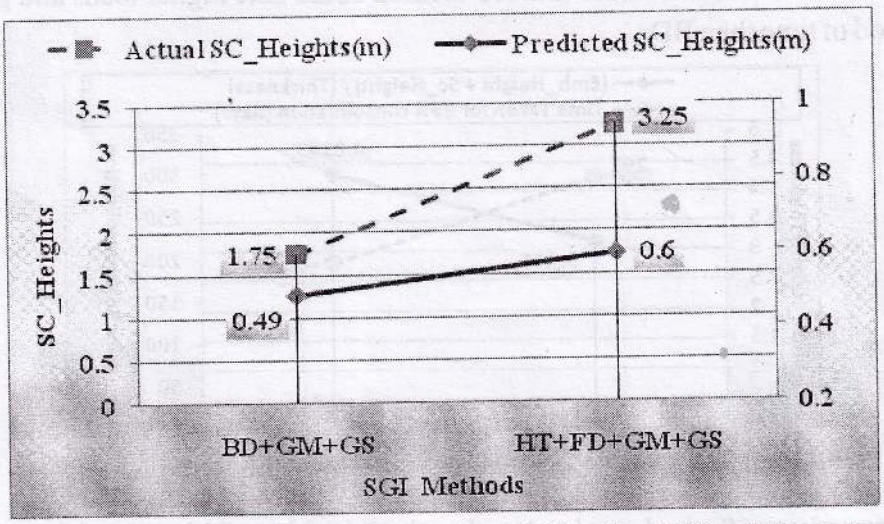


Figure 3. Comparison of predicted SC_ heights and actual SC_ heights with BD and HT methods.

The difference between these two methods is the inclusion of fiber drains for HT. It should be noted that the actual surcharge height is very different than the predicted value. This kind of observation could be mainly due to variations in the sub soil.

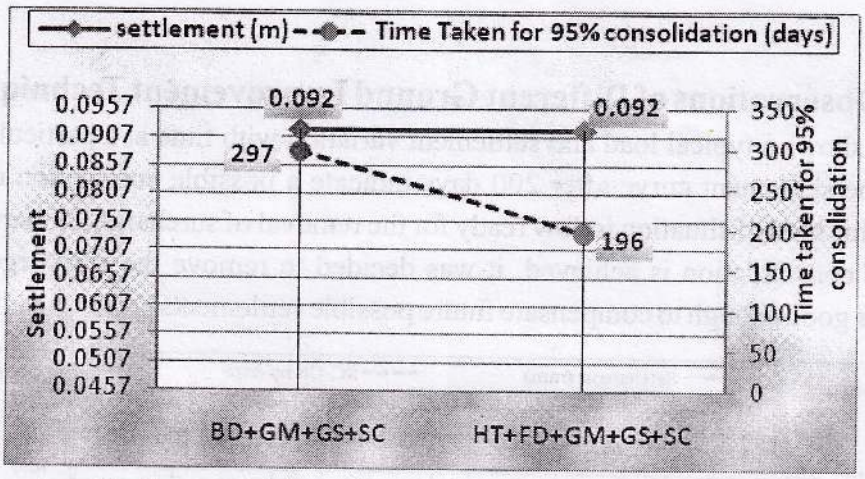


Figure 4. Comparison of settlements heights and time taken for 95% consolidation with HT and BD methods

Table 1. Days spent to achieve different degree of consolidation

Item	BD+GM+GS+SC	HT+FD+GM+GS+SC
Time taken for 95% consolidation	297 days	196 days
Total time taken for construction	397 days	351 days
settlement	93 mm	92 mm

As figure 4 and Table 1 show that the settlements are exactly same, BD method takes more time than the HT.method in order to achieve 95% consolidation. It should be noted that the surcharge heights are not same and this concludes that HT method could take higher loads and get consolidated in a shorter period of time than BD.

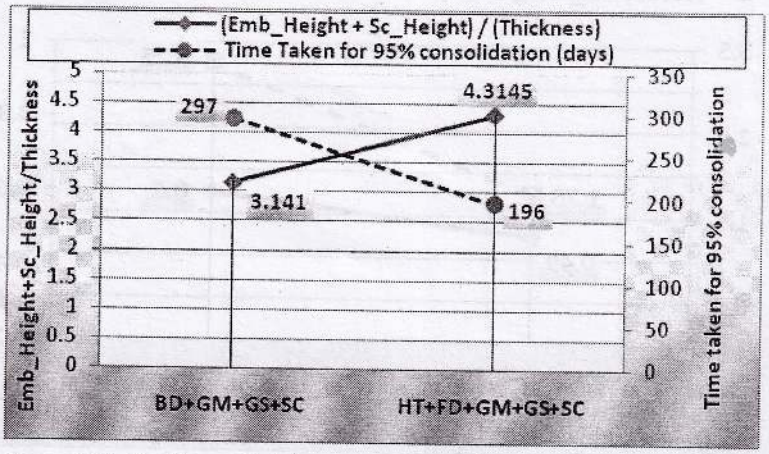


Figure 5. Comparison of (Embankment height and surcharge/ soft layer thickness) and time taken for 95% consolidation with HT and BD methods.

Figure 5 too expresses similar behavior for HT compared to BD in achieving the required consolidation during a shorter period of time.

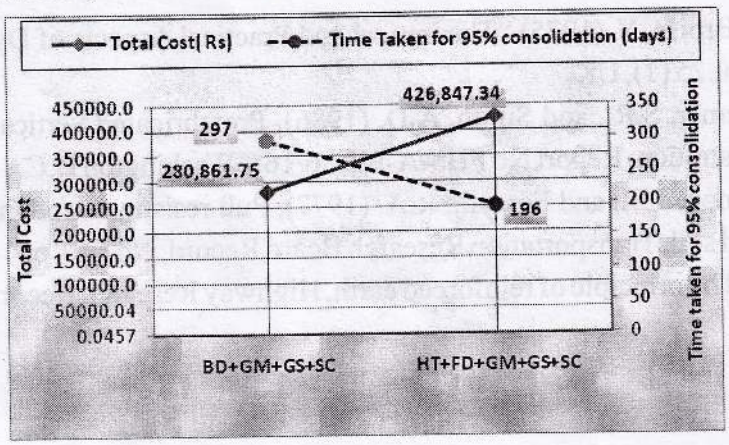


Figure 6. Comparison of total cost and time taken for 95% consolidation with HT and BD methods

Table 2. Cost comparison

Item	BD+GM+GS+SCH	T+FD+GM+GS+SC
Time taken for 95% consolidation (Days)	297	196
Total time taken for construction	397	351
Total cost (Rs. Mn)	280,861.75	426,847.34

Figure 6 and Table 2 were prepared considering the total cost for both BD and HT methods for a longitudinal section of 100m. This clearly shows a higher expenditure in HT compared to BD, although the time needed for 95% consolidation is shorter in HT.

Concluding Remarks

Sri Lanka is also facing the lack of good grounds for civil engineering projects. Therefore, grounds previously considered as "not good" are now used with some improvements. STDP is a project where all the latest ground improvement techniques were applied. This paper compares two different techniques (BD and HT) applied for a similar soil condition. It should be clearly understood that although the HT method has been very expensive during the construction, it was a new technology applied in Sri Lanka for the first time. This kind of experience is necessary for selection of appropriate techniques for future infrastructure projects.

Acknowledgement

IESL undergraduate project student, Mr. Dasun Aravinda Siriwardena for taking the necessary approvals for publishing STDP data for his research is kindly acknowledged. Dr. Asiri Karunawardena, Director General of National Building Research Organization and the STDP officials for their continuous encouragement are kindly remembered.

References

1. MÀnard, L. and Broise, Y. (1975) "Theoretical and Practical Aspects of Dynamic Consolidation" Geotechnique, Vol.25 (1), UK.
2. Rixner, J.J., Kraemer, S.R., and Smith, A.D. (1986), Prefabricated vertical drains, Vol1, Federal Highway Administration, Report No FHWA-RD 86/168, Washington D.C.
3. Chang, J.C., Hannon, J.B., and Forsyth, R.A. (1977), Pull resistance and interaction of earthwork reinforcement and soil, Transportation Research Board Record, No 640, pp1-7
4. Vidal, H. (1969), The principle of reinforced earth, Highway Research Record, No 282, pp 1-16

Change is Inevitable. Then Why Fear or Resist?

Mr.selvaretnam Raghavan
Executive Director,
Bartleet Finance Plc.
Past District Governor, Lions Clubs International.
S-raghavan@hotmail.com

Think a minute. Let us look at our world. How many animals and plants have gone extinct? But, is it not surprising that still the tiny micro organisms like bacteria and amoeba are surviving? Why? The answer is simple. It is all because that those plants and animals could not adapt themselves to the changes in the environment, they became extinct. Those microorganisms amoeba and the bacteria multiply fast undergoing modifications and adaptations to match the changes that are taking place in the surroundings and hence still survive in this world despite many attempts by human beings to eradicate them. That is the secret of their success.

Friends! This theory is true and is more applicable even today to any living organism or any organization. No one can be an exception to this rule.

Falling in line with this thinking, any organization for that matter to remain and grow should now be going through a process of re-engineering to meet the growing demands, expectations and the changes that are taking place in the internal as well as the external environment. In this exercise if we are to succeed at the end, there are two fundamentals that have to be followed by us from the beginning.

One: It is essential that every employee irrespective of the grade should be made to understand why we are going through these changes. It is very common in any organization that the staff members initially feel unsecured when the changes are brought about and hence develop a fear and resist change. As employers, it is our paramount duty to explain in detail and convince them to allay their reasonable fear. The process of re-engineering cannot be done by the top management alone and hence we need to carry all and if not the majority of the staff with us throughout this process. We must involve them in this process, make them the owners of the change to derive satisfaction and make them celebrate success at the end. There should be a constant dialogue between the party administering the change and the party embracing the change even after the process is over in order to find out the pros and cons which will always be there and then make improvements.

Two: One has to be proactive in this exercise and learn at the beginning itself to understand and adapt himself to the changes that are contemplated, for him to survive in that changing scenario. This

can only be done by preparing himself to take up this challenge for the betterment of the organization and for his personal career development.

Being proactive alone will not be enough and one should be positive in his attitudes too. Our attitudes need to change. That is why I said earlier that every member of the staff should be involved and made a stake holder of the change. Therefore it is very essential that we should first develop a change in the culture in the organization to promote the above attributes among us.

These new approaches should be put into practice now at all levels right down from the chairman and the board of directors, for institutions to survive in this competitive and somewhat unpredictable environment. This will be more relevant and applicable in today's context to many institutions in the north, now facing great challenges from many changes that are taking place in the activities in the external environment. No decisions should be made unilaterally by the corporate management other than those relating to certain policy matters. Instead, committee systems should be established inviting the members consisting of staff at all levels to look into different aspects of management, study them and come out with their proposals and recommendations. Whatever changes thoes are brought about in the systems and procedures or whenever new practices are introduced, we should make it a point to communicate, consult, clarify and obtain a consensus among the staff involved before implementing them.

While valuing the involvement and contribution from the management staff at all levels in decision making, we should appreciate that this new approach also help the staff in the middle and lower management level to develop their leadership and management skills and come up the ladder in their career development. Any organization should be mindful about staff development and therefore consider Staff Training as very vital for the institution to fill new positions that will come up when they expand. Please also remember that learning organizations can only face the tough competition and survive in today's modern world. Keeping this in view, the institutions should take the right step in deciding to invest more funds for staff training and develop competent staff to handle higher responsibilities. Performance counselling should be introduced to assist those who find it difficult to adjust themselves to changes and perform well, by finding out the reasons for poor performance and together working out an improvement plan. This will enhance the element of trust between the employer and the employees.

In today's market, Risk Management is another important area of administration for corporate bodies and the institutions in the north also should develop a sound strategy on this crucial issue.

I am very happy to be involved with Jaffna Managers Forum and watch their progress in promoting learning among people from all walks of life. After all learning is life-long. Conducting 100 seminars and brainstorming sessions within 5 years covering a wide range of subjects and well received by the participants should be considered a great achievement that needs to be recognized. Publishing a souvenir to mark this occasion is a right move which will provide an opportunity for good articles to go on record for future reference. Congratulations and my best wishes to all of you on this journey together to make the future a memorable and rewarding one to all the stake holders.

Developing Leadership Skills

Prof.Manikam Nadarajasundaram,
profnadam@gmail.com.

No one is a born leader—everyone can develop leadership skills and everyone can benefit from using them.

First, take time to honestly analyze yourself.

Learn to understand yourself. It's the first step to understanding others. Consider these important questions:

1. What kind of leader am I? One who helps solves problems? A leader who helps people gets along? How do others see me as a leader?
2. What are my goals, purposes, and expectations in working with this particular group?

Identify areas for improvement.

Ask yourself these questions:

1. Do I try to be aware of how others think and feel?
2. Do I try to help others perform to the best of their abilities?
3. Am I willing to accept responsibility?
4. Am I willing to try new ideas and new ways of doing things?
5. Am I able to communicate with others effectively?
6. Am I a good problem solver?
7. Do I accept and appreciate other perspectives and opinions?
8. Am I aware of current issues and concerns on campus or in my community?

Then--after analyzing your strengths and weaknesses--take action.

Devise a strategy for upgrading your skills. Here are a few strategies to consider:

1) Communicate effectively.

Effective communication is dialogue. Barriers are created by speaking down to people, asking closed questions that elicit yes or no answers, using excessive authority, and promoting a culture that depends on unanimity. If your focus is winning the argument or if you react defensively to criticism, you'll create fear of openness and hinder the organization's growth.

Try these steps to effective communication:

Listen actively-ask open questions. Be genuinely interested in what others say.

Thank people for their openness--stress how much you value it--even if you don't like specifically what is being said.

Point to areas of agreement before jumping on areas of disagreement-this reduces defensiveness; members wont fear being "attacked."

Set aside your authority to create an atmosphere of partnership to reduce fear in group members. Promote a culture of constructive dissent-though not to the point of paralysis. Portray disagreement as simply a difference of opinion. Get rid of the "I'm right, you're wrong" attitude.

2) Encourage enthusiasm and a sense of belonging. Show:

Friendliness: others will be more willing to share ideas if you're interested in them as people too.

Understanding: everyone makes mistakes. Try to be constructive, tolerant and tactful when offering criticism.

Fairness: equal treatment and equal opportunity lead to an equally good effort from all group members.

Integrity: members will take tasks more seriously if you show that you're more interested in group goals than your own personal gain.

3) Keep everyone working toward agreed upon goals:

Remind everyone of the group's purposes from time to time. It's easy to become too narrowly focused and lose sight of the larger goals.

Provide encouragement and motivation, by showing your appreciation for good ideas and extra effort.

Harmonize differences and disagreements between group members by stressing compromise and cooperation.

Involve everyone in discussions and decisions, even if asking for opinions and ideas means a longer discussion.

4) Get to know the people around you

Everyone has different abilities, wants, needs, and purpose in life. To get along with others and get results, you need to get to know them.

Interact with group members as often as possible. The only way to get to know someone is through direct personal contact.

Become familiar with every member of your group. Take note of each person's unique qualities and characteristics.

5) Treat others as individuals

Put your knowledge and understanding of each group member to work!

Be aware of expectations. Everyone expects something different: recognition, a chance to learn, a chance to work with other people, etc.

Be creative. A repetitious routine can cause boredom. A successful leader thinks of new and better approaches to old ways of doing things.

Provide rewards. Recognition by the group is a source of personal satisfaction and positive reinforcement for a job well done.

Delegate responsibilities if everyone shares the work, everyone can share pride in the group's accomplishments. Let each member know what's expected of him/her, available resources, deadlines, etc.

The Art of Negotiation

Mr. V.T.Sivalingam
Attorney at Law, M.I.PM
Management Consultant
Jaffna.

The demand for skilled negotiators has grown at such a pace in the present era; as such companies are taking more interest in training their Managers and technical specialists in this direction, spending lot of money. The word Negotiator is a much talked word these days, whether it be in the case of solving the ethnic issue or in the case of companies for bargaining a tender or dealing with trade unions, or why even in the field of sports too., A growing number of companies are now endeavouring to teach negotiating techniques to a wide range of their Managers.

Taking a company into a contract or out of an embarrassment is a crucial part of business. So much so, those firms are teaching their managers how to do without involving themselves or their companies in situations of conflict.

What makes a good or bad negotiator? The qualities of being logical or articulate on all occasions are not essential. Logical arguments, if carried to extremes, may expose the flaws in the opposition's case so harshly that they provoke a hostile, defensive response. Even being inarticulate can have its advantages. Someone who has to negotiate with a man, who stammers, can find himself anticipating aloud what he is trying to say. In effect he is making his adversaries points for him. Experts advise that for anyone who wants to be a good negotiator, that before a negotiation reaches the stage of face to face encounter, the following steps should be taken in the pre negotiation planning.

Look for common ground:

The skilled negotiator gives more than three times as much attention than the average negotiator to looking for areas of common ground instead of concentrating solely on areas of conflict. He goes into a negotiation prepared to say "At least we can agree on this and this and this "or "I shouldn't think that these points will present much of a problem. If we reach agreement on these, then may be this area, where real conflict may arise will be more amenable to solution".

Plan flexibility:

The skilled negotiator is more likely to set upper and lower negotiating limits for him, while the inept negotiator plans inflexibly around the achievement of a single objective.

Plan around issues rather than in sequence:

To negotiate in a predetermined sequence moving from point to point, may seem the logical way to plan a negotiation. But if the opponent then says "Lets forget the first point, it doesn't interest me. I want to discuss this point followed by that point" he has seized the initiative. Most trade union negotiators plan on self contained issues, rather than in sequence. If they wish to discuss wage increases, redundancies welfare facilities and joint negotiation machinery, they will regard each issue as a playing card which they can shuffle and deal at will. They plan for each issue to stand on its own feet and not to depend on the success or failure of the previous item negotiated.

Use information positively:

The unskilled negotiator tends to use information like a club with which to hit the opposition. The skilled negotiator, in contrast is not content, just to collect information he can use but asks himself how he can use it more persuasively, what unresolved questions there are likely to be and how, and when, he should put them to the other party. He also plans to use printed information details of schedules, laws or relevant statistics, sparingly.

Make accurate power assessments:

It is easy to overestimate the negotiating power of the opposition. For example if you are negotiating with a single source supplier, he may seem all powerful. But if he believes, or can be led to believe that you can do without his product he loses a lot of his power, or perhaps you are negotiating with a contractor who is holding out for a high price. Pre negotiation planning will aim to assess what other factors may influence him, apart from price, when it comes to the point of decision. His real though hidden goal may be to work for you, a prestigious company on almost any terms. In that case his demand for a high salary becomes a bluff that you can call.

Take an appropriate negotiating position:

The appropriate negotiating position should be as accommodative as possible, though firm. In most cases people should start with high aims and that they should take a realistic position. If they are seen to be putting forward a facetious offer, the other party will react in a similar way and put up a facetious counter offer which wastes a lot of time. It is better to say that people who aim higher do better, but that they have to be realistic.

Do not tell the negotiators to strictly adhere to your instructions to the last at all times. Allow them to be flexible when it is wanted. Most negotiators are capable of avoiding the gratuitous use of direct insults or unfavourable value judgements. But the skilled negotiator also avoids saying favourable things about him. The good negotiator has the ability to screen out significant information about his performance and drop irritators in his deal. Less successful negotiators however, find it difficult to recognise that an irritator even is an irritator.

Curb the use of counter proposals:

Skilled negotiators make far fewer immediate counter proposals. If one makes a proposal and the other follow it up with a counter proposal, how do you proceed from that. You will probably see it as a disagreement and a shunning of the proposal. What happens then is that you become concerned with protecting your proposal. You are forced on the defensive, and if you are not listening to his proposal it is not going to get through even though it might be a good idea that might have resolved the issue.

Avoid the defend attack spiral:

As a negotiation becomes more intense, emotional or value loaded behavior, which passes unproductive judgements on the other party, can begin to intrude. What one negotiator sees as a legitimate defence, the other sees as an unwarranted attack, comments such as "you can't' blame us for that" incite the retort"Cant' we "?" Just try us". It can lead to a self perpetuating spiral that gets nowhere. The skilled negotiator is less prune to indulge in this defending attacking behavior. However he does not avoid attacking altogether. There are occasions when he might think he is getting nowhere and will come in hard with an almost furious attack and then move on. The less experienced man tends to attack more mildly, let the other party bounce back and then go into the spiral.

"Label" behavior".

This is a useful devise which involves giving advance warning of what you are going to say. "Can I make a suggestion which I think will help us overcome this obstacle"? Is another way of saying "Here comes something constructive"? Introducing a bit of social pressure into the Proceedings, takes away some of the cut and thrust of negotiation while inviting a response. The less successful negotiator tends to label only his disagreements. He will say" I disagree with that because……."

Test and summarise:

At some point in a negotiation it is valuable to check whether anyone agrees on what has been said. The negotiator who lacks confidence often does not do this because he fears that making things explicit might cause the other party to disagree. The skilled negotiator, on the other hand, does not want agreement for disagreements sake. He wants a solution that can be implemented and will stand the test of time.

Make inner feelings explicit:

This is most important as a negotiation nears agreement. What you need is a certain level of trust, not in the integrity of that person but in his ability to be committed to, and carry out effectively, the implementation.

Take all the time that is needed:

This is where management often suffers terribly. It can be very vital in a negotiation to say "Look because this so important, I would like to spend more time on it "Never be rushed and at the very least, never give the impression of being rushed.

Basic Needs for Healthy Life

Prof. K. Sivapalan
kanagasabaisivapalan@gmail.com

Earth is the only known place in the Universe which supports life or life forms as we know. The earth has diverse life forms in water and land. All living forms have some basic needs. Let us think about what these needs are, how these needs are met and how human differs from others. What makes human different from other animals? Chemically all animals are composed of the same elements. Biologically, the bone, muscle, heart, liver, spleen and all the tissues are same as other animals structurally and functionally. The only organ that shows uniqueness is the brain. In the brain also, most parts are same as animals. The part of the brain that is unique to man is called the cerebrum of which the part lying in the front portion, known as the Frontal lobe. The Frontal lobe is responsible for higher level of thinking, logical deduction of the consequences of actions and planning: in other words, the intellectual capacity. The portion next to the cerebrum is known as the limbic system which also is known as emotional brain. Most animals have only this emotional brain which decides on routine biological activities such as eating, sleeping, fighting etc. Development of unique intellectual brain in human does not seem to have suppressed the emotional brain and does not seem to have succeeded in overpowering the emotional brain because most people act emotionally and criticize others actions also emotionally. Very often our needs are determined emotionally.

Clothing:

Human is the only animal that covers its body with cloths. People decorate their pets and animals with cloths and other materials without knowing whether the animals like to wear them. If we look at the biological explanation of the need for clothing, the human clothing practice could be viewed as complementing the defects in the skin to protect from environment. Clothing is effective in protecting from cold. All animals that evolved after reptiles are called warm-blooded animals because their body temperature has to be maintained at a constant higher temperature than the environmental temperature. Reptiles and lower animals are called cold-blooded animals because their body temperature is not controlled and they reflect the environmental temperature. The skin of all warm-blooded animals is covered by a thick layer of non-conducting material and also thick coating of fur or feathers except in humans. When the environmental temperature is very cold, the hair or the feathers stand erect and trap a layer of air which provides an efficient shield from cold.

Human borrow the hair from goats to make clothes or use the skin with the hair as cloths in addition to cotton and many synthetic materials. The sad part of the story is that we, living in warm

environment had a traditional dressing style which suited the environmental temperature but after changing to the dress pattern of cold countries, are sweating inside the dress or spending to cool the environment.

There is another angle to look at dressing. All animals are interested in enhancing their appearance generally and to attract the opposite sex in particular. Cat family of animals is well known to groom their hair and cleaning the skin often by licking. Birds spend large amounts of time in grooming their feathers. Animals with horn are known to decorate their horn with different types of clay. People belonging to several tribal families have developed traditions to paint their skin with natural colored clay and other materials to suit various occasions. Most of us are now spending greater portion of our earnings on dressing, decorating additionally with jewels and applying various agents to enhance the skin appearance.

Housing:

All higher animals have the habit of claiming certain area on the surface of earth for individuals or groups. The biological need for such place appears to give protection from enemies while sleeping and to ensure availability of food by way of cultivation and storage. The house also provided the privacy needed for intimate activities of the husband and wife. While animals depended on naturally available caves and trees for housing, human started to construct artificial houses depending on the availability of men and material. Today, the house seems to be more of status symbol than one to provide protection from extremes of temperatures, wind, rain etc.

Food:

Do we eat to live or do we live to eat? Basically, eating occurs as a result of an instinct initiated by different factors for different people. Some people eat when they see food. Some go searching for food and eat at specific times. Some eat when they have completed all other activities. Do we respect the feeling of hunger and eat only when they are hungry? Some people consider eating variety of tasty substances as the only meaningful pleasure in life. Others see eating as an obligation to keep alive.

Biologically, food should provide all essential nutrients for growth in children and energy for body activities for all. Since only plants have the capability to harness energy into chemical bonds, plants can survive with water, carbon dioxide and other elements. All animals depend on this chemical energy from plants either directly eating plant products or indirectly by eating the animal that has got nutrients from plants. The animals like cow, goat, horse or elephant that depend totally on plant products such as leaves and grass have evolved rumen which harbors micro-organisms that can convert un-digestible cellulose into absorbable glucose and make all other nutrients in the plant cell available to the animal. These animals are unable to eat energy rich refined food products such as cooked rice or bread as they will disturb the micro-organisms in the rumen.

Human gastrointestinal system is designed to the food habits of hunter-gatherer: to eat meat when animals are hunted and to gather fruits, yams, seeds and the like in the appropriate season. This kind of mixed meal with wide variety ensures consumption of all required nutrients naturally. However, food was not freely available and the gastrointestinal system has evolved to digest and absorb all nutrients eaten and the body mechanisms developed to store excessive nutrients for future use. The natural periodical changes in excessive eating and starvation balanced the needs and people apparently remained healthy. Within the last few centuries, revolution in technology, agriculture and food industry has led to consumption of highly refined, low fiber and energy rich food material with artificial flavoring agents continuously. Body tissues are now flooded with all kinds fast food making it difficult to maintain the balance for some people while others are driven poor and unable to afford the necessary food due to socio-political reasons. Malnutrition- over nutrition, under nutrition and un-balanced nutrition- has come into existence making humans sick. The food which is supposed to provide health is seen as a threat to health.

Traditionally, food has another important role. It has been used as a tool to promote social harmony. Inviting guests and feeding them is not seen as a culturally acceptable activity nowadays and food served at weddings and other functions has become a symbol of status. Cheap and nutritious foods are rejected and expensive imported substances are consumed in the name of status and prestige.

Water:

In a normal adult male, 60 % of the body weight is water. Several substances are dissolved in it and there are several physiological mechanisms to control the concentration of these substances within narrow limits. All chemical reactions that sustain life take place in body water. Slightest changes in the composition can bring serious mal-functioning of these reactions with grave consequences. One can live for months without eating but living for more than 6-7 days without drinking water is impossible. The most important substance to remain healthy is to drink adequate water and ensure that 1-1.5 liters of urine is passed daily- at least 4-5 voiding of full bladder per day. That is why provision of adequate good drinking water and adequate toilet facilities are essential for any society or institution. Water is consumed in addition to pure water as various beverages and food substances soaked with water during cooking. Water leaves body as urine, feces, sweat and insensible evaporation from the surface of the skin. Water loss in urine can be controlled to a certain extent but if the daily urine output becomes less than 500 ml, it will amount to serious kidney disease. When atmosphere is dry, evaporative loss is increased and adequate water should be consumed to balance the loss. Otherwise the concentrations of the solutes will increase and body mechanisms will be affected leading to unhealthy conditions.

Sleep:

One can remain healthy without water for about 6-7 days but not more than 3 days without sleep. Every organism in the earth is said to need sleep. Even the birds that migrate thousands of miles over several days by non-stop flying have developed a way of allowing half the brain sleep at a time:

which means that the sleep is more important for brain than the body. Tamil philosophers have identified several different stages of sleep and different components in the body that work predominantly at each stage. Whether such knowledge exists now also or has it been lost with the demise of such philosophers? Science indulged into research on sleep and it is an ever growing field. First thing they established was that sleep is an active process of the brain and not passive resting.

Basically sleep is divided into rapid eye movement (REM) sleep and non-REM sleep. Anybody can observe movements of eye balls under the closed eye lids during REM sleep. These two phases alternate 5-6 times in one night in a defined pattern. Disturbing REM sleep results in mental symptoms and severely impaired brain function. Disturbing NREM sleep results in fatigue and bodily abnormalities.

Main activity during REM sleep has been found to be related to learning and memory. All information that reaches brain through eyes, ears and all sensory organs can be compared to various books and periodicals coming to a library. The librarian keeps all of them on the first day in a common place for people to know about the new arrivals. Then they are taken in, numbers are assigned, reference card is prepared and placed in an appropriate shelf to be retrieved as and when needed. Similarly, the brain keeps all information in a short term memory and processes the information during REM sleep and sends the selected new information to long term memory and associates repeated information and forgets un-necessary information. It is not so simple as that because people awaken in REM sleep will report experiences called "dreams".

Some scientists believe dreams are the brains' attempt to find meaning in the random signals that are picked up during REM sleep from the memory traces. The cortex is the part of the brain that interprets and organizes information from the environment during consciousness. It may be that, given random signals from the interior brain during REM sleep, the cortex tries to interpret these signals as well, creating a "story" out of fragmented brain activity. Scientists also believe that sleep may be involved in "erasing memories from the immediate and distant past," and that dreaming is probably a piece of this process.

NREM sleep is essential for growth and development of babies and children. Endocrine and many body mechanisms are geared for growth and repair and to recover from the normal wear and tear of the previous day. Based on the brain activity recorded by electroencephalogram, this sleep is divided into four sub stages. The first two are light sleep and the latter two are deep sleep.

Going through all these stages in an orderly fashion during sleep is essential for health. Sleep disturbances are well known to cause cardiac illness, hypertension, diabetes and many other diseases. Therefore, unlike the common belief of sleeping as waste of time, it is very important and the brain is highly active during sleep and not resting. To be fresh and creative on the following day, the most important necessity is peaceful sleep during the previous night. The problem of night shift and driving is well known. People working without adequate sleep have caused serious industrial accidents, road traffic accidents, improper decision making, gross medical mistakes (in the case of doctors and nurses) resulting in great danger to public.

The most important fact about sleep is that the healthy growth and development of children depends on adequate sleep. Recommended hours of sleep at different ages: Newborn – 18, 3 months- 15, 6 months- 14–15, 1 year- 13–14, 2 years- 13, 3 years- 12, 4 -6 years – 11, 7-8 years – 10, 9-17 years- 9-11, Adults and Elderly- 7-8. Starving children of sleep has shown to develop antisocial attitudes, violent behavior, and inability to learn and keep things in long term memory.

Recreation- Exercise:

Involving in activities such as music, drama and dance is considered generally as leisure time activities: that is to engage only if time is available. People tend to engage into the mainstream activity- job for adults, house hold work for house-wifes and studies for students- all the time expecting to maximize performance and very often end up as frustrated persons. Human beings are not robots to keep doing the same thing again and again to satisfy the needs of somebody else. The feelings and the needs of the brain should be considered if someone is to lead a meaningful life. The brain needs diversion from time to time to put its functions in order. When exhaustion point reaches, it is mandatory to stop the mainstream activity and listen to some music, watch a film or drama or do something that relaxes the brain depending on the preference of the individual and that is re-energizing your brain, your mind and even your body. It can be even talking to friends or relatives or even just visiting them [sensitive or difficult topics should not be opened if mind is not relaxed already]. That is why it is given a very good term- recreation.

Recreational activities are essential for normal healthy life and to optimize the achievements. Lots of scientists have stated that the most important discovery occurred in their mind while dreaming or engaging in recreational activities. At higher level, it can be meditation, prayer or going to temple. Spirituality can provide more benefits.

One activity that is neglected by most of us is "physical exercise". Human is said to have evolved as hunter-gatherer. The body evolved to suit the need at that time with roughly 50 % of the body as muscles and bones. Large portion of the brain is dedicated to control of movements. The neo cortex in the human brain has evolved to control the behavior considering the long term benefits and consequences. But the limbic system, that is the emotional brain, continues to dominate the control of behavior based on the immediate needs and comfort. The development of technology facilitating automation and communication has made physical activity redundant and the people are using the muscles, bones and the brain minimally resulting in unhealthy life style. The nature of the body and the brain remains the same as before, obeying the principle, "use it or lose it". This necessitates compulsory indulgence in physical exercise if the life style is sedentary.

Benefits of exercise include: increased strength and vascularity of skeletal muscles, increased strength of bones, tendons and ligaments, thicker articular cartilage, increased growth of bones, reduced risk of heart diseases, reduced coagulability of blood, improved blood glucose control, improved lipid profile (less LDL and more HDL), improved Immunity and wound healing and reduced adipose tissue. Benefits to higher functions include improved problem solving ability,

feeling of wellbeing, good sleep, reduced anxiety and depression and reduced sexual activity among adolescents. Exercise plays an important role in rehabilitation after many disorders. The negative aspects of exercise include injuries – overuse, accidental or foul play. Whether the stresses of competitive sports outweigh the benefits of exercise is worth considering. Effects of exercise in illnesses like viral infections, liver diseases and kidney diseases seem not to have been studied adequately. Majority of the world population is undernourished and still depends on manual work to earn their living. The effect of excessive energy expenditure of exercise on their body composition and health is likely to have adverse consequences. Females get all the benefits from exercise as males only if they consume adequate food and fluids. Otherwise the reproductive function can be affected by excessive exercise. Exercise tolerance during pregnancy depends on pre-pregnancy exercise training. For some persons exercise induces asthma attack because of dry, cold air entering the respiratory tract because of inadequate heating and humidification in the upper respiratory tract increased dust due to incomplete removal in the upper respiratory tract as a result of increased ventilation during exercise in dusty environment.

Regular exercise is rapidly gaining widespread advocacy as a preventative measure in schools, medical circles and in the popular media in the west. The World Health Organization has produced a freely downloadable document on recommendation of exercise for different ages and it can be summarized as follows:

- 5–17 years: – at least 60 minutes of moderate to vigorous-intensity physical activity daily.
- 18–64 years: [in bouts of minimum of 10 minutes]
  - at least 150 minutes of moderate-intensity aerobic physical activity weekly, or
  - At least 75 minutes of vigorous-intensity aerobic physical activity weekly, or
  - an equivalent combination.
- > 64 years: – as above depending on their abilities and conditions.

Sex:

Is sex a sin or divine? Sex is one of the biological needs like hunger and thirst: but it is considered as one of the worst five sins. There is a lot of confusion between love and sex. The Tamil literature and cinema give unfairly exaggerated expectations about the joy of sex/love, and advertisement industry is exploiting the unfulfilled expectations of people. Lots of family disputes and sex related crimes stem from these illusions of sex/love not coming true. Culturally it is prohibited to talk about it but everybody talks about it- especially the adolescents- all the time in private invariably getting the wrong information. There was an attempt by the Ministry of Education to educate all adolescents through a well designed and easily understandable book in all three languages, "மலர்ந்த யவ்வனம்" in Tamil or "Splendor of Youth" in English. Every adolescent and all adults should read that book if it is available in any school or library.

Reproductive Health is defined by the World Health Organization as, "a condition in which reproduction is accomplished in a state of complete physical, mental and social wellbeing and not

merely as the absence of disease or disorders of the reproductive process". The ability, particularly of woman, to regulate and control fertility is an integral component of reproductive health package.

According to WHO publication a few years ago,

Over 100, 000,000 sexual intercourses take place every day.

From this, 910,000 conceptions and 356,000 sexually transmitted infections occur daily.

Of these pregnancies, 50 % are unwanted.

150,000 unwanted pregnancies are terminated: 33% under unhealthy and unsafe conditions with 500 maternal deaths due to abortion daily.

1370 women die daily due to pregnancy related problems and many times more this number have narrow escape with significant physical and psychological injuries.

Sexual and reproductive health is at the centre of human dignity, relationships and well-being. The private nature of sexual and reproductive health does not diminish its significance on the lives of men and women in every culture. Everywhere in the world sexuality and sexual behaviour have profound consequences on individuals, families, and societies.

When a male and female get involved in family relationship, mutual trust and interest should prevail for development of good family life. But the society feeds suspicion and wrong image about females in the male's mind and suspicion and wrong image about males in the female's mind and both are trying defend them from falling into the 'hold' of the other. This never ending cold war in the family leads to indulgence in alcoholism, smoking, extra-marital relationships etc.

Mutually fulfilling sexual relationship is important for mental health of men and women. When sexual act take place, the joy should be shared equally by both, the man and the woman. If it involves anger, violence, coercion, abuse or rape it can have serious consequences on the partner and the child conceived. Sexuality can be affected by the environment, mental state, physical state and social state. Sexuality is often surrounded by strict social, moral, and religious beliefs.

All men women, adolescents and adults should be educated about keeping the reproductive organs clean, keeping the sexual arousal under control, getting into healthy relationships among friends and couples, finding appropriate ways of fulfilling sexual needs, avoiding teenage pregnancies, planning when to have babies and select appropriate contraceptive of conceptive practice resulting in healthy and contended family.

Conclusion:

Let us gear the development process towards providing a conducive environment for healthy and peaceful life for everyone, fulfilling the physical, psychological and spiritual needs to be able to pursue carriers of everyone's choice in diverse fields of interest improving the quality of life further.

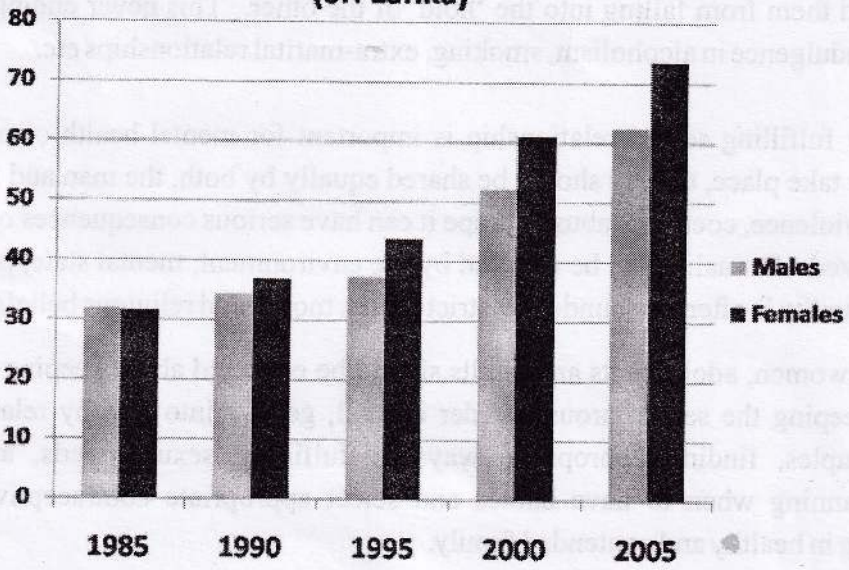
Priorities for Cancer Prevention in the Northern Region of Sri Lanka

Dr. N.Jeyakumaran, MBBS(Jaffna), MD(Colombo)
Consultant Clinical Oncologist.
Teaching Hospital Jaffna

Cancer is a major source of disease burden in Sri Lanka, and the cost from morbidity and mortality is enormous in human and economic terms. Cancer is the third leading cause of death and the leading cause of premature mortality.

In Sri Lanka, among males and females, the cancer incidence is in the increasing trend from 1985 to 2005. Overall cancer incidence among males has increased from 31.7 per 100,000 to 62.3 per 100,000 and that among females, it has increased from 31.5 per 100,000 to 73.4 per 100,000 during the period of 1985-2005(Fig - 1).2-6

Fig-1: Pattern of Cancer Incidence (Sri Lanka)

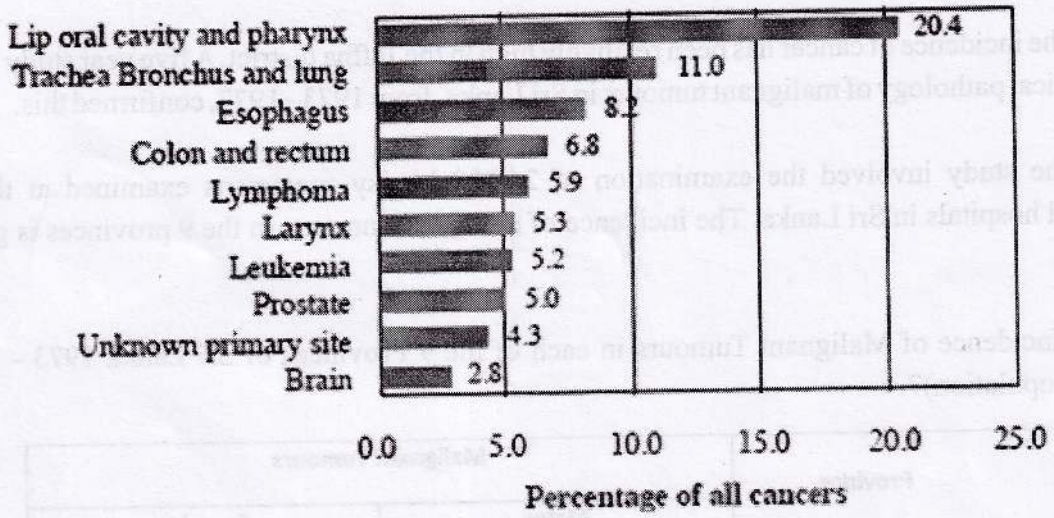


Source : Cancer Incidence Data, Sri Lanka Cancer Registry

The number of cancer cases can be expected to increase further because of the growth of ageing population in coming decades.

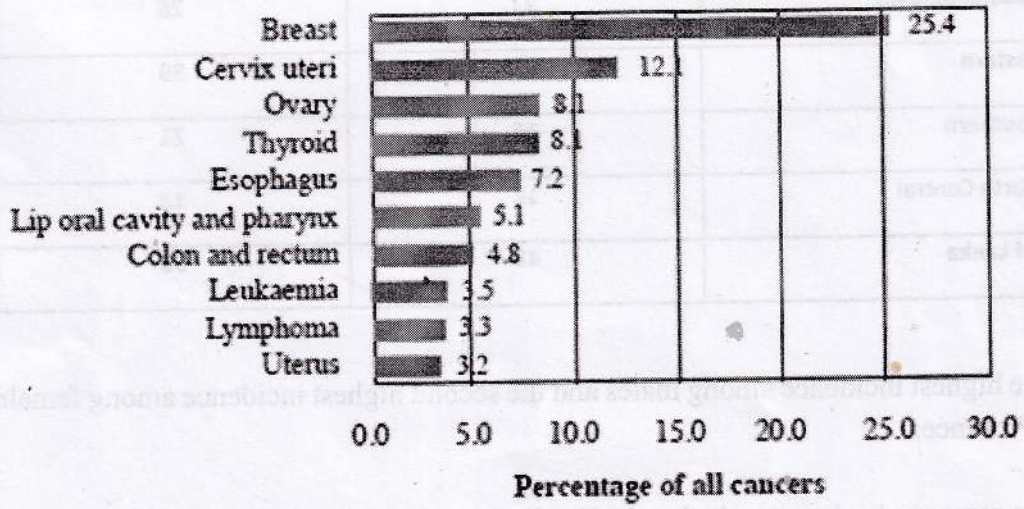
Among males, the most leading cancer site was oropharynx. The second and the third leading cancer sites among males were lung and oesophagus (Fig - 2).6

Fig-2: Distribution of Cancers among Males: 2005



Among females, the most leading cancer site was breast. The second and the third leading cancer sites among females were Cervix and Ovary (Fig-3). 6

Fig-3: Distribution of Cancers among Females: 2005



Cancer Burden in Jaffna Peninsula:

Jaffna district is the northern most part of Sri Lanka. The district together with the Pachilaipalli AGA's division (Pallai) of Kilinotchi district forms the Jaffna peninsula.

The incidence of cancer has been relatively high in the Jaffna district. A five year study 7 on the geographical pathology of malignant tumours in Sri Lanka, from 1973 - 1977, confirmed this.

The study involved the examination of 24,029 biopsy specimens examined at the nine provincial hospitals in Sri Lanka. The incidence of malignant tumours in the 9 provinces is given in Table-1.

Table-1: Incidence of Malignant Tumours in each of the 9 Provinces of Sri Lanka 1973 - 77 (per 100,000 population)7

Province	Malignant Tumours	
	Males	Females
Northern	96	81
Western	80	87
Central	55	60
Uva	28	31
North Western	28	34
Sabaragamuwa	27	28
Eastern	21	39
Southern	16	21
North Central	12	12
Sri Lanka	**48**	**56**

The highest incidence among males and the second highest incidence among females were in Northern Province.

The same study also reveals that the Tamils have the highest incidence of cancer in Sri Lanka as seen in Table-2.

Table-2: Cancer Incidence (1973 - 77) of Malignant Tumours in different Ethnic groups in Sri Lanka.7

Ethnic Group	Incidence (per 100,000 population)
Tamils	108
Sinhalese	91
Muslims	57
Sri Lanka	92

The increased incidence among Tamils may be due to the fact that Northern Province is inhabited by Tamils as the incidence in Eastern province did not show much high incidence.7

This geographical variation may have correlations with something connected to the soil, water, environment or any special habits or activities that is unique in the Northern Province.

The same paper also reveals that the common cancers in Jaffna peninsula are that of Oro pharynx, Oesophagus, stomach, breast and liver.7

Since 1985, the National Cancer Registries2-6 have been published that the incidence of cancer has been reported low in Jaffna peninsula. This may be due to the prevailed war in the Jaffna Peninsula since 1983 and consequent deterioration of health care services with minimal investigatory facilities which would have resulted in under reporting as the source of data were obtained mainly from the Cancer Units in Sri Lanka.

Now, efforts have been taken to regularize the cancer registration with better reporting from the Jaffna peninsula since the establishment of new cancer care service in Jaffna in December 2004. This will improve the reliability of our statistics in the forthcoming Cancer Registries.

Cancer Control:

Prevention and screening of common cancers are important scientific and public health challenges to reduce the burden of cancer. Scientific researches have demonstrated that cancers occur not as sudden catastrophic events, but rather as the result of a complex and long evolving process called Carcinogenesis. The process of carcinogenesis can take decades to complete, providing time and opportunity for us to intervene to stop or to reverse its progress either before the clinical appearance of cancer or at its earliest stages.

Due to the continuing burden, public health interventions have to be focused on prevention and early detection to reduce cancer incidence and mortality. Logically, reducing cancer incidence through

primary prevention is the most desirable goal, and major reductions in cancer incidence are possible through improved nutrition, physical activity and avoidance of carcinogens as well as other cancer risks.

Impact of Possible Carcinogens in Jaffna Peninsula:

Main carcinogenic exposures among males are attributed to the habits of betel nut chewing, tobacco consumption and alcohol intake. Other than that related to the habits, in many ways carcinogenic exposures are prevailing in the environment in Jaffna. In addition to the control on personal habits to reduce the carcinogenic exposure from betel nut chewing, smoking and alcohol abuse, it is important to control the changes in the environment. In Jaffna we should take actions to reduce excess water nitrate level, misuse of pesticides and other chemicals.

Nitrosamines and Nitrates:

Carcinogenic N-nitrosamines are ubiquitous environmental contaminants and can be found in food, alcoholic beverages, cosmetics, oils, rubber, and tobacco. Endogenous nitrosation also can occur because of the reaction of an amine with nitrate alone or nitrite in the presence of acid. The N-nitrosamines are activated primarily by an enzyme CYP2E1. This isozyme is inducible by alcohol.

Nitrate is potentially hazardous when present at sufficiently high concentrations in drinking water. Nitrates which could be converted into carcinogenic substances such as nitrosamines within the body are of importance in the carcinogenesis of oesophageal and stomach cancers.8, 9, 10, 11

In the Jaffna peninsula, ground water is the main source of water for human consumption, hence any pollution of ground water resource is a matter of serious concern. Many studies have shown that water nitrate-nitrogen levels in Jaffna peninsula are above the safe level specified in the WHO International standard for drinking water (ie. above 10mgs/l)12 - 16 (Fig -4 -5 and Table-3). This may be due to the mixing up of abundant nitrogenous waste matter and heavy use of nitrogenous fertilizers in agriculture with shallow ground water. It is also possible for nitrates to enter the ground water from human waste matter in the septic tanks.

Increased nitrogen in the soil also may cause serious health problems because some plants such as carrots could store this excess nitrate and then reduce it partly to nitrite within itself.14 These nitrous compounds can be converted to nitrosamine in the body leading to carcinogenesis.

Contamination of shallow ground water aquifer or soil in Jaffna Peninsula is a silent threat to the health of the people who consume it. Hence promoting the recommended use of fertilizers, efficient use of irrigation, continuous monitoring and quality assessment of well water are necessary to avoid health hazards to the people in this area.

The Dept. of Agriculture, Health and Water Board should jointly take responsibility in the preservation of ground water resource in Jaffna Peninsula.

Fig - 4: NO3-N Concentrations in Thirunelvely Area (N=20).
(Purposive Sampling from Intensive Agricultural areas) [15, 16]

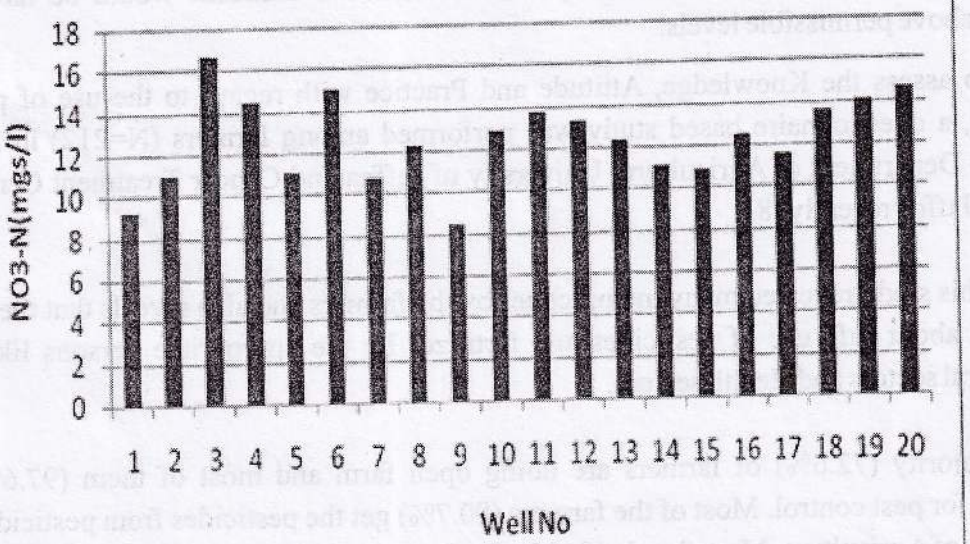
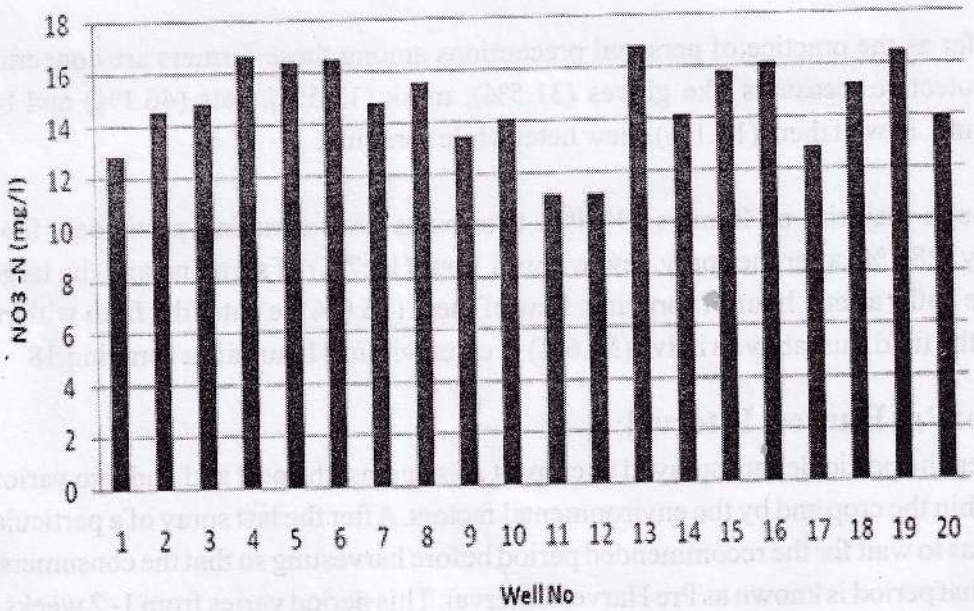


Fig - 5: NO3-N Concentrations in Kondavil Area (N=20).
(Purposive Sampling from intensive Agricultural areas) [15, 16]



Pesticide residues:

Possible cancer hazards from pesticide residues in food have been much discussed and hotly debated in the scientific literature.17 Farmers are not adhering to the regulations with regard to the use of pesticides and fertilizers. The farm products which we consume would be having pesticide residues, above permissible levels.

To assess the Knowledge, Attitude and Practice with regard to the use of pesticides and fertilizers, a questionnaire based study was performed among farmers (N=212) in Jaffna district jointly by Department of Agriculture, University of Jaffna and Cancer Treatment Centre, Teaching Hospital, Jaffna recently18.

This study revealed many malpractices by the farmers and also reveals that they are not well instructed about safe use of pesticides and fertilizes by the appropriate persons like those from Agricultural sectors and Health sectors.

Majority (72.6%) of farmers are doing open farm and most of them (97.6%) are using pesticides for pest control. Most of the farmers (80.7%) get the pesticides from pesticide sellers than from Dept. of Agriculture. More than half of the farmers (56.5%) use more than one pesticide at a time. Nearly a quarter of farmers (23.1%) use the pesticides in greater concentrations than recommended.18

Majority of farmers (86.0%) spray on their own and spray most of the time in early mornings or in evenings. Most of the farmers (74.4%) use separate vessels for dissolving the pesticides and the rest even use the vessels used for cooking or bucket that is being used for fetching water from well.

Though no one is using the empty bottles or cans for storing food or drink, majority of the farmers (65.2%) throw the used ones. After that what happens to those empty bottles is not known.

As far as the practice of personal precautions among these farmers are concerned, they use minimal protective measures like gloves (31.5%), mask (13.5%), hats (46.1%) and boots (3.4%) while spraying. Few of them (10.1%) chew betel while spraying.

Though majority of farmers (94.4%) take baths after spraying pesticides, few take baths immediately (28.1%) after the spray, few within 1 hour (15.7%) of spraying and the large number of farmers take baths after 1 hour of spraying. Few of them (16.0%) re enter the farm within 1hour after spraying to the field. Just above a halve (56.6%) re enter within 4 hours after spraying.18

Concept of Pre Harvest Interval:

When the pesticides are sprayed to crops it acts against the pest and undergo various chemical changes within the crop and by the environmental factors. After the last spray of a particular pesticide, the farmer has to wait for the recommended period before harvesting so that the consumers will not get poisoned. That period is known as Pre Harvest Interval. This period varies from 1- 2 weeks.

In our study18, when the time of marketing after the last spray was analyzed, that revealed about 10% of the farmers do marketing on the next day of spraying itself. A one fifth (19.8%) of farmers, market the harvest within 2 to 3 days. About 54 % of farmers do market after 4 to 7 days and only a few farmers (17%) do harvest 2weeks after the last spray. This clearly shows that the vegetables in the market will have more pesticide residues and that may have some influence in carcinogenesis.

The National Research Council (NRC) classifies chemicals that cause cancer into two groups. One is that directly affects DNA forming DNA adducts are called genotoxic chemicals. Other group is that not directly affects the DNA but through other mechanisms like hormonal effects on receptors or through toxic cell death is called non genotoxic chemicals.19, 20

Some agrochemicals are linked with carcinogenesis. Phenoxy acid herbicides or contaminants are linked with soft tissue sarcoma and malignant lymphoma. Organochlorine insecticides are linked with soft tissue sarcoma, Non Hodgkin's Lymphomas, leukaemias, cancers of lung and breast. Organo phosphorous compounds are linked with Non Hodgkin's Lymphomas and leukaemias. Triazine herbicides are linked with ovarian cancers. Increased incidence of stomach cancer and Multiple myeloma are noted among farmers.

To analyze the possibility of change of practice among the farmers in this study, we had to explore the educational levels, involvement of the Dept. of Agriculture and Health and about the participation of seminars.

Most of the farmers (80.7%) have studied up to Ordinary Levels (O/L) or below that level. Agriculture instructors have visited only 50% of the farmers. There is not much health education especially for farmers related to pesticide and its health hazards. The participation of farmers (35.8%) in seminars arranged by the Dept. of Agriculture, Agriculture Association or by NGOs is less. About two thirds of the farmers (63.7%), have expressed willingness for organic farming while 80.7% of farmers emphasized that pesticide use in farming is a must.18

A joint action of the Dept. of Agriculture, Dept. of Health, NGOs and Legal bodies towards initiating educational activities for farmers and enforcing good practices and regulations would be very useful to control the agriculture related carcinogenesis exposure. At the same time steps are to be taken to promote organic farming, Integrated Pest Management (IPM) and pesticide free home gardening.

Aflatoxins:

Aflatoxins are metabolites of Aspergillus flavus. They are fungal mutagens that contaminate cereals, grain, nuts and palmyrah legume. In Jaffna, consumption of ground nuts and palmyrah legumes is very high. A positive correlation exists between dietary aflatoxin exposure and incidence of liver cancer in developing countries, where grain spoilage is high.

More recently, urinary levels of certain aflatoxin adduct and metabolites have been correlated with incidence of liver cancer in China.9 It also should be noted that Hepatitis B virus infection independently increases the risk of liver cancer, but the effects of hepatitis B infection together with ingestion of aflatoxin are multiplicative.

Other Chemicals:

We may be consuming or exposing ourselves to other chemicals that may cause cancers. With our busy life style, we may be consuming foods that have additives, colouring agents, preservatives, flavouring agents and solvents. These chemicals may enter the food during production, processing, packaging and storage.

We also use chemicals such as repellents of mosquitoes and other nuisance flies or insects. These chemicals itself or partially burnt materials of those chemicals are carcinogenic to human.

The increased incidence of cancer in the Northern region of Sri Lanka may be related to the altered environment, the peculiar habits of the people in this area and any chemical adulterations of food or water. The threshold of carcinogenesis may be lowered due to the genetics as well. These causal agents can be minimized to a lower level by cooperative efforts with dedication on the part of many with a strong leadership and good intention towards building up a Healthy Nation!

References:

1. Annual Health Statistics, Ministry of Health, Sri Lanka - 2007.
2. Cancer Registry, National cancer Control Programme , Sri Lanka - Year: 1985.
3. Cancer Registry, National cancer Control Programme, Sri Lanka - Year: 1990.
4. Cancer Registry, National cancer Control Programme, Sri Lanka - Year: 1995.
5. Cancer Registry, National cancer Control Programme, Sri Lanka - Year: 2000.
6. Cancer Registry, National cancer Control Programme, Sri Lanka - Year: 2005.
7. Panabokke R.G The Geographical Pathology of Malignant Tumours in Sri Lanka. Ceylon Medical Journal, 1984, 29, 209-224.
8. De Vita et al.Cancer: Principles and Practice of Oncology, 7th Edition.
9. James.F., Holland. et al. - Cancer Medicine.
10. Imaida, K., et al., Carcinogenesis 12, 3027 (1995).
11. Iwagawa,M.,et al., Carcinogenesis 7, 1285 (1989).
12. Jeyaruba.T, Mikunthan.T. Health Hazardous by Nitrate Pollution in Intensive Agriculture Areas: 33rd International Geographical Congress in Oslo, Norway: 6-8, August 2008.
13. Lawrence.A.R, Chilton P.J, Review of the pollution threat to ground water in Sri Lanka. Journal of the Geographical Society of Sri Lanka, Vol.1. 1988, 85-92.
14. Maheswaran.R.,Mahalingam.S. Nitrate-Nitrogen Content of well Water and Soil from Selected Areas in the Jaffna Peninsula: J. Natn. Sci. coun. Sri Lanka 1983,11 (1):269-275.

15. Mikunthan.T, Shanthi De Silva.C. Preliminary study on Nitrate contamination in shallow aquifers - A case study in Thirunelvely and Kondavil in Jaffna District. Water professionals' Day Symposium - October 2007 - Session 1. 16. Mikunthan.T, Shanthi De Silva.C. Vulnerability assessment for shallow aquifers using chemical quality of ground water – A case study from Thirunelvely and Kondavil. Accepted for publication in 20th Annual Congress of Post Graduate Institute of agriculture: November 2008. 17.Gold, L.S., Slone, T.H., Ames, B.N., and Manley, N.B. Pesticide Residues in Food and Cancer Risk: A Critical Analysis. In: Handbook of Pesticide Toxicology, Second Edition (R. Krieger, ed.), San Diego, CA: Academic Press, pp. 799-843 (2001).
18. Jeyakumaran.N, Mikunthan.G, Poster on "Knowledge Attitude Practice and Toxicity symptoms associated with Pesticide Use among Farmers in Jaffna District" at the Scientific Sessions of Sri Lanka Medical Association.(2009)
19. Safi JM, El-Nahhal YZ, Soliman SA, et al. Mutagenic and carcinogenic pesticides used in agricultural environment of Gaza Strip. Science of the Total Environment 1993;132:371–80.
20. Smith, B.A.et al., Environmental Health Perspective. 99, 277 (1993).

Tuberculosis Control – Northern Sri Lankan Experience

Dr. C.S.Jamunanantha MBBS, DTCD
District Tuberculosis Controlling officer,
Jaffna.

Tuberculosis control activities are synchronized by WHO, implementing DOTS. The estimated incidence of all forms of TB, estimated prevalence of all forms of TB mortality all continue to show a downward trend in the world.

Northern Sri Lanka experience in tuberculosis control is beneficial for community health care workers especially in a conflict area. We had almost paralyzed health system for tuberculosis care. Chest hospital is still in high security zone since 1990. We had several difficulties getting drugs. We kept the drugs in three different places during the war time and we had also 3months buffer stock.

Chest ward was shelled at DH chavakachcheri in 2000. Chest clinic, Jaffna was shelled in 2006 and Chest clinic was affected by "Nisha cyclone" disaster in 2008.

Mile stones/Achievements

1. Establishing Chest Clinic in a New Building - 2005
2. Implementing DOTS - 2005
3. Introduction of Adult FDC drugs - 2006
4. Establishing Branch Clinics - 2006
5. Establishing Microscopic centers - 2007
6. Introduction of Paediatric FDC - 2008
7. Introduction of Electronic Recording and Reporting - 2011
8. Implementing PAL Approach - 2012

TB Data 2005 - 2012				
Year	Positive	Negative	EPTB	Total
2005	171	83	107	361
2006	102	103	75	280
2007	133	271	77	481
2008	120	195	65	380
2009	97	178	73	348
2010	118	201	101	420
2011	115	134	105	354
2012	120	82	116	318
Total	976	1252	719	2947

We expect 1200 Tuberculosis patients will be diagnosed & treated in next 5years in Jaffna District.

New Smear Positive Cases – 2011										
Age Group	0 - 4	05* - 14	15 - 24	25 - 34	35 - 44	45 - 54	55 - 64	65 - 74	75+	Total
Male	0	0	3	7	10	8	13	7	2	50
Female	0	0	9	7	5	18	9	6	2	56
Total	0	0	12	14	15	26	20	13	4	104

Advocacy Communication Social mobilization activities

1. Leaflets
2. Posters
3. Bill boards
4. Books
5. Cultural events / infotainment
6. World wide web. (www.Tuberculosis.jaffna)

Impact of war on TB

1. Direct Impact
   * Overcrowding, poor ventilation – due to forced displacement
   * Stress and Psychosocial problem - Alcoholism
   * Scarring lung – post war
     Pneumanoultramicroscopicsilicovolcanoconiosis
   * Defaulters
2. Indirect impact
   1. Lack of health facilities
      Hospital /Chest ward or infrastructure – Chest Hospital in high Security zone since 1990.
      Doctors, PHI, MLT, Nursing staff } Shortage
   2. Poverty and malnutrition malnutrition
   3. Improper settlement of force Displaced People (FDP)

Planned Activities

1. Establishing Regional culture Laboratory
2. Constructing Chest Wards or re opening Chest Hospital (K.K.S)
3. Microfinance development for families - With TB
4. Operational Research (Study on the dietary habits of Tuberculosis Patients treated at Chest Clinic, Jaffna)

} 2012 - 2015

5. Management late on TB Introduction
6. Recombinant BCG Vaccination.

} 2015 – 2020

Discussion

An estimated "one third" TB cases remain "unreported". Such cases are of particular concern because they perpetuate the continued disease transmission in the community;

At the same time, "addressing social determinants of health" is one of the challenging components in TB control. Health systems that are involved in TB control must therefore be strengthened urgently. The physical, social and financial barriers that prevent affected persons from accessing the needed care and service must be overcome.

In this context, it is important to recognize that improvement in the overall social and economic development of a country will contribute importantly in its long-term, sustained success in

TB "elimination" or "eradication". Indeed, a comprehensive and holistic package of interventions for TB control must involve multisectoral" and "multidisciplinary" efforts.

Practical approach to lung heath (PAL) is useful in the management of TB patients as the patients are managed through a "Syndromic approach" that educates them appropriately.

Achievements can be successfully maintained in the long term only through national health systems based on the primary health care (PHC) approach. Tuberculosis is a disease of poverty, having strong social and economic determinants. However, tuberculosis is essentially a disease of poverty, and unless we research the poorest of the poor, and focus on prevention and education, we cannot hope to eliminate the disease. The hurdles faced by national TB programmes in eliminating TB are often social and economic factors as much as health factors: poverty, stigma, polluted and crowed living and working environments, displacement, poor nutrition, as well as difficulty in accessing quality diagnosis and treatment. There are also logistical and technical issues-there is an urgent need for better Laboratories and greater availability of improved diagnostics.

A comprehensive and holistic package of interventions for TB control must involve "multisectoral" and "multidisciplinary" efforts. The basic issue involving the following areas must tackled first for TB control.

- Universal case detection of all forms of TB
- Introduction of new and more effective laboratory
- Increasing access to quality DOTS services;
- Effective infection control, both in and outside institutions
- Availability of quality TB drugs that are affordable to individuals, families, community and the government; and
- Drugs that is accessible to all patients who need them.

In particular, the rational use of anti-TB drugs must be promoted.

Understanding Glycaemic Index for healthy Life of Jaffna People

Senior Prof. Vasanthy Arasaratnam
Department of Biochemistry,
Faculty of Medicine, university of Jaffna
Vice chancellor
arva26arva@yahoo.com

1. What is glycaemic index?

Glycaemic index measures the rate at which the carbohydrate in certain foods is digested and absorbed into the blood stream as glucose, i.e. the GI of a food represents its blood-glucose raising potential. The Glycaemic Index according to FAO/WHO is defined as the incremental area under the blood glucose response curve of a 75g carbohydrate portion of a test food expressed as a percent of the response to the same amount of carbohydrate from a standard food taken by the same subject. Foods with a high glycaemic index raise blood glucose quickly, (e.g. glucose) while with low glycaemic index (e.g. legumes) promote a slower release of glucose (and raise blood glucose slowly) and insulin. Diets with high-glycaemic index have been linked to an increased risk for both diabetes and heart disease. **Glycemic Index (GI) ranks foods on a scale from 0 – 100, according to their actual effect on blood glucose levels.** On the Glycaemic Index scale, glucose is taken as 100 since it causes the greatest and most rapid rise in blood glucose - all other foods are rated in comparison to glucose. Since the GI ranks foods based on their actual effect on blood glucose levels. If a food has a glycaemic index of 75, it means that it raises blood glucose by 75% compared with glucose. Foods with an index number of 70 or more are considered to be of high GI, with an index number between 55-70 as medium GI, and 55 or less as low GI.

2. Factors That Influence The Glycaemic Index

The following factors influence the digestion and absorption of carbohydrates, and thus on blood-glucose levels, and hence affect the glycaemic index of the food.

Different nutrients

Fructose occurs naturally in many fruits, some vegetables (corn, sweet potato), corn syrup, and honey. Fructose is absorbed as fructose and contributes very little to blood glucose levels because fructose must be converted into glucose by the liver. High fructose foods have a lower GI.

And the greater the ratio of fructose (fruit sugar) to glucose in a food the lower its glycaemic index will be. It is interesting to note that sugar (sucrose) has a lower index than bread or potatoes because sucrose is a disaccharide made up of both glucose and fructose, if glucose has a glycaemic index of 100 and fructose is 23 then sucrose will be the average of these two figures i.e.**100 (GI glucose) + 23 (GI fructose) = 61.5 (quoted as 65) / 2.** Lactose and sucrose have an intermediate effect on blood glucose levels. Honey has an intermediate GI (58).

A ripe fruit or vegetable has a higher sugar content than one that is still green because during ripening large poly-saccharides are converted into small saccharides (sugars) leading to a decrease in the time to digest (with some 40%) and, therefore, has a higher glycaemic index, e.g. the riper the food the higher the GI, e.g. yellow/black bananas vs. greenish bananas.

It has been noticed for a long time that two carbohydrates (or poly- saccharides) with the same molecular weight but a different structure cause different reactions when digested. If there is more of the branched starch (amylopectin) and less of the unbranched chains (amylose), digestion will be quicker. Amylose is made up of long straight chains of glucose molecules which tend to line up in rows and form compact clumps that are harder to gelatinise and therefore more difficult to digest (lower GI). Starches, such as rice, can have different types of starch structures, which affect their digestibility. Among the rice available in Sri Lanka BW 400 red varieties showed lowest GI of 27.5 and BW 2726-B (parboiled) showed the highest value of 42.9. Some types of rice such as Basmati have higher amylose content. Other rice, with higher amylopectin content, is much easier to digest and has a higher GI. Beans and pulses have mostly amylose and are digested slowly. The starch in potatoes, for example, is digested and absorbed into the bloodstream relatively quickly.

Fibers are "those carbohydrates that are not digested by human enzymes in the small intestine". Fibers shield the carbohydrates in food from immediate digestion, so the sugars in fiber-rich foods tend to be absorbed into the bloodstream more slowly. Soluble fiber slows down the digestion of starches and the absorption of glucose into the bloodstream, e.g. fruit pectin (especially cold climate fruits) and legume fiber (baked beans, lentils etc.)22. Further the foods containing soluble fiber have a **lowering** effect on the GI because they delay gastric emptying. Insoluble fiber such as that found in digestive bran has very little effect on the digestibility of the carbohydrate foods it is found in. But, in very large amounts, bran can lower the GI.

Stomach is emptied slowly if the food contains high amounts of protein and fat. The higher the fat content of foods the slower its carbohydrates are converted to sugar and absorbed into the bloodstream. As they take longer to digest they have a lower GI. Fat also slows the absorption of a meal. However, it is not advisable to eat too much protein or fat. Protein tends to wear out the body's insulin; and fat has the effect of decreasing the effectiveness of insulin. Protein also overtaxes the kidneys and an over-consumption thereof can lead to osteoporosis, arthritis and gout.

Methods of food preparation Milling,

Blending, mixing, mashing and refining foods raise the GI of that food. That is why it is recommended to limit beating, liquidizing or processing in recipes. One of the most important factors in increasing GI is the degree of processing of carbohydrates. In highly processed carbohydrates, the outer bran and inner germ layer are removed from the original kernel of grain, which causes bigger spikes in blood sugar levels than would occur with less-processed grains. Foods, which are more processed, digested quicker and have a higher GI, e.g. instant potato, refined cereals. Processing makes the starch faster to digest. Whole-grain foods tend to have a lower glycaemic index than their more highly processed counterparts.

Gelatinisation of starch occurs when the starchy food is exposed to liquid and heat (i.e. cooking). Water binds with starch (e.g. flour) in the presence of heat and gelatinises the flour. The heat and water expand the hard compact starch granules (which make the raw starch difficult to digest) into swollen granules. Some granules even burst and free the starch molecules. **The less a starch is gelatinised, the slower it is digested and absorbed.** In other words, it will have a lower GI. **Many confectionery items that contain sugar have a lower GI than those without!** If sugar is added, **the sugar binds with the liquid, preventing it from binding with the starch and thereby preventing gelatinisation.**

Finely ground flour has a higher glycaemic index than more coarsely ground flour. Intact grains such as whole wheat, whole corn and whole rice have a much lower GI value than flours made from the same grains.

The more processed/refined a food is, the higher the GI. Foods, which are more, textured, chewy, crunchy, fibrous tend to take longer to be digested and release their glucose into the blood stream more slowly than soft, refined or pre-cooked foods. Long grain white rice has a lower GI than quick cooking brown rice and multigrain bread has a lower GI than whole meal bread.

Anti nutrients such as Phytates, lectins and polyphenols (tannins) normally slow digestion and thereby decrease the GI. If an acidic food is added to a meal, this will lower the GI, e.g. by adding dressing to a salad, digestion of food by the stomach is made more slow. The higher the acid contents of a food, the slower its carbohydrates are converted to sugar and absorbed into the bloodstream. The more acidic a food, the lower is the GI of that food, e.g. lemon juice on vegetables, vinaigrette dressings on salad, pickled foods, increasing the acidity of bread by using sour dough fermentation. For example, a green apple will have a lower GI than a yellow Golden Apple.

Food that has not been properly chewed also has a lower GI – it may also lead to indigestion.

Salt and salty foods/condiments tend to speed the rate of digestion of starches and increase the rate of absorption of glucose and increases the GI of the meal.

3. Glycaemic Index versus Glycaemic Load

If foods with low GI are eaten, the blood sugar levels will remain more stable. But when low glycaemic index foods are chosen and eaten too many of them at once, that is, if a meal with a high glycaemic load is eaten, the blood sugar will still rise dramatically and excessive amounts of insulin is required to deal with it. The blood sugar levels will not be nearly stable enough because the insulin index of the meal is too high. The Insulin Index measures the amount of insulin the body produces in response to a set carbohydrate load in a particular food.

Which is more important, is glycaemic index or glycaemic load?

The glycaemic load of a meal has a much greater effect on its insulin index than its glycaemic index, so the total amounts of carbohydrates that are consumed control blood sugar levels. If high

glycaemic indexed carbohydrate foods are chosen, and if small amount of them is eaten, the blood sugar will be under control. Thus eating a small amount of carbohydrates with high GI is not unhealthy. While, too much of carbohydrates with low GI are still bad. Sucrose is a good example of the difference between glycaemic response and insulin response. Sugar (sucrose) is insulinogenic (meaning it elevates insulin), but the insulin-stimulation caused by ingesting sugar is greater than its GI would indicate. When dietary fat is added to sugar, the combination of fat and sucrose produces a mild glycaemic response, but with a powerful fat-storing insulin response. Choosing foods with a low GI and low insulin index can improve diabetic management and may possibly reduce the incidence of diabetes complications e.g. heart disease, renal disease.

4. What is the significance of Glycemic Index?

All foods with a GI of 50 or less are slow releasers of carbohydrates and are the best choices for inactive people, the overweight, as well as diabetics and persons with high triacylglycerols. Low GI means a smaller rise in blood sugar and can help to control established diabetes, can help people to lose weight and lower blood lipids and can improve the body's sensitivity to insulin. **Low GI foods** are best for most people to reduce appetite and help reduce overeating. **Low-GI diets offer a unique set of benefits such as they** `do not stimulate fat storage, enhance sports performance, improve energy levels while reducing sugar-related energy and mood swings, improve muscle to fat ratio, enhance mental alertness and may help to lower blood lipids.

Intermediate GI foods are those with a GI of between 50 and 70. They are the best choice after low-intensity exercise of short duration, in the morning after exercising the previous night and directly after moderate activity in diabetics.

Foods with a GI of 70 and higher are called high-GI foods. High-GI foods are excellent for the prevention of fatigue and hypoglycaemia in regular sportsmen after doing moderate to high-intensity exercise. High-GI foods should, however, be limited by diabetics under normal circumstances, but are completely safe after **strenuous** exercise lasting two to three hours.

5. What Problems Are there in practicing GI?

i. GI values of all foods are not known.
ii. Foods are not eaten as varied meals.
iii. The GI varies for different brands of the same product
iv. The GI does not relate to the nutritional value of a food.

6. Jaffna Food and glycaemic index

Form our recent studies the GI values obtained for the locally available foods were determined. The glycaemic index (GI) values of cooked white rice, brown rice, parboiled rice, 'Pittu' and 'string hopper' are given in Table. The mean GI values of parboiled rice ('Mottaikarupan'), 'kurakkan pittu' (Eleucine coracana) and 'atta pittu' (whole wheat grain flour) either with green leaf curry (Amaranthus) or gravy (soya meat) or green leaf curry and gravy were determined. The GI of parboiled rice or 'kurakkan pittu' or 'atta pittu' with green leaf curry differed significantly from other

combined foods. The GI of parboiled rice or 'kurakkan pittu' or 'atta pittu' with gravy or green leaf curry and gravy did not differ significantly among them. 'Kurakkan pittu' is inferior to 'atta pittu' and parboiled rice. Including curries to basic foods altered the GI. Therefore, when dietary advice is given to diabetic patients, not only the basic foods, but also the curries to be consumed have to be considered. From the findings it could be concluded that among the starch sources 'atta flour' pittu was the best followed by parboiled rice. Even though we have had the believe that 'kurakan' and its flour are good starch based diets for diabetics and CVD patients, and obese and overweight persons. The results indicated that the foods made out of 'kurakan' flour should not be recommended.

The glycaemic index (GI) values of cassava (Manihot esculenta), potato ((Solanum tuberosum, Nuwara Elia), boiled green gram (Vigna radiata) and chick pea (Cicer arietinum) were determined. Boiled green gram and chick pea were low GI diets. Cassava was a high GI diet. As low GI diets are good for diabetic and coronary heart disease patients, precaution has to be taken when selecting the correct diets.

The glycemic index of the bakery products such as bread, normal bun, butter cake, hard bun, and rusk available in Jaffna was determined. The results suggested that the hard bun and rusk have lower GI and bread, normal bun and butter cake are medium GI foods.

Glycemic index of Dosai and Idly with different combinations of side dishes were determined. Based on these GI values, it can be suggested that 'Idly' with 'sambol' & plantain ('itharai') is lower GI food *(the GI values are less than 55%). The 'dhosai' either with 'sambol' or 'sambol' & plantain* ('itharai') or 'sampar' & plantain ('itharai') or 'sambol' & 'sampar' or 'sambol', 'sampar' & plantain ('itharai') and 'idly' either with 'sambol' or 'sampar' & plantain ('itharai') or 'sambol' & 'sampar' or 'sambol', 'sampar' & plantain ('itharai') are medium GI foods (the GI values between 55 to 70%). The 'dosai' either with 'sampar' and 'idly' with 'sampar' are high GI foods (the GI values are more than 70 %). 'dhosai' is inferior to 'idly'. When plantain ('itharai') was given with 'dhosai' and 'idly', the GI values were decreased. When these foods were eaten with 'sampar', the GI values were increased. The GI values were increased when the foods were consumed with 'sampar' alone or 'sampar' and 'sambol'. Thus, when consuming the basic foods with different side dishes, the GI values would be altered.

The glycemic index (GI) values of fruits such as 'Kathali' (Yellow plantain), 'Kappal' (Golden plantain), and 'Itharai' (Green plantain) varieties of plantains, jack fruit and papaya were determined (Table 3). Among the different types of plantain varieties, ripped 'ithari' is best followed by kappal. However among the fruits, papya is the best followed by 'Ithari' variety of plantain.

7. Conclusion

Therefore, when dietary advices are given to diabetic and coronary heart disease patients, not only the basic foods have to be considered but also the slide dishes to be consumed. The lower GI value foods are better choices for patients who are suffering from diabetes mellitus and coronary heart diseases while higher glycaemic index foods are good for athletes and to those who wants to increase the weight.

Foods			Glycemic index (%)
Rice	Parboiled		56.00
	Sampa		66.60
	Polished (At-402)		60.20
Parboiled rice	Green leafy curry		47.50
	Gravy		56.30
	Green leafy curry and gravy		54.70
String Hoppers	Rice flour and wheat flour-1:2 ratio		50.00
Pittu	Rice flour and wheat flour-1:2 ratio		43.70
	Kurakkan flour	Green leafy curry	57.50
		Gravy	63.30
		Green leafy curry & gravy	59.30
	Atta flour	Green leafy curry	44.40
		Gravy	50.80
		Green leafy curry & gravy	46.30
Bakery Products	Wheat Flour bread		68.59
	Normal Bun		67.30
	Hard bun		52.78
	Butter cake		64.72
	Rusk		50.30
Boiled Foods	Potato		75.20
	Cassava		78.70
	Chick pea		33.30
	Green gram		31.40
'Dosai'	'Sambol'		63.93
	'Sambol' & Plantain ('Itharai')		60.17
	'Sampar'		71.90
	'Sampar' & Plantain ('Itharai')		68.57
	'Sambol' & 'Sampar'		65.63
	'Sambol', 'Sampar' & Plantain ('Itharai')		63.04
'Idly'	'Sambol'		56.85
	'Sambol' & Plantain ('Itharai')		51.10
	'Sampar' & Plantain ('Itharai')		70.32
	'Sampar' & Plantain ('Itharai')		67.45
	'Sambol' & 'Sampar'		63.99
	'Sambol', 'Sampar' & Plantain ('Itharai')		61.30
Plantain	'Kappal'		54.50
	'Kathali'		50.40
	'Itharai'		48.50
Fruits	Papaya fruit		34.8
	Jack fruit		64.4

Table: Glycemic Index values of different foods commonly eaten by Jaffna inhabitants.

Economically Viable Medicinal Plants in Jaffna

Dr.(Mrs).V.Sathiyaseelan
Senior Lecturer
Unit Of Siddha Medicine
University of Jaffna

About 250 plants are commonly used in the day to day practice of indigenous medicine and it is sad to say that nearly 80% of these are imported from India and the neighboring countries. For numerous reasons they are presently found scarcely or not found at all here.

Some economically viable species

1. **Kandankathari:-** Solanum virginianum

An annual prostrate herb, the root is valued as an expectorant and used in coughs, asthma and loss of appetite. Large quantities are imported from India. This plant has grown extensively here, especially in Vadamarachi, Keerimalai and Kaithady areas. The Indian variety when dried looks golden yellow where as the local variety looks pale ash or black in colour, sometimes with fungus attack. Research is needed on aspects of drying and processing. This price varies from Rs 350 to 400 per Kg.

2. **Amukkara:-** Withania somnifera

This plant was found abundantly in the dry zone as a weed. In the past this plant had grown at Poinpitro presently is cultivated in the Navakiri herbal garden and one of the farmer's garden at Sandilipay. Its tuber is used in medicine as it is believed to have rejuvenating properties and neurological disorders sometimes physicians used the plant Ruellia tuberose (Veadipalavan-Tamil name) as a substitute. The price of Amukkara varies between Rs 600 to 650 per Kg. roots can be harvested after about 41/2months.

3. **Vasambu:** - Acorus calamous

This is an aquatic plant growing in both wet and dry zones. It is commonly see in Thunnalai pillayar temple pond. The dry rhizome is used in medicine. It is an aromatic marshy herb. An infusion of the rhizome is given for dyspepsia, flatulence, choleric diarrhea in children, cough, and fever and with other ingredients for abdominal colic, piles and anemia. The powdered rhizome in an insecticide. Large quantities are imported from India. Rhizomes can be harvested after ten months. It costs about Rs 300 to 350 per Kg.

4. **Nilavembu:** - Andrographis paniculata

An annual herb. The plant is useful for treating fever, general debility, dysentery and certain forms of dyspepsia. The root and leaves are used in medicine. Even though the plant is available in Jaffna, large quantities are imported from India. Whole plant is used in medicine. A decoction of this plant is an excellent bitter tonic often used as a substitute for Peristrophe bicalyculata (Kattu nilavembu). The price varies from Rs 1300 to 1400 per Kg.

5. **Nelli:** - Phylanthus emblica

A small or middle sized tree. Ripe fruits used generally fresh, dry also used. It is very commonly seen at the vicinity of the temples. Large quantities are used for making linctuses, lekiyam and hair oils. The famous chavana prassva lakiyam is made out of raw nelli. Although the BMARI developed a method for drying nelli, very little is processed locally. It costs about Rs 350 to 400 per Kg.

6. **Nannari:-** Hemidesmus indicus

Perennial, semi shrubby twiner. Occurring over the greater part of Jaffna. Hot infusion of the root bark with milk and sugar is a good alterative, blood purificator and tonic, especially for children. It is a genuine species found in Jaffna district.

Decalepis hamiltonii (Malai nannari) is an another species used as substitute for a genuine species of Hemidesmus indicus. But the substitute of Decalepis hamiltonii is imported from India are probably of an inferior quality compared to the local variety. It costs about Rs 600 to 650 per Kg.

The above mentioned plants could be considered as economically viable medicinal plants. Farmers should be encouraged to grow these and they should be taught about techniques of growing, harvesting and processing of plant products. Research in to various aspects of growing, harvesting and processing should be encouraged. The existing knowledge should be disseminated. Fifteen outlets are available as in only in traditional outlets, there should be modernized by identifying the substitute in the outlets and by preventing their usage, we can encourage the usage of genuine species of raw materials.

Employees' Provident Fund and its Present Stand in the Northern Province

Mr.Kanagasabapathy Kanakeshwaran, B.A, M.A, SLAS
Deputy Commisinor of labour,
Northern Province.
dclnorthzonal@gmail.com

Employees' provident fund Act came into operation from 1st June 1958. The act has been amended several time thereafter. This fund insure retiring benefit to Employed person in the private sector, State –sponsored co-operation, statutory board and peoplised undertaking by means of contributory provident fund and are based on the principal that superannuation of employees is the joint responsibility of the employees and employer.

Membership

Whatever is the nature of the employment is not important. It may be permanent, non-permanent, apprentices , temporary, Casual, shifting, piece rate, on contract basis, on commission basis and on quantum of work basis all the above categories of employees whether male or female , If remunerated (in cash or any other manner) are entitled to membership in the employees provident fund.

Once it is commenced contributing towards E.P.F on behalf of the employees, E.P.F membership cards viz A, B & H should be filled perfectly and forwarded to the relevant Labour offices in order to ascertain the member ship of the respective employees. Upon authentication made in the "B" card the Labour office will send back the "B" card to the respective Employers enabling them to hand over same to the employees concerned. Securing this important document will facilitate the E.P.F related correspondences in the future.

At present measures are take up to obtain the Employees' Finger print, photo graphs and scanning of N.I.C, in addition to the earlier formalities In filling up of A,B & H cards. These additional measures give more protection to the E.P.F Contributors.

The office for this task had been setup of the Deputy Commissioner's office (Northern Zone) in Jaffna meant for all the employers from Northern region. Employers are expected to make arrangements for their employees to provide the finger prints and other requirements during weekdays only.

Rate of Contribution

Every employee in covered employment must pay minimum of 8% and the employer a minimum of 12% of the employee's total earning for each month to the Employees provident fund. Therefore a sum equivalent to 20% of employee's total earning is going to the central bank of Sri

Lanka. The employer is authorized to deduct 8% of the total earning but employer has no authority to deduct anything from employees earning in respect of the 12% that he much contribute.

Contributions are computed in the total earning. It include the salary, cost of living allowances payment made in respect of holidays, cash value of food supplied, food allowance and any other kind of remuneration expect overtime, bonus and incentive

Refund of benefit

In the following situation a member of the fund shall be paid the total amount lying in such members' individual account as soon as possible.

- **Reaching age of retirement .**When males on reaching 55 years of age and females reaching 50 years have retired from service they are entitled to receive the benefits.
- **Leaving service on ground of marriage.** Women employees who have left service in either of the following ways are entitled to have their benefits paid to them.
  - If married, within 5 years of leaving service
  - Have left service within 3 months get marriage.
- **Leaving service on permanent disability.** Any person concern is unable to work anymore is entitled to have their benefits paid to them.
- **Migrating on a permanent visa.** If any person want to go abroad with No Intention of return. He is entitled to have their benefits paid to them.
- **Leaving for employment in government service or Local government.** Those who leave on securing employment in Government service or Local government service with permanent and pensionable ground are entitle to have their benefit paid to them.
- **Benefits of a deiced member.** When member of the fund dies before becoming entitled thereto, his nominee or legal heirs are entitled to have their benefit paid to them.

Enforcement of E.P.F activities might have lagging during prolong of the conflict but it has taken a fresh trend with the inauguration of KIlinichchi sub labour office and the Mullaitivu sub labour office on 09/06/2010 and 04/01/2012 respectively for tendering grater service to the public after ceasing conflict.

In the wake of the completion of hostility, Labour inspections with regard to Employees Provident Fund are being carried out in full swing.

Field inspections also have increased tremendously with the recruitment of Labour officers newly.

The chart shown hereunder is self-explanatory for these facts

District	E.P.F Labour inspection	
	2011	2012
Jaffna	2473	1693
Vavuniya	1586	757
Kilinochhci	420	359
Mullaitivu	-	301
Mannar	23	55

With the increase of E.P.F inspections the numerical strength of Establishments those have been enlisted to the E.P.F scheme also have increased and also the contributors' statistic also had considerably increased.

The chart shown hereunder confirm this position

District	No of Establishments enrolled to E.P.F scheme		No of Employees enrolled to E.P.F scheme	
	2011	2012	2011	2012
Jaffna	355	264	936	854
Vavuniya	85	481	62	333
Kilinochchi	139	81	260	386
Mullaitivu	-	63	-	156
Mannar	07	13	16	55

Not only the enrollment of new contributory to the E.P.F scheme is taken a fresh trend but also the E.P.F Refunding process is in lighting speed both in the Jaffna District Labour office and in the Vavuniya District Labour office.

The applications submitted with adequate and correct information are being rapidly processed and the payment of refund is deposited to the member's account within two weeks' time.

Office	Refund of E.P.F Benefits (K claim)	
	2011	2012
District Labour office, Jaffna	890	999
District Labour office, Vavuniya	439	435

Anyone who have lost their related documents by reason of the conflict or by any other reasons need not hesitate to visit the nearest Labour office, and get their E.P.F benefits returned within a shortest period.

Telephone numbers and addresses for easy contact to E.P.F related matters.

Name of the office	Address	Telephone Numbers And email addresss
Office of Deputy Commissioner of Labour Northern Province	Sivan pannai road, Jaffna	0212226333 dclnorthzonal@gmail.com
District Labour office Jaffna	Sivan pannai road, Jaffna	0212222375 DlabourJaffna@gmail.com
District Labour office Vavuniya	Park road, Vavuniya	0242222316, 0242226712 dolvavuniya@sltnet.lk
Labour office, Kilinochchi	Kandy road, Kilinochchi	0212285020 kilabourdept@gmail.com
Labour office, Mullaitivu.	Agrarian service centre Mulliyawalai	0213215330
Labour office, Mannar.	Pallimunai, Mannar	0232222331

Friends Bank

Mr.S.Rajendran
asrajendran@hotmail.com

Recently I had the pleasure of speaking at the 100th meeting of the Jaffna Managers Forum. I was really surprised to see that something like this forum can happen in a war torn zone. I could see that the hall was full of enthusiastic people who were not shy to take part in a discussion. I have spent most of the last 40 years outside Sri Lanka and used to visit only occasionally. I know the difficulties one had to face in organizing meetings and especially in a regular format and where people can freely express their opinion. The organizers should be congratulated for their effort. The list of the speakers in these hundred meetings is very impressive.

At the end of the meeting on that day few questions came to my mind. During this period I happened to read a novel titled "The Zahir" by the world famous Brazilian author Paulo Coelho. I am writing this article based on the questions raised in my mind and some interesting points made in the novel.

Basically the three important aspects of JMF are:

1. To let people know that there are a lot of business opportunities in this region and with some effort hidden wealth can be brought to surface.
2. To share technical and business information among like-minded people, and
3. To establish contacts and friends.

The concept of making right contacts for a successful business is not only relevant to our area but also true worldwide. In the novel, the author refers this as 'Favor Bank', the most powerful bank in the world. In every sphere of life people have to make deposits in the bank and at the right time they will withdraw favors from the bank.

The following passage is quoted from the book:

Quote:

"I start making deposits in your account - not cash deposits, you understand, but contacts. I introduce you to such and such person; I arrange certain deals, as long as they're legal. You know that you owe me something, but I never ask you for anything'.

'And then one day....'

'Exactly. One day, I'll ask you for a favor and you could, of course, say "No", but you're conscious of being in my debt. You do what I ask, I continue to help you, and other people see that you're a decent, loyal sort of person and so they too make deposits in your account - always in the form of contacts, because this world is made up of contacts and nothing else. They too will one day ask you

for a favor, and you will respect and help the people who have helped you, and, in time, you'll have spread your net worldwide, you'll know everyone you need to know and your influence will keep on growing'

Unquote:

According to Paulo Coelho, the idea of 'Favor Bank' was first mentioned in 'The Bonfire of the Vanities' by Tom Wolfe. What is said in this Favor Bank concept is that you have to deposit in the form of 'helps' to various people so that you can reap the benefit at a later profitable time. Everything is done within the law. Yet, timely help from the appropriate people can take your business a long way.

The idea of helping others so that you will be helped is not new to Tamils. Long ago, one of the greatest poet of the world, Auvaiyar (xsitahh;) had said it with a difference in one poem.

"நன்றி ஒருவர்க்குச் செய்தற்கால் அந்நன்றி
என்று தருங்கொல்' என வேண்டா - நின்று
தளரா வளர் தெங்கு தான் உண்ட நீரைத்
தலையாலே தான் தருதலால்"

Auvaiyar is an expert in expressing her thoughts with the appropriate metaphors. As far as I know she is the best poet in this aspect. In this poem she tells not to worry about when you would be repaid for the help you have done to somebody. She compares it with helping the coconut tree by watering the roots and getting the reward in the form of coconuts from the head of the tree. She means something different from the 'Favor Bank'. According to her, if you help somebody, some day you will be helped by someone else (including the helped person). I am sure that in this business world she would accept that nothing is wrong to expect to be helped by the person you help.

In this context, I like to bring to your notice to the saying by another great Tamil poet, 'Thiruvalluvar':

"அன்பும் அறனும் உடைத்தாயின் இல்வாழ்வில்
பண்பும் பயனும் அது"

In this kural, Thiruvalluvar says that if you lead a loving, helping and virtuous life, the reward is the joy and peace of mind you get out of it. You do not need to be repaid by others. The action alone brings forth joy and peace of mind. I agree with this idea, because joy and peace of mind are the ones everyone is looking for in this world. Even though this may not be very useful in the business world, it is better to have it always in your mind to remind you that you have been rewarded to some extent while helping others. In case someone does not help you in return, there is some consolation that you have already been rewarded with joy and peace, thus preventing you from being emotionally upset too much.

As far as JMF is concerned, I know that it is already contributing towards making contacts and helping others. But, can JMF do more?. Yes, I think so given the current Jaffna situation. At the moment, because of the long war, Jaffna man is suffering in two aspects:

1. He has no confidence in himself and he hesitates to take any risk (During war time: " If I say or do something one of the parties does not like I will be punished")
2. He does not trust the other person (During war time: " I cannot trust him because he may belong to any one of the other parties and may inform them that I am against them")

Given the two above scenarios, we can understand the mind set of the Jaffna man. Without the self-confidence and the trust in others it is very difficult to succeed in business. Nobody can blame him. It will take time to build the old confidence and to start trusting others. The JMF can play a positive role in building up the two missing aspects.

Currently JMF is holding meetings only among a small group of people and that too only in Jaffna town. JMF can spread its wings to other parts of Jaffna (in fact, to other parts of Tamil areas and later to other parts of Sri Lanka) involving as many people as possible. In order to do that, the organizers have to make an important decision. Currently, I notice that the proceedings of JMF is mainly in English. It is very difficult to spread the institution using English alone. (Please note that I am a lover of Tamil language, but not a fanatic. I believe that English is essential for any continuous progress and English should be taught in schools using a fast track method). If one of the main aims is to build confidence among people it is necessary that the communication among them has to be excellent. Communication cannot be done effectively with only less than ten percent of the people being fluent in that language.

Furthermore, using English as the main communication language will alienate a lot of people and will create a social-divide, something similar to the caste system. In fact, we have to do three things in parallel; one is to help everyone to build their circle of friends, the second one is to make them confident to do whatever they are good in and the other one is to make everyone bilingual.

I like to quote another passage by Paulo Coelha

Quote:

"He was helped in his struggles by the angels; celestial forces placed each thing in its place, thus allowing him to give of his best. That is why, at sunset, he kneels and gives thanks for the Protective Cloak surrounding him.

His companion says: 'He's so lucky!' But he knows that 'luck' is knowing to look around him and to see where his friends are, because it was through their words that the angels were able to make themselves heard"

Unquote

I believe that the Universe is sending us messages continuously either directly by way of intuitions or through friends.

I hope that JMF can play a leading role in helping Jaffna man to deposit 'funds' in his own 'Friends Bank'

Review on Development and the Jaffna Managers Forum

Mr.R.A. Thilagaratnam.
Retired Director,
Advanced Technological Institute (ATI) Jaffna.
Administrative Officer – Caritas Jaffna HUDEC
rthilagaratnam@yahoo.com

The Jaffna Managers Forum (JMF) has initiated and continuing to contribute towards the regional development in Jaffna from 2005. At its periodical meetings the discussions always center around economic development, political, social and cultural issues. The concentration is on resettlement of the IDPs as a priority, streamlining the Educational and Health facilities. The prolonged thirty years old conflict and displacement of the people from their own abode without the basic needs has cost a big psychological impact among children, parents, elders and the sick. As a result of the ethnic conflict the development programme in Jaffna virtually came to a standstill during the period 1980 to may 2009. With the cessation of war the Government has commenced the resettlement programme diverting all available resources towards development. There is also a progressive attempt towards regional developmentby the FOURM contribution since the year 2010 after the resettlements started. I wish to place on record my appreciation to the management of Eurovil with the special mention to Mr.Niranjan for the keen enthusiasm exhibited, to organize discussions of this nature.

"Development is a complex issue, with many different and sometimes contentious definitions. A basic perspective equates development with economic growth. The United Nations Development Programme use a more detailed definition – According to them development is **"to lead long and healthy lives, to be knowledgeable, to have access to the resources needed for a decent standard of living and to be able to participate in the life of the community".** Achieving human development is linked to a third perspective of development which views it as freeing people from obstacles that affect their ability to develop their own lives and communities. **Development, therefore, is empowerment:** it is about local people taking control of their own lives, expressing their own demands and finding their own solutions to their problems".

It is obvious that the rehabilitation and reconciliation of Jaffna District can be justified by the progress of constructive development. Since the Government articulated that the war is not against Tamil's but to liberate Tamils from LTTE, priority given for the development of war torn Jaffna is justifiable. Now the question is "what they mean by development especially after subjugating the area for more than three decades?" They have interpreted that the infrastructure development, such as highways, roads, banks and business ventures lead to economic development. At this juncture we have to pose a question as to whether we too are prepared to accept the development in the same sense?, and when discussing about the banking developments, medical improvements, political opinions, social

and cultural views, stock market involvements, etc, can these help to fulfill the actual expectations of the war affected resettled victims.

We cannot run away from studying and understanding the impact of the war and the ground situation. The suffering of the IDPs and the aggrieved and the denial of self employment for their daily sustenance forced them to depend on the Government and assistance from welfare organizations. This sort of long time dependence paved the way to lose self confident, self respect and even the gained experience skills in their own vocation. They continue to expect similar support even now, Instead of regaining their traditional skills, self confidence and self employment and to make use of the available resources in the north. These attitudinal changes can be due to the continuing abnormal civil administration and intervention of the security forces in the civil administration. The denial of resettlement of the IDPs in their own land to reactivate their own professions such as fishing, agriculture and other self employment still continues. Further we can observe the differences among most of them in achieving job satisfaction, reluctance in decision making and to accept responsibilities. Unemployment and under employment especially in Government sector are conspicuous to all stakeholders. Under the prevailing situation, to avoid unwanted confrontations and in fear majority of youth seek asylum abroad. Majority of us are also aware that a reasonable number of families are still depending on their relative's remittances from abroad for their daily bread.

In this scenario the following setbacks will have to be considered:-

- The educated youth and even graduates have less competence in their learning areas. As English is a universal language and it is a must to know other advanced technical skills to compete in the job markets.
- Earning concept has become prioritized in the organizational behavior and not to consider the satisfaction of the consumers.
- Change of Consumer behavior has made them depend for everything from the markets, and to reject homemade local products.
- The householders have developed a culture to depend on Colombo.
- The interventions of southern entrepreneurs lead either to capture the savings of the local people or induce them to spend on unnecessary luxury items.
- Penetration of the southern and Indian fishermen to the Northern fishing areas prevents the Jaffna fishermen to do fishing.
- Self appreciation behaviors of parents or relatives for the achievement of students by the advertisements in the daily papers may misinterpret the cultural values.
- More importance is given for learning in the tuition centers which is accepted as a status of symbol than in school learning

Without considering the above facts, organizing discussions on general topics, will it lead to development?

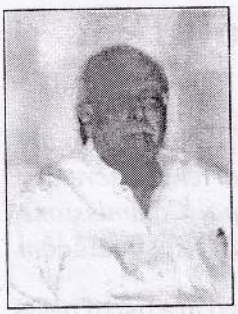
We feel that the FORUM discussions can redesign the objective goals and outcomes. The main concern of the discussions should provide facilities for the people to have control of their own lives, and find their own solution to their problems to make them self - reliant. In this view we must target the satisfaction of the common people and not to satisfy the aspirations of the well to do people. These include the Investors, Politicians, Educationists, and even intellectual. Conducting the discussions in English may be a symbol for development in the intellectual circle. But we must avoid hidden agendas behind development. Further our discussions without proper follow ups will not be pragmatic. Here we are only bringing awareness for the smooth implementation of our programmes. Therefore we will have to redesign the FOURM activities. Our main ambition is to make the FOURM discussion more meaningful.

We have to be aware that any of these hidden agendas should not convert this region as a new marketing segment solely for the southern traders. The present obstacle for the marketing local products should be overcome instead of allowing the southern products to enter the local markets. Meaning full steps should be taken to extend the marketability of the local products. When considering the regional economic development a subsidized scheme is essential to resist cost analysis and globalization trend.

As humanitarian activators we had an opportunity to evaluate the attitudes of the people who are trying to regain their normal life after the cessation of war in the Northern Province. They feel that they are oppressed, and even supervised rigidly for reasons of security and hence Voiceless. This state of affair may have been taken up as an advantage by the oppressors to meet their interest only. The activities of the FORUM simply tolerate and overlook such setbacks in the name of development. This doesn't mean that we the citizens of this region are allowing ourselves to be exploited by the oppressors. Also we understand that something is better than nothing and your interventions might influence some of our scholars and well wishes to contribute towards the development targets of the Government. But the main concern is that development should lead the people to take over proper responsibilities, on their own.

It is important of point out that the people should be empowered to contribute to the development, make to understand the realities of taking part in a role in development and to know legal matters that allow them to mobilize the resources on their own. And above all they must realize that there is universal assurance for human dignity. Failing to consider the above facts the discussions may isolate the ordinary people from the development. For example after so much of advocacy programmes organized on share market operations by the FORUM, the motivation to promote limited companies in the region is still not in process. Here we will be blamed if we do not consider above the selfish attitude of some of our people in this regard. To gain profit or to increase their earnings they are prepared to adopt any criss-cross manipulations. This is the main obstacle in the way to development. I suggest these, considering the above facts to make the FOURM more effective.

Message to Jaffna Managers Forum



Prof.Tissa Vitharane
Minister of Science and Technology and the Leader of the LSSP

It is with great pleasure that I send this message in appreciation of the success of your Forum in crossing the 100 meetings mark, and to wish you well. It is an indication of the seriousness of the intellectuals of Jaffna to help re-build the economy and society, undoubtedly on better and more modern lines, after years of war and devastation. It has been the view of the LSSP that the Tamil people must be empowered to achieve effective and meaningful development. It was therefore most appropriate that I had the opportunity to discuss with your membership the key issue of "devolution" and how the various problems can be overcome.

I would like to emphasize the fact that in order to get optimal devolution it is essential that the fear of "separation" that exists in the South must be removed by a categorical and unambiguous commitment to the unity of Sri Lanka by the leaders of the TNA and the rejection of separation. Further the TNA should participate without pre-conditions in the Select Committee process in Parliament to achieve the broadest possible consensus, which includes the SLFP, on a solution to the national question and to fashion a new Constitution, now that we, from within the Government, have got the President to agree to such a course, within a limited time frame. We are glad that our request for early elections to the Northern Provincial Council have borne fruit and they are to be held in September. This is a good first step.

I am glad that the importance of science, technology and innovation for development was brought up in the course of our discussion. I, as the Minister of Scientific Affairs, both as a LSSPer and a scientist, have always emphasized that the way out of poverty for Sri Lanka is through the maximization of value addition to our raw materials, specially by using advanced technology – nanotechnology, biotechnology, electronics etc. By establishing the Sri Lanka Institute of Nanotechnology (SLINTEC) near Colombo, and the Vidatha centres to support the SMEs, in Jaffna as well, I have provided the technology platform for economic takeoff. I hope your members will make use of these opportunities to generate industries that could produce the Hi tech products that would capture markets, both in Sri Lanka and abroad.

Your well attended meeting also provided me the opportunity to clear some misunderstandings that existed regarding the role of the LSSP. The 1972 Constitution, drafted by Dr. Colvin R de Silva, an LSSP leader, is a milestone in the history of the country in that it enabled our country to gain complete political independence from Britain by becoming a Republic. It also, for the first time in our history, handed sovereignty to the people, which had till then been enjoyed by the British, and prior to that foreign and local, hereditary rulers. The ineffective clause 29 (c) of the Soulbury Constitution, which had failed to protect minority rights e.g. the deprivation of citizenship rights of the Indian Tamils, and the Tamil language rights through the 1956 Sinhala only Language Act, were replaced by an entire chapter on Fundamental Rights. The LSSP remains committed to equal rights for the Tamil people.

Parliamentary Select Committee and the Political Solution

Mr. C.V.K.Sivagnanam
Chartered Secretary
Rtd. Municipal Commissione
cvkayes@gmail.com

The Tamil Community has a long history of having participated in a list of pacts , agreements ,talks, negotiations, with the Sri Lankan Governments to arrive at a reasonable solution to their political problems, but with no tangible results and have been let down at every turn.

The aspirations of the Tamil community have been very clearly spelt out by both the moderate and militant leaders during the last 65 years, and they are mainly as follows:

Recognition of the Northern and Eastern Provinces as the traditional homeland and areas of historical habitation of the Sri Lankan Tamil speaking people;
Recognition of the fact that the Tamils are a distinct Nation;
Recognition of the rights of the Tamil speaking people to self rule in a federal form of government;
Recognition of the right to self determination.

No one on either side of politics could pretend not to know these; but however these pretentions are still prevailing in the minds and actions of the southern leadership.

It appears to be very relevant to quote two paragraphs from the Lessons Learnt and Reconciliation Committee Report.

"9.184 The Commission takes the view that the root cause of the ethnic conflict in Sri Lanka lies in the failure of successive Governments to address the genuine grievances of the Tamil people."

"9.185 A political solution is imperative to address the causes of the conflict. Everybody speaks about it, though there is no agreement about the diagnosis and the prescription".

The LLRC has recognized the significant facts that the Tamil people have a genuine grievance; and that successive Governments have failed to address them. It has also emphasized the imperativeness of finding a solution to the ethnic issue.

The last or recent one regarding talks has been the bilateral talks between the SLFP delegation led by the Hon. Minister Nimal Sripala de Silva MP and the TNA delegation led by Hon.

R.Sampanthan MP, which commenced on 10th January 2011. After a few round of talks the TNA at the request of the Government delegation submitted a comprehensive proposal to it on 18 March 2011.

At this point it is very relevant to refute the allegation of a few people who say that the TNA has not put forward its demands to Government, and to categorically state that it has done so with full responsibility. These proposals were expected to be the basis on which the bilateral talks could have proceeded. This information would also meet the allegation within the Tamil ranks that the TNA was simply attending the talks without putting forward the demands and aspirations of the Tamil people.

Quoting a few paragraphs from the proposals would explicitly explain what the TNA has said and why the Government delegation did not respond to it.

"The Centre and the devolved units should be supreme in their respective spheres of competence in the executive and legislative spheres. Judicial power to be devolved through the Provincial High Courts."

"The governor of the Province must be a ceremonial post without powers over the executive or legislative spheres."

"All state land in the North East Province to vest in the Provincial Council with provision for the centre to request and use lands necessary in respect of reserved subjects in accordance with such procedures as may be established by law. Lands that are presently used by the Centre in respect of devolved subjects to be handed over to the Provincial Council. Land in excess of the Centre's requirement for any of the reserved subjects held by the Centre and requested by the Provincial council for a provincial subject shall be released to the Provincial Council in accordance with procedure established by law."

"One of the units of devolution would be the North and East Provinces."

"Law and Order to be devolved, except in matters concerning national security and offences relating to international crimes and inter- provincial crimes. A National Police Force and a Provincial Police Force to be set up."

"The reserved list for the Centre will consist of all matters necessary to preserve the unity, sovereignty and territorial integrity of Sri Lanka, without undermining maximum possible devolution".

"There is no need for a concurrent list." .....

The TNA continued to participate in the Talks with the hope that there would be a positive response from the Government side. However by 16th September 2011 it was obvious that the Government Delegation was backtracking

It was so tantalizing to the TNA, and to its disappointment on 10th October 2011, the Government announced the establishment of a Parliamentary Select Committee to deal with the political solution. With this, as usual with the attitude of successive Governments, the bilateral talks were un-ceremonially abandoned.

Now the much talked issue of the TNA not participating in the PSC arises. The position of the TNA was that it was much feasible to arrive at a consensus with the delegation of the SLFP which is the dominant major constituent of the UPFA which has around 17 parties within its ranks and then go to the Parliament.

It is also very relevant to state that arriving at any reasonable solution would be nigh impossible with the chauvinists personalities like Ministers Wimal Weeravansa and Hon.Champika Ranawakka who with their demagogue rhetoric is on record to have repeatedly stated that Tamils have no place in the governance of the country . They have also clearly demonstrated their demand that the 13th Amendment and the Provincial Council system should be scrapped and abolished and that they are opposed to any form of devolution. Of course the stand of the entire Tamil Nation is that these are not the solutions to the ethnic problem. However, these are considered as part of the entire country's administrative structure and not specifically for the Tamil Nation.,

An argument is advanced that the Leftist leaders in Parliament would stand by the TNA, if they attend the PSC. If that is so they can stand by the decisions arrived at the bilateral talks when it comes to the issue of approval by Parliament. Tamil people respect the leftist leaders, but have a feeling that they are helpless in the hands of the chauvinists and fundamentalist fanatics.

It must be emphasized that the TNA has never said that it will not participate in the PSC. It has at one stage offered to nominate three members to the PSC if the bilateral talks are resumed. It had certain reservations and compulsions which should have been cleared by the Government, if it was serious about reaching a political solution, especially in the light of the fact that Mr.Sampanthan has clarified that the TNA was ready to consider a solution within the framework of a united Sri Lanka.

It would now be clear that the creation of the PSC idea is a dilatory process and having found the TNA was advancing certain conditions, the Government started insisting on its participation. This is a method adopted to delay the political process in reaching a political solution to the ethnic issue.

Parliamentary Select Committee on Devolution of Powers and Related Matters

Eng.M.Sooriasegaram, Bsc, Bsc (Eng), Msc,
Consulting Engineer.
soori1942@gmail.com

Devolution of powers under the 13th Amendment to the Constitution and related matters is a national issue, requiring a democratic decision with the active and responsible participation of all the 10 political parties elected to the parliament. The parliamentary select committee is a legitimate and democratic process to arrive at decisions, which can then be ratified by parliament to become the law of the land. Consensus is the key to implementability.

Participation and a unanimous decision on the details of the devolution would of course be difficult but would be the best outcome because that would pave the way for successful implementation. The second best outcome would be to arrive at a consensus with two thirds majority in which case implementation may face some resistance but can be easily overcome. The third outcome is decision by a simple majority, which will face considerable resistance during implementation but with skill, determination and the active support of the President and his key coalition partners in the government and a responsible stance from the opposition parties, can achieve the desired results in the interests of unifying the country. The eyes of the international community are now focused on all political parties and their responsible/mature behavior. Extensive lobbying on realistic proposals is the key to securing consensus.

The worst scenario will be a stalemate in arriving at a decision or non-participation or abstention or walk outs, which will tantamount to betraying the very people who elected the concerned parties to the parliament. Such political parties, abdicating their duties and responsibilities, do not deserve the continued trust and vote of the people.

The government has appointed a Select Committee of all political parties represented in the parliament precisely to arrive at a democratic decision on an issue which has caused so much grief to the people in this country. Understandably the issues are very controversial and all political parties and governments have hither to failed to resolve this issue and precisely for this reason we expect them to have learnt lessons and act wisely this time. The opportunity, to serve in this committee and contribute positively to arrive at a solution acceptable at least to a majority, if not unanimously, must not be missed.

It is insane that the TNA, which should have been the first to grab the opportunity to send their representatives to take part in the select committee, is now hopelessly divided and is in a state of confusion on this issue. Veerakesari reported recently that TNA MP's Sampanthan and Suthanthiran were at logger heads over the 13th Amendment, the former calling for its implementation while the latter calling for it to be dumped altogether, putting those who voted them into office to shame. If TNA continues to boycott the PSC they will go into obliviance. While understanding the previous history of frustrations, to which most parties including Tamil Parties contributed in varying degrees, we must not miss any opportunities that come our way for dialogue. Parliamentary Select Committee is a forum no political party should boycott. By boycotting the select committee TNA is disenfranchising the Tamil people, who voted TNA to represent them to seek solutions to their problems and their MP's are paid a handsome salary for this.

Therefore we urge TNA to take an active part in the PSC, to engage positively and to put forward constructive and meaningful proposals which are essential to empower Tamil, Muslim and Sinhala people all the way down to grass root level. Any attempt at securing and concentrating devolved power to the local and overseas Tamil elites will be, quite rightly, viewed suspiciously. It will exacerbate the fear or even paranoia held by some parties like JHU and JVP on separatist agenda with western backing as before. Such outcomes are not in the interest of the Tamil people, who live and work in Sri Lanka. TNA must act as representatives of the Tamils and Muslims, who elected them and not as representatives of British or French or Canadian Tamils, who have deserted Sri Lanka for better pastures in those countries. This approach will clear the air and create a conducive atmosphere in the PSC.

Rightly or wrongly there is a view among Sinhala people that TNA is more interested in talking to Tamil Nadu, Indian and overseas Tamils and western powers and impose their solutions to our internal problems. Not willing to take part in the PSC will only reinforce such views and will create further obstacles.

TNA must engage in self criticism, not engage only in blaming others and demonstrate that they have also learnt lessons from the past.

TNA must invest their time and energy in their electorates and serve the people who elected them, feel their pusles, conduct regular surgeries and also travel the country and engage with Sinhala people and their leaders following the example set by TNA Member of Parliament, late Mr.Raviraj. We believe being an MP is a full time job and not a part -time activity to be engaged in between overseas living.

TNA must actively engage with all other Tamil and Muslim parties and attempt to evolve common proposals, which can then be discussed with southern politicians and community groups to see if consensus can be reached before taking them into the PSC. This is an effective approach to succeed in the PSC

Alternative Culture Media for Microbial Growth

Dr.Sevvel Pathmanathan
Senior Lecturer ,
Department of Botany, Faculty of Science,
University of Jaffna. SriLanka.
sevvel@jfn.ac.lk

Introduction

Microorganisms need nutrients, a source of energy and certain environmental conditions in order to grow and reproduce. Culture media used in the laboratory for the cultivation of microorganisms supply the nutrients required for growth and maintenance. Nutrient Agar and Potato Dextrose Agar (PDA) are usually used for the cultivation of bacteria and fungi respectively. Nutrient agar consists of nutrient broth and agar. The cost of 1kg of nutrient broth (Biochmika) is approximately € 93 (15,750 LKR). It costs around 100 LKR to prepare 1 litre of nutrient medium whereas it costs less than 10 LKR to prepare different alternative media formulations for bacteria. Similarly 1kg of PDA (Oxoid) is approximately US$ 140 (18,000). It will cost around 200 times lesser to prepare a litre of alternative media formulation when compared with PDA. As the readily available culture media are expensive, there is a need to find alternative media or reduce the amount of agar added during the preparation of culture media in laboratories with less facility.

Alternative nutrient source for nutrient broth /PDA

The following are some of the studies carried out by various researchers around the world in order to replace the nutrient broth. It should be noted that these studies have used agar but some of the studies have used the same amount as used in nutrient agar while others have used less amount of agar which is economically profitable. Arnan-Parh et.al has worked on cowpea as a cost effective alternative culture media for bacteria [1]. Though the authors have used cooked (boiled) cowpea to increase the shelf life up to three months in their study, it is assumed that it is not essential to boil as it is readily available. Further there are also reports using vegetables as an alternative source for preparing culture media for the growth of bacteria and fungi [4]. In another study by our group, nutrient source is replaced by a protein formulation. Legume seeds serve as a good protein source and they are locally available cheap materials. Green gram, black gram, cowpea and soya meat were selected as a natural protein source to formulate the media for the growth of bacteria and fungi [6, 7]. There are also reports that uses fish products for the growth of extreme halophilic bacteria [5].

Alternative solidifiable nutrient source for nutrient agar/PDA

There is a report that used starch as less expensive growth media for bacteria and fungi [2]. In this study the authors have found out that the media prepared with Sago and Palmyrah had automatic solidification property even without adding agar.

Conclusion, future perspectives and unanswered questions.

Thus the use of different media formulations described above as culture media in laboratories

with basic facilities is very much feasible and cheaper when compared to commercially prepared nutrient agar or PDA. Although these media formulations can be prepared instantly like nutrient agar or PDA, grownded powders of some of them can even be stored for more than a month at room temperature in tropical climate.

It is interesting to note that at least some of these studies have used a common bacterium E.coli and a common fungus Saccharomyces cerevisiae which are generally used in microbiological studies in almost all labs. Studies should be carried out to find the chemical composition of most of the formulations given above and biochemical characteristics and morphology of the bacteria and fungi. In addition various other nutrient sources including some sources from the waste and more varieties of bacteria and fungi should be used to identify the suitability of using these formulated media as an alternative general purpose medium. It is recommended that further research be conducted with other possible protein sources for the production of bacterial culture medium.

Acknowledgement

I thank Nirmala Ravimannan and Kularajany Niranjan for their help in the ongoing research projects.

REFERENCES

1. Annan-Prah A., Akorli S.Y. and Sedofia K.B. (2010). African journal of Microbiology Research. Vol.4 (23):2626-2628.
2. Tharmila S., Jeyaseelan, E. C. and Thavaranjit A. C. (2011). Archives of Applied Science Research. Vol.3 (3): 389-393.
3. Kapilan, R and Thavaranjit A. C. (2008). Sago as a medium for "in vitro" cultural of some common soil bacteria Journal of Science of the University of Kelaniya, Vol.4: 11-14.
4. Deivanayaki, M. and Iruthayaraj, A. (2012) Alternative vegetable source for microbial growth. International Journal of Biosciences (IJB). Vol. 2 No. 5: 47-51.
5. Yeannes, M. I., Ameztoy, I. M., Ramirez, E. E. and Felx, M. M. (2011) Culture alternative medium for the growth of extreme halophilic bacteria in fish products. Ciênc. Tecnol. Aliment. [online]. Vol. 31, No.3 : 561-566.
6. Ravathie A., Sevvel P., Nirmala R. and Kularanjani N. (2012). Alternative culture media for bacterial growth using different formulation of protein sources. J. Nat. Prod. Plant Resour., 2 (6): 697-700.
7. Sevvel P. et al (2013). Unpublished data.

Big Bang and the Expanding Universe

S. Thavarajah

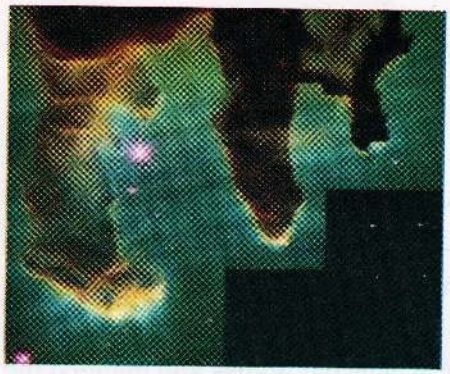
When we gaze at the night sky, we see mostly darkness. But, on a cloudless clear night we see multitude of glittering sparks scattered all over the sky and slowly drifting over our heads from the east to west. For thousands of years the early civilization across the Globe such as Mesopotamians, Babylonians, Iranians, Indians, Chinese, Greeks and Maya had recorded the movements of these celestial objects. They observed a pattern on the movements of these celestial bodies and mapped the positions and movements of the planets and stars without the help of any instruments. As civilizations developed, with the accumulated knowledge of these astronomical observations, the quest to explore the nature of the universe began.

With the advent of telescope, in the 17th century, the humanity moved beyond the limited vision of its naked eye. Telescopes brought the heavens to earth. It revealed countless stars, and other celestial objects such as moons of other planets, asteroids and asteroid belt, nebulae (interstellar cloud of dust, hydrogen, helium and other ionized gases) etc. cloaked within the vastness of darkness.

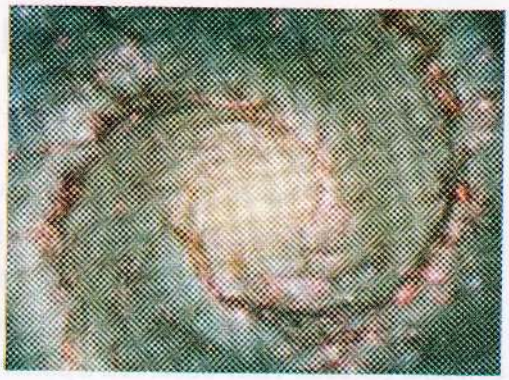
Until 1925, it was believed that the huge number of stars, observed and catalogued up to that time, were held together by gravitational force on a larger scale similar to that of the Solar System, which was known as Milky Way Galaxy. The popular belief then was that the universe consisted entirely of the Milky Way Galaxy.

On January 1st, 1925, an American astronomer Edwin Hubble presented a paper based on his observations at Mount Wilson Observatory, California, to the American Astronomical Society, which fundamentally changed the scientific understanding of the universe. His findings were that there were galaxies similar to the Milky Way Galaxy at far-off distances and that they were drifting away from us. Thus he mooted the idea of expanding universe. Today, the Hubble Space Telescope, launched in 1990 as a joint project of NASA and European Space Agency, orbiting the earth at an altitude of 569 km and circling it every 97 minutes, has sent back mind boggling pictures of the universe.

Hubble has the advantage of capturing light from the distant objects without atmospheric obstruction and distortion. What we see as a twinkling of a point of light in space, Hubble has captured structures; what we see as a haze in space, Hubble has sent details; and in the vastness of the dark empty space, Hubble has uncovered the dim glow of the early universe. Hubble has provided with astounding pictures of planets and its moons, stars, clusters of stars, magellanic clouds, nebulae with glittering star forming regions, galaxies, white dwarfs, neutron stars and pulsars, supernova, gamma ray bursts, deep field images, images depicting gravitational lensing, etc. which have transformed the scientific understanding of the origin, composition, evolution, structure and dynamics of the universe.



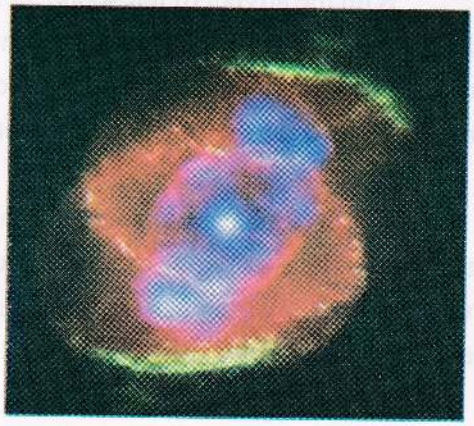
Eagle Nebulae – Courtesy NASA



Spiral Galaxy - Courtesy NASA

Hubble's discoveries, while unfolding the splendid wonders and the rich beauty of the universe, have helped to answer some of the most compelling cosmic mysteries of our time. In the meantime, it has also led to host of new questions and new mysteries.

Gravitational Lensing
- Courtesy NASA



Planetary Nebulae
(Remnant of a Dead Star) – NASA

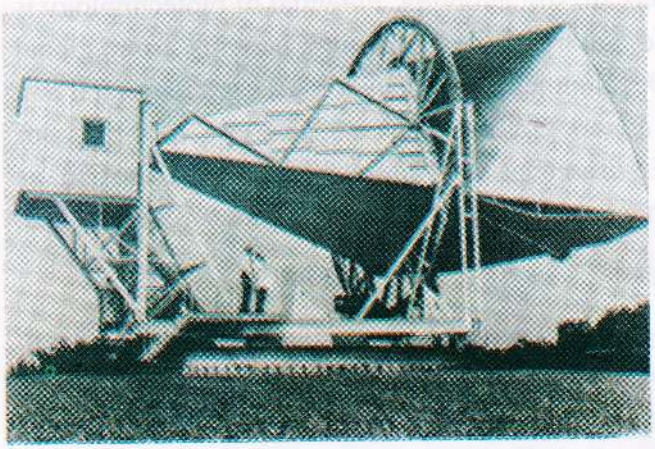
The revelation of Edwin Hubble's experimental observations in the late 1920s that the galaxies are moving away in every directions relative to earth at velocities directly proportional to their distance from earth and each other (Hubble's Law), gave rise to the notion that the space (the fabric of the universe)itself was expanding, not the bodies in space. This revelation also means that it has taken every galaxy the same amount of time to move from a common starting position to its current position. It was this interpretation that led to the concept of expanding universe. The inverse application of this conception also led to suggest that the universe must have been once compacted and started speeding from the same point.

Thus, Hubble's observations provided the first clue for the formulation of the Big Bang theory. Since then, by calculating the expansion rate of the universe, scientists started to work on the age of the universe. Extrapolation of the expansion of the Universe backwards in time using Einstein's general theory relativity also yielded an infinite density and temperature at a finite time in the past. However,

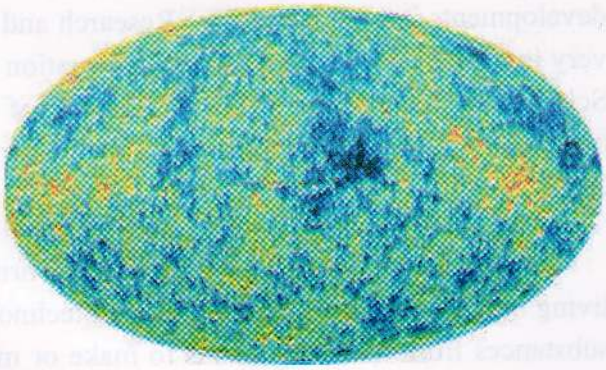
the big bang theory didn't get due recognition from the scientific community until 1965, because it lacked evidence. If the universe was initially very hot as the Big Bang theory suggests, the scientists argued, that we should be able to find some remnant of this heat.

In 1965, while Arno Penzias and Robert Wilson, two employees attached to Bell Laboratories, were testing their radio telescope (antenna) for satellite communication, found continuous background noise coming from all directions. This distortion was a uniform signal in the microwave range and remained the same through all the four seasons. They tested and excluded all possible sources of radiation and finally concluded that it was the residue of the Big Bang explosion – Cosmic Microwave Background (CMB) radiation. This discovery won them the Nobel Prize for physics in 1978. The CMB was later mapped in greater detail by NASA's two space missions, COBE and WMAP.

The CMB is omnipresent. We can witness it from our bedrooms. When we tune an analogue TV set, we witness "snow" like effect on the screen with noise in between channels; this is caused by the CMB, the residue of the Big Bang.



Penzias and Wilson with their Radio Telescope
Courtesy NASA



Cosmic Background Radiation - -

With this hard evidence the scientific community accepted the Big Bang theory as the well tested cosmological model describing the early development of the universe. The mathematical calculations postulate that the Big bang occurred 13.798 million years ago. The Big Bang should not be construed as an explosion of matter moving outward to fill an empty universe. It needs to be understood that the space itself is expanding with time everywhere in all directions, thus it increases the physical distance between two commoving points. The expansion rate of the universe is calculated today as about 74.3 km per second per 3million light years (28.38 x 1018 Kilometers).

Modern Biotechnology in Agriculture

DR. Kalaivani Vivehananthan
Senior Lecturer.
Department of Biotechnology,
Faculty of Agriculture and Plantation Management,
Wayamba University of Sri Lanka,
Makandura, Gonawila (NWP), Sri Lanka
kalaivanivive@gmail.com

Biotechnology is one of the most important scientific and technological revolutions of the century and greatly influences various aspects of human life. Recent advances in molecular biology and biotechnology infiltrate our life in many ways. The Biotechnology was born about 50 years back in the laboratory of the industrial west. Today, this technology is used in many areas such as in medicine, agriculture, industry and environment. Agricultural Biotechnology is gaining attraction worldwide as a method for improving crop yields.In agriculture, biotechnology has enabled the genetic alteration of crops, improved soil productivity, enhanced weed and pest control and in addition, involved bioremediation of wastes from contaminated sites etc.In Sri Lanka, Biotechnology is at a nascent stage. National policy & regulations are still evolving. Potential of biotechnology is still greatly underexploited, and the people did not reap the maximum benefits from global developments in biotechnology. Research and Development in biotechnology has progressed at a very low pace (Global Agriculture Information Network GAIN Report, 2005). Further, Ministry of Science & Technology (MST), Ministry of Environment & Natural resources identified as biotechnology is an important area for development in Sri Lanka (National Report of Sri Lanka, 2002).

Biotechnology holds the promise of bringing prosperity not through machine, but through living organisms. Broadly speaking, biotechnology is any technique that uses living organisms or substances from these organisms to make or modify a product for a practical purpose.Traditional biotechnology has been used to bake bread, brew alcoholic beverages, and breed food crops or domestic animals. But recent developments in molecular biology have given biotechnology new meaning, new prominence, and new potential. It is modern biotechnology that has captured the attention of the public. Modern biotechnology can have a dramatic effect on the world economy and society. One of the exciting aspects of being involved in the field of molecular biology is the ever-accelerating rate of progress, both in the development of new methodologies and the practical applications of these methodologies.

The main focus of molecular biology research is on the study of the molecules that make up living things. It explains how molecules transfer information and influence gene sequences. Modern molecular biology emerged with the discovering of the structure of DNA. DNA is the hereditary material which contains genes. Genes provide the information that a cell needs to make proteins; proteins are then used to provide structure and function for an organism.

The manipulation of DNA called genetic engineering is possible because DNA is a universal blueprint that all cells from any organism can read. This is usually accomplished by transferring a section of DNA, or gene, from one organism to another. Two decades ago, many agricultural scientists rightfully saw the emerging recombinant DNA technology as a potent tool in enhancing crop productivity and food quality while promoting sustainable agriculture. Genetic engineering allows scientists to know exactly which genes they are inserting into the genetic code of the organism. In addition, the genes do not have to be from the same species. A desired trait from a bacterial or mammalian gene may be inserted into a plant. Since all organisms read DNA the same way, a gene from the DNA of one organism can be inserted into the DNA of another organism.

The molecular tools of biotechnology offer greater potential for improvement in the agricultural sector, including horticultural, plantation crops and forest trees. It will play an important role in increasing land productivity in a sustainable way. The world's population is expected to grow from today's 6 billion to about 8 billion by 2030. Feeding all of these people and eliminating hunger will require advances in food production and distribution that enhance food supplies without damaging the environment. Green revolution of mid 1960s has saved millions from starvation but in the recent past, the growth has slowed down. With the mounting population pressures, and millions who cannot secure two squares of meal, there is an urgent need to supplement ongoing technological interventions with newer inventions. The technologies must be designed not only to meet the specific needs of the developing countries, but also to create an enabling environment for adaptation of these technologies by masses. In most developing countries, however more effective extension systems must be devised for better adaptation of the technologies already available, thus to helping to increase the production of food grains. Agricultural biotechnology is one tool that holds great promise for alleviating hunger and poverty. In agriculture, plant biotechnology is used for crop improvement. Crop improvement through genetic engineering includes resistance to insects, tolerance to herbicides, immunity to disease, and enhanced nutrition. Therefore, modern biotechnology has offered opportunities to produce more nutritious and better tasting foods, higher crop yields and plants that are naturally protected from disease and insects.

Scientists have been improving plants by changing their genetic makeup since the late 1800s. Historically, traditional breeding has been used for crop improvement, but in comparison, genetic engineering for crop improvement may be faster and more precise. Traditional breeding may take many years of tedious labor in order to obtain a crop that has all of the desired traits. An additional drawback to traditional breeding is that it is only possible to combine genes between organisms of the same species. Unlike traditional breeding, genetic engineering allows for the transfer of only one or a few desirable genes, thereby permitting scientists to develop crops with specific beneficial traits and reduce undesirable traits.

Much of the early excitement and expectations was met with successive breakthroughs in scientific research on plant gene transfer methods, identification of valuable genes, and the eventual

performance of transgenic crops or genetically modified crops. Plant breeders viewed the technology as an additional tool for crop improvement that could complement the existing methods. Biotechnology is being used to address problems in all areas of agricultural production and processing. It covers development of new varieties and designing genetically modified crops for particular traits such as to raise yields; to improve resistance to pests, diseases and abiotic stresses such as drought and cold; and to enhance the nutritional content of foods, in addition, identification of microorganisms for the application of bio-pesticides, bio-fertilizers and bioremediation. Biotechnology is also being used to develop low-cost disease-free planting materials for crops such as cassava, banana and potato and is creating new tools for the diagnosis and treatment of plant and animal diseases and for the measurement and conservation of genetic resources. Biotechnology is being used to speed up breeding programmes through use of DNA markers to screen individual plants, livestock and fish and to extend the range of traits that can be addressed. Animal feeds and feeding practices are being changed by biotechnology to improve animal nutrition and to reduce environmental waste. Biotechnology is also used in disease diagnostics and for the production of vaccines against animal diseases.

The most widespread application of genetic engineering in agriculture by far is in engineered crops known as genetically modified crops (GM crops). Thousands of such products have been field tested and many of those have been approved for commercial use. Like other products, genetically engineered products undergo a period of research and development before they are ready for commercial release.

Development and adoption of new biotechnologies will be crucial in meeting the challenge of producing enough food for growing world population while reducing impacts on the environment. Biotechnology is one of the most promising new technologies and it is too important for the future prosperity of the country. Biotechnology in the form of genetic engineering, is a facet of science that has the potential to provide important benefits if used carefully and ethically. Active involvement in technology breakthroughs will fulfill the nutrient requirement needed for the country leading to poverty alleviation of the Sri Lankan nation.

Nanotechnology and its Potential Applications

"There's Plenty of Room at the Bottom" Theoretical physicist Richard Feynman December 29, 1959.

Prof.P.Ravirajan
[BSc(Hons, Jaffna), MSc(Pera), DIC, PhD(London)]
Professor and Head, Dept of Physics,
University of Jaffna

Mr.M.Thanihaichelvan
[BEng(Hons)(Anna), MSc(East London)]
Lecturer, Dept of Physics
University of Jaffna

Nanotechnology is the emerging technology of 21st century. The potential applications and their benefits are expected to be another revolution in the live style of mankind. You might have seen that the James Bond uses a hand held device to communicate and locate his position in the earth in 1970s bond movies. That was a freaking fiction during that time. But the fiction became real within next 3 decades. The term nanotechnology is also a fictional

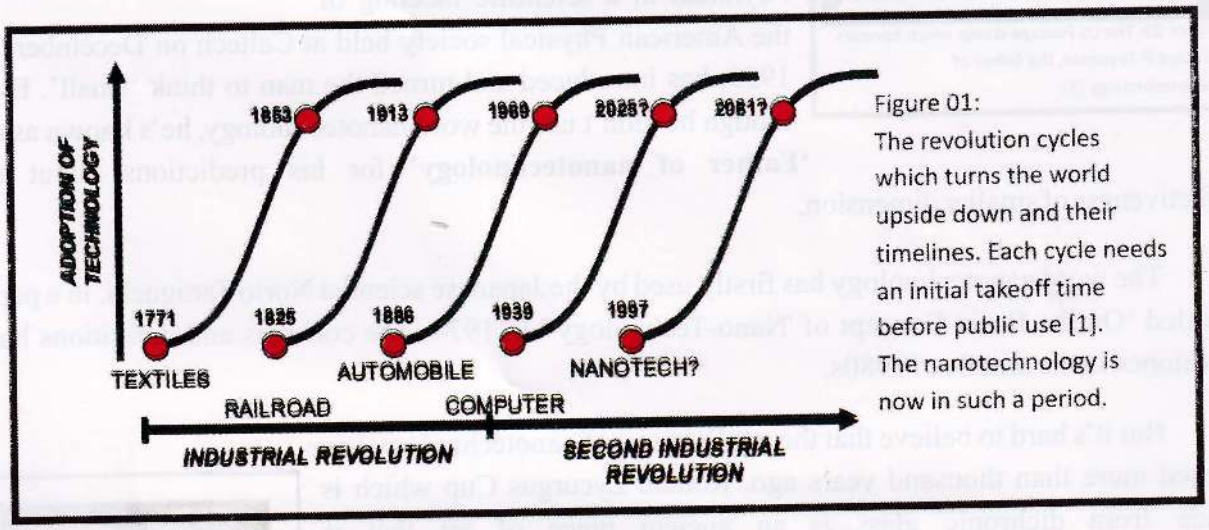


Figure 01: The revolution cycles which turns the world upside down and their timelines. Each cycle needs an initial takeoff time before public use [1]. The nanotechnology is now in such a period.

Even though the evolutionary cycles predict that the rapid adoption of the nanotechnology will be started by 2025, (the predictions have done by the year 2000) at 2006, the researches indicate that the part of nanotechnology will exceed 3.1 trillion USD by the year of 2015 (Lux Research 2008). Also the jobs in the field of nano manufacturing will occupy 11 % of global manufacturing jobs.

The article tries to create awareness to the public who can contribute and benefited by the nanotechnology. The cartoon shown in Fig. 02 has published at the end of 2004. The miniature men coming from the nanotechnology laboratory clearly shows the ideas about nanotechnology at that time. But the scenario has changed a lot within last eight years.

The term nano is scientifically 10-9 (a billionth), a nanometer is 10-9 meter. The following comparison will give a clear idea about a nanometer, if you assume the diameter of the earth as one meter, then the diameter of a small marble will be around nanometer.

Nanotechnology is a highly multidisciplinary field and often has different meanings to people from different groups. The term nanotechnology can be defined as understanding and control of matter and processes at the nanoscale, typically from 1 to 100 nanometers in one or more dimensions which is 10,000 times smaller than anything that the human eye can see. It is fabrication technology in which objects are designed and built by the specification and placement of individual atoms or molecules or where at least one dimension is on a scale of nanometers.

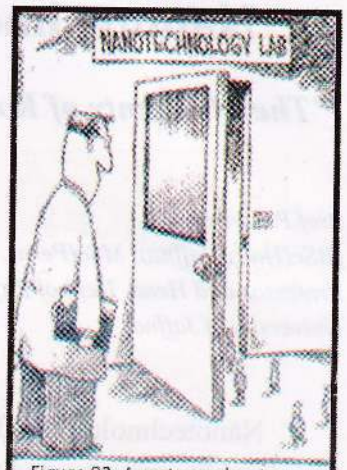


Figure 02: A cartoon about Nanotechnology which is clearly shows the understandings about it in the year 2004 [2].

Figure 03: The US Postage stamp which honours Richard P Feynman, the father of nanotechnology [3].

History of nanotechnology

"There's Plenty of Room at the Bottom" the magical words of the famous theoretical physicist Richard Feynman in a scientific meeting of the American Physical society held at Caltech on December 29, 1959, has introduced and turned the man to think 'small'. Even though he didn't use the word nanotechnology, he's known as the **'Father of nanotechnology'** for his predictions about the effectiveness of smaller dimension.

The word nanotechnology has firstly used by the Japanese scientist Norio Taniguchi, in a paper entitled 'On the Basic Concept of 'Nano-Technology" in 1974. The concepts and definitions have developed in the middle of 1980s.

But it's hard to believe that the applications of nanotechnology have started more than thousand years ago. Roman Lycurgus Cup which is made from dichronic glass is an ancient piece of art that is nanotechnology-enhanced so that depending on how the light hits it; the cup glows either green or red (refer Fig. 04). The Lycurgus Cup demonstrates a short-lived technology developed in the fourth century A.D. by Roman glass-workers. We now understand that these effects are due to the development of nanoparticles in the glass.

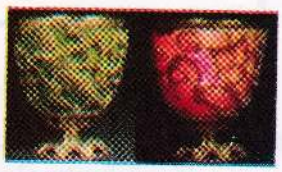


Figure 04: Roman Lycurgus Cup

Another best example for the tremendous advantages of nanotechnology is the lizards which we show every day in our ceilings. Many of us have never even thought how it can walk on a ceiling against the gravity. The secret has revealed one of the potential applications of nanotechnology. The spatulas on a lizard (gecko) are so small (refer Fig. 05) and get so close to the surface that an attractive van-der-waals force of around 0.4 μN develops between a single spatula and a surface. To hang a man of 80 kg, we need around 2 billion such spatulas (or fibers). You can also walk on the ceilings, if yous

hands of spider man may also be possible with the help of nano-fibers. As we know the man never dreams the impossible and he never leave the dreams as dreams. The only thing between the dreams and real is called time which is independent on every other things in the earth.

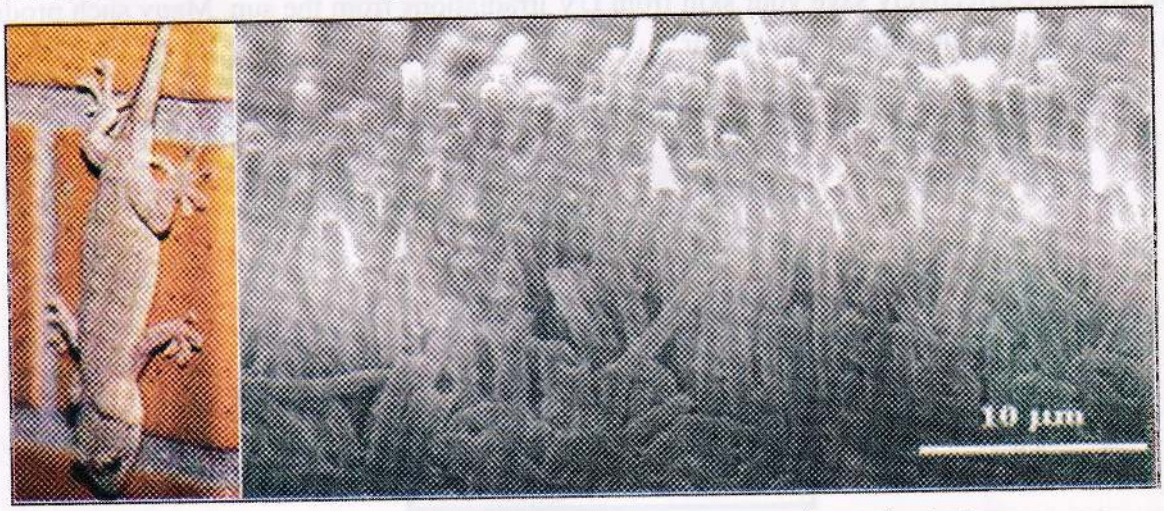
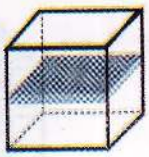
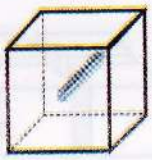
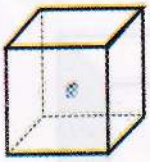
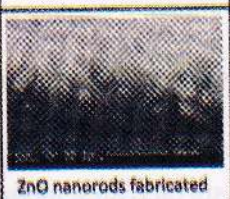


Figure 05: A lizard and high magnification image of spatulas in its paw

Nanomaterials

Nanomaterials are defined as a set of substances where at least one dimension is less than 100 nanometers. The nanomaterials are categorized into three groups based on their dimensions such as, 0 Dimensional (0D) structures (nanoparticles and quantum dots), 1 Dimensional structure (1D) (Quantum wires) and 2 Dimensional (2D) structure (quantum wells).

Table 1: The nanostructures

Bulk material (3D)	Nanomaterials		
	Quantum Well (2D)	Quantum Wire (1D)	Quantum Dot (0D)
			
	Nano films	Nanorods Nanowires Nanohairs	Nanocrystals (Has countable number of atoms)
High magnification images of nanofilm and nanorods fabricated in Nano Physics Laboratory (NPL), Dept. of Physics, University of Jaffna	 polymer and TiO_2 bi-layer nanofilm fabricated by spray pyrolysis (TiO_2) and Spin coating (Polymer) [4]	 ZnO nanorods fabricated by Chemical Bath Deposition [5]	 Cadmium Selenide (CdSe) quantum dot nanoparticles by spin coating [6]

The 0D nanoparticles or quantum dots are invisible to human eye sights. The metal oxide nanoparticles such as, Titanium dioxide (TiO2), Zinc oxide (ZnO) are now being used in cosmetics. The unsightly white or yellow colored sunscreens can be replaced by invisible nanoparticle creams which are more effectively save your skin from UV irradiations from the sun. Many such products have released in the consumer market so far.

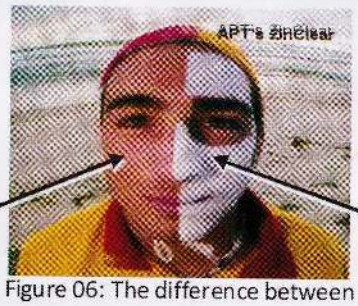


Figure 06: The difference between nano sunscreen and ordinary sunscreen.

The figure 06 illustrates the difference between the sunscreen cream made up of ZnO nanoparticles and the ordinary sunscreen. The white color is due to the scattering of sunlight in the particles. But the nanoparticles are optically transparent as their size is smaller than the minimum wavelength of the visible spectrum. Also the nano sunscreen applied in the right half of his face is more resistant to the UV harmful rays.

The nanoparticles have very high surface to volume ratio. The figure 07, shows that the increment of surface area with confinement of the particle. The increased surface area increases the rate of chemical reactions incredibly when compare to the bulk material. Also the nanowires show unimaginable mechanical and electrical properties which lead to the next level of technology.

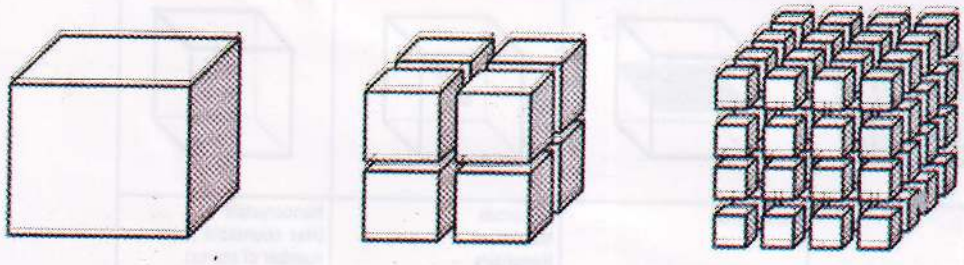


Figure: 07 Increment in surface area with decreased particle size with same volume.

The above figure illustrates the variation of surface area with different particle size of same volume, and the variation of total surface area against particle size. If the length of the large cube is four cm, then the total surface area is 96 cm2. When it is cut into eight equal cubes with size of two cm,

then the total surface area will be ((2×2)×6)×8=192 〖cm〗 ^2. The surface area of the third figure which has sixty four numbers of one cm sized cubes will be((1× 1)× 6)× 64=384 〖cm〗 ^2. The total surface area of one gram of TiO2 nanoparticles with 10 nm diameter is equal to the area of a football ground (500 m2).

The nanowires or 1D nanostructures also have wide range of applications. As their shape supports to the control flow of electrons, they are widely used in electrical applications. The fuel cells and, solar cells are some of the main applications of nanowires. Also the nanowires are the best material for chemical and environment sensing. They can detect the level of many hazardous gases in the atmosphere. Even to detect the leakage of LPG in your kitchen.

The thin films also another form of nanostructures. Especially the semiconducting metal oxide thin films are vital in the fabrication of nano solar cells. The optical properties, specially the transparency of the thin films are unique for every material. The thin films are also being used as the conducting bottom electrodes for many nano electronic devices such as, solar cells, LEDs, Diodes and transistors.

Properties of nano materials

One of the main advantages of nano technology is as in nano scale, some of the materials begin to show extraordinary physical, chemical mechanical and electrical properties. The figure illustrates the variation of melting point of gold with different sizes of particles. An

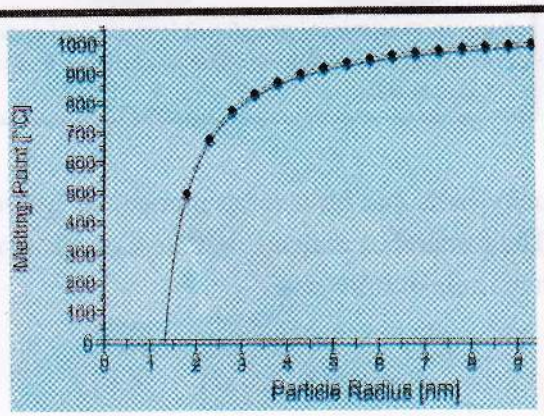


Figure 08: The variation of melting point of gold with different radius of gold particles

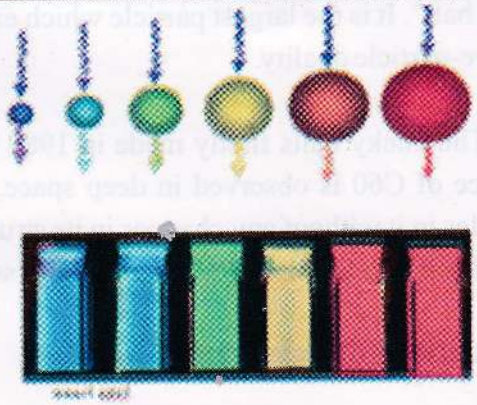


Figure 09: Different colours of CdSe quantum dots and the secret behind it [6].

Interesting feature of nanoparticle is the dependency of color with particle size. The reason for the colors in nanocrystals is also different from others. The crystals actually absorb and re-emit the color. The given figure shows that the color of Cadmium Selenide (CdSe) quantum dots with six different sizes (2.3 to 5.5 nm) excited by a long wavelength UV irradiation.

CNTs

The carbon compounds only revealed the world of nanotechnology by its unique nanostructures such as, Carbon Nano Tube (CNT), and fullerenes. One of the initial breakthroughs of nanotechnology is the invention of CNTs. A single wall carbon nanotube (SWCNT) is a cylindrical alignment of carbon atoms with a diameter of few nanometers and the length up to few micrometers. The Multi Wall CNTs are the hierarchical cylinders of multiple CNTs. The SWCNTs are extremely strong and have ultra high conductivity up to a billion Amperes per square centimeter (109 Acm-2), but very light when compare to other materials. Presently the CNTs are widely used in design of space shuttles, automobile spares. The chemical and electrical properties of the CNTs can be tuned by modifying its diameter. Fuel cells, Water and air purification are some of the chemical applications of CNTs. The electrical and optical properties of a CNT enable its applications in organic displays, optical igniters, transistors, solar cells, conducting thin films and super conductors.

Figure 10: An artistic expression of FET which has SWCNT as channel (assume that the diameter of an SWCNT is 1 to 2 nm) [7].

Fullerene is another interesting nanostructure of carbon. The shape of fullerene is like a football with hexagonal joints, which has carbon atom in each corner. The fullerene is made up of 60 carbon atoms and called as Buckministerfullerene or "bucky ball". It is the largest particle which exhibits the wave-particle duality.

Figure 11: The fullerene, a nano sized football which made up of 60 carbon atoms which cannot be seen by Lionel Messi and Cristiano Ronaldo

The bucky balls firstly made in 1985 but the existence of C60 is observed in deep space. The bucky balls can hold large number of hydrogen molecules in it without any changes in its structures. The researches indicate that the use of hydrogen as a fuel will be possible in ordinary vehicles soon with the help of fullerenes.

Applications of nanotechnology

Nanotechnology is a highly multidisciplinary field. The applications are open to everywhere and in every technology being used now. Currently, the nanotechnology is being used for strengthening the existing methods and materials. But, the application of nanotechnology is vital when it comes to the ground.

As many nanotechnology products have reached the commercial market (fully or partially) and the importance of nanotechnology have received properly by the public and private sectors which are investing more than a billion dollars in the research and development of nanotechnology.

As a part of it, Sri Lankan government also launched nanotechnology as a priority research area by the year of 2008 [8]. And nearly 33 million rupees worth research grants won by the Department of physics, university of Jaffna to the research and development (R & D) works in nanotechnology from many national and international level funding agencies such as National Research Council (NRC), National Science Foundation and International Foundation for Science (IFS), Sweden for four independent project proposal in the field of nanotechnology for solar energy conversion. These projects have successfully been completed and presented in several national and international conferences.

The following table shows that the total potential impact on nanotechnology in different market sectors by the year 2015 [9]. According to the report, the nanomaterials and electronics have the highest impact on the economy.

Table 02: The impact of nanotechnology on several market segments by the year 2015 [9].

Market Segment	Potential Impact ($B)	Share
Materials	$340	31%
Electronics	$300	28%
Pharmaceuticals	$180	17%
Chemical Manufacture	$100	9%
Aerospace	$70	6%
Tools	$20	2%
Improved Healthcare	$30	3%
Sustainability	$45	4%
Total	$1,085	100%

Nanoelectronics

The sizes of initial stage computers are too big. They occupy very big space, consumed enormous power and functioning with the speed of a snail. But, the invention of transistor has made very small computers and they were more comfortable with the new technology of the 20th century called Integrated circuits. After the invention of transistor, use of semiconductors becomes vital in the functioning of world in the 21st century. The transistors are also the main reason behind the huge growth of information technology.

In present scenario, the main objective of consumer electronics is portable and low power consuming devices. The smaller with more facilities will win the market quickly and the low power consuming devices also attracts the consumers. The nanotechnology provides the better path to achieve these two objectives.

Figure 12: Scientists with the first commercially sold computer (UNIVAC 1) and the Google Nexus 10 tab which has a dual core processor nearly a billion times faster than the UNIVAC1 [Web Images].

The Moore's law states that in a chip, the number of transistors doubled in every 18 months. The electronics has already entered into the league of nano technology. The channel width of a latest Intel® processor reached its minimum (about 15 nm) by using current semiconductor fabrication techniques. Hence, the world of electronics needs more advanced fabrication technique to keep the Moore's law alive. That platform using nanotechnology is going to be the biggest revolution in the field of IC technology in the 21st century. The memory sticks capable of storing 128 Terabytes (TB) or more are possible by the end of 2020.

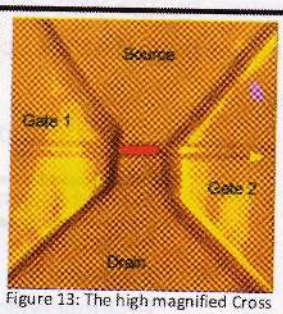


Figure 13: The high magnified Cross sectional view of Single electron FET with an atomic diameter channel [7].

The ultimate of the nanoelectronics will be a transistor which can be switched by the flow of single electron [10]. A team of researchers at the University of Pittsburgh and University of Wisconsin in USA, created a transistor, which is just an atomic diameter in size and can be switched on and off by just one or two electrons. The device now in the laboratory level and it will dominate the world of solid state electronics soon.

The technical end of the electronic technology is also going to be benefited hugely by nanotechnology. The complicated and costliest fabrication techniques can be substituted by the cheap and best nano processing methods. Low power consuming processors, Flexible electronics and displays, cheap and smallest semiconductor memories, faster internet and data transmission are few of advantages of nanoelectronics in near future.

Bio Nanotechnology

Biotechnology is the application of modern technologies in health care and food manufacturing and processing. For example, a biotechnologist can create a tomato species that can be bigger than the normal and enriched with essential nutrition and minerals within short time period. Also, they can able to keep the fruits and vegetable for a long time without any damages.

The nanotechnology is going to empower the field of biotechnology also. The few nanometer thick thin films of materials are in the market. They are preserved the fruits and vegetables from damages due to the external factors like temperature and humidity.

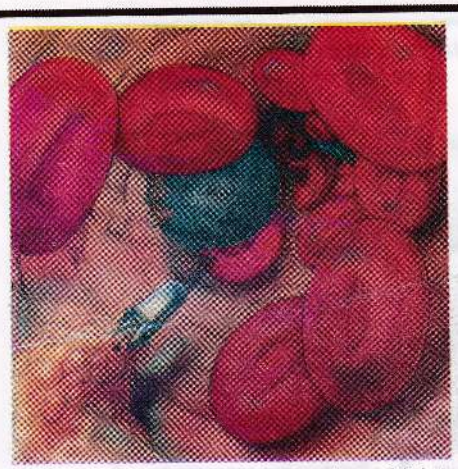
Figure 14:

Another application of nanotechnology in agriculture is use of the nanosensor array to monitor the plants. The sensors can able to send the data from inside the plant such as, required nutrients, amount of water, etc. This will reduce the use of water, pesticides and fertilizers in the land. Also, the plant tonic was introduced by the Nano Green Technology, Inc. It is used to keep the plants cleanly and make the product more hygiene. The nanoparticle layer of 0.4 nm to 8 nm is used for this purpose [11].

Nanotechnology in Medicine

The application of nanotechnology in medicine also receives significant interest from the researches. Especially, nanomedicines and nanorobots in medicine will be the revolution of modern medicine era in the 21st century. The special application of nanotechnology in medicine is nanosurgery robots and drug delivery [12].

The uses of nanorobots in health care applications are already proposed by the scientists. It may be the use of nanosensors to observe the function of human organs and the nano career robots loaded with medicines, which can be navigated to the target organ by the external driving force for cure and recovery of cells even the DNAs. The nanorobots can destroy the cancer cells and unwanted fat in human body. Also, as these nanorobots are smaller than a pin hole, they can be injected inside the body using simple injection. The following figure 13, illustrates the potential application of nanorobots in nanosurgery and medicine navigation.



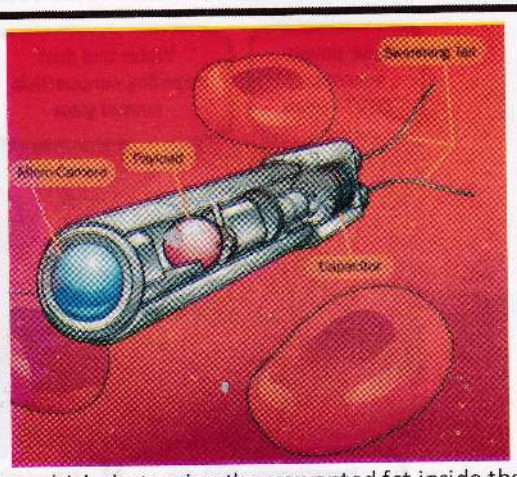


Figure 15: A pictorial representation of (a) A nanorobot which destroying the unwanted fat inside the blood vessel and (b) which can swim inside the blood cells and deliver the drug to the targeted organ or cells [Web images].

Nanotechnology and the global energy crisis

One of the main problems in the modern era is the energy crisis. As the availability of most of the conventional energy resources are limited the crisis to be handled carefully and effectively. The application of nanotechnology also opens the door to the use of renewable energy sources effectively. The SUN is one of the prime energy sources to the earth. The enormous amount of the solar power received by the earth is unused. The calculations indicate that a 5 km×5 km solar power plant with 10 % of conversion efficiency is enough to fulfil the energy requirement of Sri Lanka for every day and the solar panel network of 0.3 % of the total area of Sahara desert is enough to supply electricity to the whole world.

The devices used to convert the solar energy into electrical energy called as solar cells. The conventional silicon solar cells are the well-known photovoltaic device. But, the initial installation costs of the silicon solar cells are very high and the fabrication techniques are relatively complicated.

The nanotechnology is used to fabricate low cost and high efficiently solar cells, which are environmental friendly. The nanotechnology enabled the use of polymers, vegetable and plant extracts and organic dyes to generate electricity from the solar energy. Nano solar cells are flexible and very easy to fabricate with very low level machineries and raw materials. Many meters of solar panels can be fabricated within few hours. They can be even fixed in apparels to generate electricity on the go.

Figure 16: A model walking on the ramp with a summer dress enhanced with solar cells and energy is used to charge the phone in her hand.

The simple solar cell can be fabricated with Titanium dioxide and Iodine solution which are available in local pharmacies and with plant extracts. The researches from the Nano Physics Lab (NPL), University of Jaffna found that the skin extracts of locally harvested grapes has potential to generate electricity from solar energy [13]. But the stability and conversion efficiency of the grape dye is to be improved to reach the commercial value solar cells.

Figure 17: The proposed design of the car of 21stcenturary with potential applications of nanotechnology

Many research institutes have started their researches towards cost effective hybrid solar cells. The department of Physics, University of Jaffna makes significant contribution to this field. It has strong collaboration with several leading research institutes such Energy Centre for Netherland, Imperial College London, EPFL Switzerland and many other institutes from UK and USA and produced significant number of scholarly publications which have been cited more than over 1000 times in indexed journal papers so far.

References:

[1] Davis M.; Walter M., Next-wave publishing technology: revolutions in process and content. The Seybold Report 2003, 3, 3-15.

[2] By; M.Rocco, Nanotechnology Directions, 08, September 2004.

[3] http://www.nanooze.org.

[4] Ravirajan P et al., Hybrid polymer-metal oxide thin films for photovoltaic applications, Journal of Materials Chemistry, 17 (30), 2007.

[5] Ravirajan P et al., Hybrid polymer/zinc oxide photovoltaic devices with vertically oriented ZnO nanorods and an amphiphilic molecular interface layer, The Journal of Physical Chemistry B 110 (15), 7635-7639.

[6] Masaru Kenneth Kuno, Introduction to Nanoscience and Nanotechnology: A Workbook, University of Notre Dame, 2005.

[7] Nanotechnology For Electronics And Sensors Applications, Nano Connect Scandinavia, Chalmers University of Technology, DTU, Halmstad University, Imego Lund University, University of Copenhagen, and University of Gothenburg.

[8] EDITORIAL, The Government of Sri Lanka launches nanotechnology as a priority research area, J.Natn.Sci.Foundation Sri Lanka 2009 37 (2):81-82.

[9] John M A Roy., Research report on Nanotechnology, WRHambrecht and co, May 2005.

[10] M. A. Kastner., The single electron transistor and artificial atoms Ann. Phys. (Leipzig) 9 (2000) 11–12, 885 – 894.

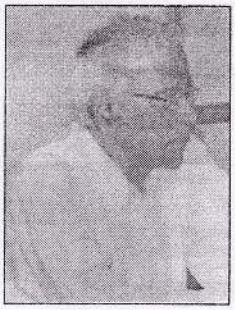
[11] http://www.nanogreentech.com.

[12] Robert A. Freitas Jr., EDITORIAL., Nanotechnology, nanomedicine and nanosurgery, International Journal of Surgery (2005)

[13] S.Sivaraya and P.Ravirajan T. Jaseetharan, S.Sarathchandran, K.Jeyakanthan, M; Utilization of Plant Pigments in Dye-Sensitized Nanoporous TiO2 Solar Cells. National Conference on Advanced Materials for Emerging Technologies (NCAMET 2007), 58, 2007.

[14] PhD thesis by, Christopher A. E. Hamlett, Utilization of nanostructured surfaces for sensing applications and the use of nanoentities for the fabrication of new materials, The University of Birmingham 2008.

Reasons why the World didn't End in 2012



S.Perasiriyan,
B.Sc FRSC(UK) FIChemC.
prsryn@yahoo.com

People from around the world are predicted the end of the mankind in the year 2012.

However different-different scientists have their own opinion. Some are saying it'll be humans that set it off. Others believe that a natural phenomenon will be the cause. Our Eco system is not able to survive for long period. The environment is getting more populated every day. We have to accept the truth that we have failed to save our earth from slow natural disaster.

However various reasons such as magnetic reversal, Sun storms, end of Mayan calendar, aliens attack, nuclear war, and bombarding of asteroid etc are forwarded as reasons for the destruction of Earth. I fully agree that these are remarkable possibilities for the end of the Earth, but the Mayans never said that the world will end in 21st December 2012. Others interpreted the end of Mayan calendar as the end of the world and created a chaotic situation. We realized that this never happened and the Earth survived on 21st Dec.2012. I would like to consider here only two points i.e. magnetic reversal and Sun storms to elaborate my reasons why the world will not end in the near future.

You are aware that Earth's magnetic field has flipped its polarity many times over the millennia. In other words, if you were alive about 800,000 years ago, and facing what we call north with a magnetic compass in your hand, the needle would point to 'south.' This is because a magnetic compass is calibrated based on Earth's poles. The N-S markings of a compass would be 180 degrees wrong if the polarity of today's magnetic field were reversed. Many doomsday theorists have tried to take this natural geological occurrence and suggest it could lead to Earth's destruction. But would there be any dramatic effects? The answer, from the geologic and fossil records we have from hundreds of past magnetic polarity reversals, seems to be 'no.'

Reversals are the rule, not the exception. Earth has settled in the last 20 million years into a pattern of a pole reversal about every 200,000 to 300,000 years, although it has been more than twice that long since the last reversal. A reversal happens over hundreds or thousands of years, and it is not exactly a clean back flip. Magnetic fields morph and push and pull at one another, with multiple poles emerging at odd latitudes throughout the process. Scientists estimate reversals have happened at least hundreds of times over the past three billion years. And while reversals have happened more frequently in "recent" years, when dinosaurs walked Earth a reversal was more likely to happen only about every one million years.

Sediment cores taken from deep ocean floors can tell scientists about magnetic polarity shifts, providing a direct link between magnetic field activity and the fossil record. The Earth's magnetic field determines the magnetization of lava as it is laid down on the ocean floor on either side of the Mid-Atlantic Rift where the North American and European continental plates are spreading apart. As the lava solidifies, it creates a record of the orientation of past magnetic fields much like a tape recorder records sound. The last time that Earth's poles flipped in a major reversal was about 780,000 years ago, in what scientists call the Brunhes-Matuyama reversal. The fossil record shows no drastic changes in plant or animal life. Deep ocean sediment cores from this period also indicate no changes in glacial activity, based on the amount of oxygen isotopes in the cores. This is also proof that a polarity reversal would not affect the rotation axis of Earth, as the planet's rotation axis tilt has a significant effect on climate and glaciation and any change would be evident in the glacial record.

A schematic diagram of Earth's interior and the movement of magnetic north from 1900 to 1996. The outer core is the source of the geomagnetic field. Graphic Credit: Dixon Rohr

View unlabeled version Earth's polarity is not a constant. Unlike a classic bar magnet, or the decorative magnets on your refrigerator, the matter governing Earth's magnetic field moves around. Geophysicists are pretty sure that the reason Earth has a magnetic field is because its solid iron core is surrounded by a fluid ocean of hot, liquid metal. This process can also be modeled with supercomputers. Ours is, without hyperbole, a dynamic planet. The flow of liquid iron in Earth's core creates electric currents, which in turn create the magnetic field. So while parts of Earth's outer core are too deep for scientists to measure directly, we can infer movement in the core by observing changes in the magnetic field. The magnetic north pole has been creeping northward – by more than 600 miles (1,100 km) – since the early 19th century, when explorers first located it precisely. It is moving faster now, actually, as scientists estimate the pole is migrating northward about 40 miles per year, as opposed to about 10 miles per year in the early 20th century.

Another doomsday hypothesis about a geomagnetic flip plays up fears about incoming solar activity. This suggestion mistakenly assumes that a pole reversal would momentarily leave Earth without the magnetic field that protects us from solar flares and coronal mass ejections from the sun. But, while Earth's magnetic field can indeed weaken and strengthen over time, there is no indication that it has ever disappeared completely. A weaker field would certainly lead to a small increase in solar radiation on Earth – as well as a beautiful display of aurora at lower latitudes -- but nothing deadly. Moreover, even with a weakened magnetic field, Earth's thick atmosphere also offers protection against the sun's incoming particles.

The science shows that magnetic pole reversal is – in terms of geologic time scales – a common occurrence that happens gradually over millennia. While the conditions that cause polarity reversals are not entirely predictable – the North Pole's movement could subtly change direction, for instance – there is nothing in the millions of years of geologic record to suggest that any of the 2012 doomsday scenarios connected to a pole reversal should be taken seriously. A reversal might, however, be good business for magnetic compass manufacturers.

Senior Citizens & Elders Issues

Mr. K.Sivalingam
Rtd Deputy Director, Planning,
North East Provincial Council.

1) Introduction

Sri Lanka ranks high as a country with a rapidly aging population. According to the national survey of elders conducted in 2003/2004, out of the population of 21Mn over 10% is estimated to be over 60 years of age and will continue to increase over the years.

Around the world a higher proportion of older people will live in the developing nations. Sri Lanka would have a population of 25Mn of which 50% would be over 50 years of age by the year 2050. Hence the current situation of the elderly and the emerging trends need careful study. By location, 84% of the elderly are living in rural areas. The gender ratio among the elderly is 51 females to 49 males 60% of the elders are in the age range 60-69 years, 30% fall in the 70-79 age cohorts and the balance 10% at 80 years and above. The number of Asians older than 60 is set to explode over the next four decades. The elder's population in Jaffna is about 51725 out of a total population of 630,440 persons (180,522 families). So we in Jaffna too are also to know how to live longer, healthier and happier.

Yet, due to various factors like the civil war, the somewhat and enforced urbanization and as a consequence of a trend towards nuclear families as well as migration of women many, elders are left alone and in need of greater attention in their old age as a result of erosion of the traditional ways of taking care of parents and elders by family members.

A World Bank report published on the needs of the ageing population in Sri Lanka (June 2007) stated that 80% of the elders lived with their children and only 6% lived alone. As per the National policy on ageing, the responsibility of elders care is cast primarily on children while the State is required to provide elders residential facilities only to destitute elders who are without children or are abandoned by their children.

The Elders Empowerment policy initiated by the National Council of elders is the organization of Village Based Elders Committees Island wide organized on a voluntary basis and administratively supported by the Provincial Social Service Department. According to the National Secretariat for elders the number of elders Committees Island wide has exceeded 10,000. The elders committee receives a grant of Rs.5000/= for initial expenses but thereafter functions as an independent voluntary organization, pooling their meager resources to support elders care programmes. In this context, a long felt need is a Society for Healthy ageing and welfare of a fast ageing population of Jaffna. The formation of such a Geriatrics Society would sort out the problems of Elders as listed below:

1. The socio cultural aspects of ageing and policies regarding Elders
2. Use of existing medical, social and philosophical knowledge to meet the needs of the elders
3. *Elders care and support of the elderly – Health care aspects*
4. Old age psychology and social relations in old age.
5. Ageing gracefully and financial planning.

2) Promotion of the welfare of the elderly in Sri Lanka

Act No.9 of 2000 was enacted by Parliament on 4th May 2000 and it is intended for the promotion of welfare of the elderly on the one hand and protection of the rights of the elders on the other.

Section 15 of the Act deals mainly; with the provision for the protection of the rights of the elders. The provisions include:

a) the responsibility of children to provide for and look into the needs of their parents.
b) the state shall provide appropriate residential facilities to destitute elders and preventing discrimination against the elderly.

3) Issues of Elder's Care

A. Functional Ability

The need for Home Care is the degree of limitation in people ability to carry out the activities of daily living.

To plan meaningful and effective health services, we need to know how the functional ability of people affect their lives. Measures of functional ability or limitation serve that purpose. These measures evaluate older person's ability to get through the day by day activities of daily life and how difficult the activity is for them and whether the help of another person is needed to accomplish a given task.

The measures of functional ability thus assesses the extent to which an individual needs help in basic personal tasks such as bathing, eating and getting dressed and with house hold and independent living tasks such are preparing meals, shopping and transportation.

One of the current questions that will have a bearing on future health needs is whether disability is increasing or decreasing as life expectancy increases. Are we living longer but in poorer shape or are we moving towards sustained good health and high functioning well into our 80 s? This debate is unresolved.

B. Self assessed health status

Rating of health by the people is an informative measure of health. A final measure of health is mortality – which dies of what and when. There are variations in the leading causes of death and in death rates by gender, race origin and age.

The mental health status of the older population is an equally important issue. Mental illnesses include cognitive, emotional and behavioral problems, depression and anxiety disorders.

C. Health status of older people

The high-tech, limited-access medical model dominated system of health care does not fit the needs of the older population. Managing rather than curing a condition and maintaining or enhancing an individual's ability to function in everyday life should be the major goal of healthcare system matched to the needs of the older population.

Long term care is the system of services provided to people with functional limitation to enable them to function as independently as possible. We do not have a coherent long term care system- and most people prefer to remain in their own homes.

D. The growing need for Care at Home

"Home Care" refers to a range of services provided to a person in their own home, to enable them to continue living as actively and independently as possible. Home care services fall broadly into two categories-social care and health care.

Social care includes both practical and emotional support. It includes home help (housekeeping), delivering or preparing meals, carrying out errands, escorting, paperwork, contact with outside agencies, some assistance with personal care, and befriending the person. Social care is usually provided by family members, friends, neighbours, volunteers and social workers, both trained and untrained.

Health care includes carrying out health checks, health education (in self-care), nursing, therapy and health- related home improvements. Health care services are usually provided by trained people under the supervision of professional health workers, such as doctors, nurses, social workers and therapists or by health workers themselves.

Home care services are needed by the small but growing proportation of older people who have difficulty managing daily living accessing health care services, due to lack of family support. This applies particularly to women, many of who outlive their husbands. In many societies, older women, particularly widows, have low social status and low incomes, making them vulnerable to abuse and neglect.

E. Models of Home Care

There are many different types of home care programmes such as:

1. Volunteer – based home help services
2. Paid home help services
3. Home nursing services which provide short – term nursing care, often for a specific purpose, such as treating pressure sores.

4. Home-based medical services play an important role in creating access to medical care for very frail, order people on a low income. However, they are expensive and doctors for home-based care are often in short supply.

Home care services may be provided by individuals, community-based organizations, such as resident committees, NGOs, housekeeping companies and government bodies such as Department of Health and Social Welfare and local government departments.

Home care programmes have a range of social, economic and political benefits. They enable older people to continue living with dignity, in line with the United Nations Principles for older person and help to prevent abuse and neglect. By easing the burden of care on families, and allowing family members more time for paid work, they help to reduce family conflict, and contribute to the household economy.

Home care programmes encourage families and communities to seek solutions to older people's problems.

Older people who are served by home help programmes require regular health checks or medical treatment, but access to services is often limited by lack of transport or the means to pay. Links established by home carers and case management coordinators can help to improve older people's access to services. About 30% of Elders are not provided with care by Elders Homes. There about 13 Elders Homes to cater to Elders of the Jaffna District besides Day Care Centres.

4) Palliative Care

More and more of elderly people suffer from chronic diseases which cause a wide range of physical, psychological and social problems even though they live longer. Age may confer wisdom. But time wreaks our bodies –sapping our strength, eroding our vision and hearing and the odds that we will be ambushed by everything from tooth decay to heart disease. After the 60s common health problems arise such as incontinence, sleeplessness and a weekend immune system. A decline in cognitive abilities loss of coordination and dexirity and increase in mental confusion – is also more pronounced.

Palliative care is the active total care of patients whose diseases are not responsive to curative treatment (WHO). Palliative care seeks the best possible quality of life for the patient and family by symptoms control and attention to the whole patient in the psychological social and spiritual dimension. Palliative care is multi disciplinary.

Palliative Care affirms life and regards dying as a normal process. It neither hastens nor postpones death and offers a support system to help patients to live actively as far as possible until death. It also offers a support system to help the family cope during the patients illness and dying.

5) Role of the Social Services Department

Elders in Jaffna District fall into two categories: those below 65-75 and those above 75 years. These elders especially the later category are in need of Home based Care on a long term basis and also need help in their last moments. Hence, Home Care providers should be given sound training in long term care as well caring for sick to the end.

The Department of Social Services has taken action for setting up a team of Elders Health Care providers for the elders care and for other welfare matters. This will go a long way to meet the welfare of these elders most of whom are alone and not cared for, particularly those who are staying at their homes. The present Elders Homes are not meeting the needs of elders.

Group of 25 volunteers who were selected from the different D.S.Divisions and training given for 60 hours. The training of volunteers will be upgraded through the Kaithady Elders Home on a rotational basis once in 3 months @ 5 volunteers per batch.

Implementation will be by the District Elders Committee which will work with the Social Services Department and give a focus for this exercise as well as implement and expand the project. Further the Jaffna District Senior Citizens Committee and the Dept. of Social Services could also look into providing Palliative Care for the Elderly through village-based Elders Committees under the supervision of the respective Pradeshiya Sabha.

Conclusion

As Geetha Iyengar points out in her article on "Ageing gracefully – the CCVS way, the Chinmaya Mission has set up Chinmaya Vanaprastha Sansthan for bringing together the elders in their areas/ towns with the aim of changing the attitude of the elderly towards themselves, their families and their Society through Spiritual awakening. The topics covered are as follows:

1. Keeping fit in old age through yoga and other such methods, thereby avoiding the use of medicines.
2. Old age psychology
3. Social relations in old age
4. Financial planning for old age
5. Old age disease and
6. Reading of Spiritual texts

These activities will surely create a new direction and enable the older people find a new meaning in life casting off feelings of isolation, depression & loneliness.

In this context we have to admit that the well being of older people is a subject of continuing debate. Political commitments, public attitudes etc are potent forces in shapings how collective

resources will be allocated to the needs of the older people. So, our Society has to make the decision as to what type of assistance we are collectively willing and able to provide for these individuals. Policies being formulated today and our view point of the elderly go together.

"If older people can retain their health, and if they live in an environment that promotes their active participation their experience, skills and wisdom will be without doubt a resource for Societies". Dr.F.R.Mehta, Country Representative – WHO in Daily News Supplement of Sept.30, 2011.

References:

1. Ageing – The Social Context
   Authors: Leslie Morgan and Suzanee Kurkel

2. Dynamics of ageing within a changing social world
   Joseph Pannirselvam in Help Age Sri Lanka – Review 2002-2003

3. Programme Frame Work for Resettlement, Rehabilitation, Reconstruction and Development – Jaffna District ("Jaffna Plan") June 2003
4. Dr.S.Premakrishnan's Consultant Anaesthetists: Paper on Palliative Care.

The Genesis of the Advanced Technological Institute (ATI) - Jaffna

Dr. S.J.M.Sahayan
Director
Advance Technological Institute, Jaffna.
jaffnaatidirector@yahoo.com

The first Institution for formal Technical education in Sri Lanka was established in the latter part of the year 1893 as an institution attached to the Department of Education. This Institution was housed in a renovated coffee store situated at close proximity to the Ceylon Government Railway Terminal building at Maradana in Central Colombo. This building was reasonable enough to house a small workshop, laboratory and class rooms to cater to the needs of the 25, the 1st batch of students enrolled.

This institution, which then was known as the Ceylon Technical School, undertook the responsibility of providing multiple services including training of Science teachers as well. This same Government Technical School was re-named as the Ceylon Technical College in 1906. By this time the college had started supplying technically competent people and was providing skilled workers to government technical departments such as the Railway, Irrigation and Public Works. When the Ceylon University College was established in 1921, the science section of the Ceylon Technical College was transferred to the new University College. The Ceylon Technical College was re-organized in 1933 and started preparing candidates for the external degrees in Engineering of the University of London. Throughout this period there was a major debate in the country on the need to expand higher educational opportunities. As a result, in 1942 fully independent and autonomous University of Ceylon was established following which in 1951 Faculty of Engineering was established. The technical education sector, which, in fact, was subordinate to the University sector, evolved into a highly fragmented sector with a network of Technical Colleges specializing in craft and trade courses. In addition to these, there were separate institutions, specializing in some kind of technical education. They operated under different development-oriented Ministries. They conducted several technical and vocational training programmes. The lack of coordination and the failure to establish specific objectives led this sector to remain dysfunctional. Most institutions conducted both Diploma and certificate level courses, and it was through this scheme that additional opportunities were created for the secondary-school leavers who could not find places within the conventional University system.

The entry qualification for these Diploma and certificate courses was the GCE Ordinary Level, and the courses were largely employment-oriented. However, at that time there were no institutions available to produce employable skills and the production of skills required for the economic

development of the country. It was during the seventies and eighties that the traditional view of higher education began to change. Most developing countries wanted to break away from this tradition and began to emphasize the need for a special category of professionals with specific training. These professionals were called the higher level technicians who have both Theoretical and Practical knowledge in their field of work. Therefore, the emphasis was on a specific education that represented an intermediate level between the degree level and the certificate level. This kind of specific system of education, up to this time, was unheard of in higher education. It is this type of education, which is expected to be imparted through the Sri Lanka Institute of Advanced Technological Education (SLIATE). During the time of President C.B.Kumaratunghe, Prof. Wiswa warnapala in his capacity as the Deputy Minister of Higher Education chaired a Committee of Experts which recommended the establishment of the SLIATE in 1995.

According to the Act, No.29 of 1995, the SLIATE enjoys the right to establish Advanced Technological Institutes (ATI) in every province, and at present, it manages 11 such Institutes and Five Institute sections, catering to nearly 11000 students who enter the different courses with GCE A/L qualifications. With the establishment of this Institute with its branches, access to higher educational opportunities has been expanded. By 2015 it is expected to cater to more than 20,000 which is equal to the present intake at 15 universities. Advanced Technological Institute, Jaffna (ATI-Jaffna) is one of the 11 institutes managed by SLIATE. The institute has been inaugurated in Jaffna peninsula in 1996. The main vision of the institute is to become the centre of excellence in technological field in Northern Province.

It has a very painful history for more than twelve years, by functioning in rented houses and private buildings without even basic facilities. However, as a blessing in disguise it was fortunate enough to have an own building through the financial assistance of Kuwait government under the Tsunami rehabilitation fund in 2008. Currently it is functioning at 665/ 2, Beach road, Gurunagar, Jaffna with two three storied buildings.

At present there are seven Higher National Diploma programmers including, Higher National Diploma in Engineering, Higher National Diploma in Management, Higher National Diploma in Accountancy, Higher National Diploma in English, Higher National diploma in Information Technology, Higher National Diploma in Business Administration and Higher National Diploma in Tourism and Hospitality Management.

Unlike in the traditional higher educational institutes, ATI curriculums are more often revised in order to be in par with the ever changing job market. Curriculums also aim to produce diplomats with not only sound theoretical Knowledge but also with appropriate skills, attitudes and proper mindset

which are now expected in the global job markets. Further, all courses at ATI have a 6 months in-plant training component which when completed adds values to the Higher National Diploma Certificate which cannot be seen in the degree certificates offered by traditional higher educational institutes. Training also gives the students courage and working experience, which lead them to get job opportunities not only in government sectors but also in private sectors and overseas. The prevailing educational system at ATI provides enough opportunities for the students to develop other skills needed to become fully pledged person to adapt to the ever changing job market. Institute also has started a student counseling and career guidance unit with trained staff and it plans to provide several trainings for the students, which can help them to compete with global job market. ATI's additional strength comes from the well qualified highly motivated dedicated staff. With this much of prevailing strengths in the system the institute looks forward to inaugurate new courses and expand the infrastructural facilities in the years to come with the view of not only serving the Northern Province but also the Eastern Province.

Technology for Development of Sri Lanka

Discussion Paper

Eng.M.Thillainathan
Appropriate Technology Services
375 (121), Point Pedro Road,
Nallur - Jaffna

Introduction

Ceylon became an independent country in late 1940s after world war two. It has transformed into an independent country through various so called reformative action by British which was an imperialist power at that period of time. It went through dominion status and after independence, became an active member of the "Commonwealth" of nations.

Now about 65 years have passed and Sri Lanka is having very serious political and economic problems. Hence we ought to have a careful consideration of these problems in the historical and global context.

We have two major indigenous groups Sinhalese and Tamils with different languages and territories. In addition, two other groups (Muslims and Indian Tamils) are present to satisfy the aspirations of all these groups are yet to be found.

The concept of Democracy and Human Rights should be re-examined and related to Sri Lankan context. These words are often misused to such an extent as to make communication difficult. Words have to be used carefully and to be understood correctly.

An amicable solution to this political problem has to be found as otherwise the very existence of the country is threatened, leave alone development of it. Thus political settlement is a prerequisite for economic development.

Economic Development

Under unsettled political conditions in Sri Lanka, governing has become problematic. British had developed a system of government to suit their colonial aspirations. It worked so well, that still some people are talking about British justice and British administration as something noble and superior while forgetting the fact of colonialism and slavery. Sri Lanka has not made much progress in reforming the colonial administrative system. Improper governing has led to corruption and inefficiency in administration which has obstructed development.

Both legislative and executive powers are with "elected" representatives. But the elections and the parliamentary process are very often influenced by intimidation and violence. Bureaucracy has to obey politicians or will have to quit. Corrupt bureaucrats will support any party that comes to power

thus eliminating honest administrators. Scant attention is paid to proper policy formulation and whenever ministers are changed, policies are changed at short notices leading to uncertainties and risks which obstruct and hinder development.

From the time of independence, the world has also changed. We may have to take a fresh look at issues like information technology, globalization etc., before making policy decisions. Women affairs and youth affairs are no longer the same as they were in the past. We have to evaluate the present state of affairs and market conditions, centering our country. World Bank loans and other so called aids will have to be assessed against past performances.

Development and Culture

Our cultural background and native wisdom have to be given due consideration that they deserve. Proper balance has to be kept between cultural requirements and technical efficiencies. Economic efficiencies such as mass production and consumer marketing practices should not be allowed to the full extent whenever they cause conflicts with traditional practices valued by the communities. At the same time certain cultural practices will have to be suitably modified or if necessary abandoned to achieve economic efficiency. Sorting this is the problem. Decisions vary with time and locality.

Issues such as globalization, gender equality, extent of mechanization cannot be discussed in isolation without referring to the requirements in our country. We seem to have too many debates without referring to the proper contexts. Certainly barriers and controls have to be maintained or may have to be broken down or may be even added for development to take place.

Slogans have a life period. Some have short periods of life such as the ones used during wars or emergency times. Some have long periods or almost eternal such as the ones told by saints. Thus certain slogans appropriate for a particular time or location may not apply to another. Proverbs can be quoted for both sides of an argument.

AGENTS OF DEVELOPMENT

Who can develop Sri Lanka? Who should develop Sri Lanka? Who will develop Sri Lanka? These have various answers. One can ponder over these questions and a categorization may be possible.

- Government can – should and will develop certain sectors.
- Institutions can - should and will develop certain sectors.
- Universities can - should and will develop certain sectors.
- Commercial undertakings can - should and will develop certain sectors.
- Individuals can - should and will develop certain sectors.

There is further division such as local and foreign. Now there is a third category "migrant" has emerged which is neither foreign nor local.

For certain projects, only one enterprise might emerge as the most suitable agent to plan and execute while in others alternatives might, all of which are equally suitable. Further levels and scales of the projects may affect the choices. If wrong choices are made, the project may end up incomplete or as a failure.

If the context or circumstances do not dictate the success of a project, can one achieve complete success? Yes, we can by proper planning and effort. This gave birth to science and technology.

Development as Sectors

Some sort of division of the overall development as various sectors may be under taken in order to:

1. Obtain an overall view and to bring out the inter relationships.
2. Ascertain priorities in terms of time and money and to enable phasing out.
3. Achieve two things in one attempt (a solution to one problem might at least partly solve another problem)
4. Not to miss out any particular sector or part of development.

The major subjects may be grouped under following sectors.

1. Society – social science such as History, Information, Media and Library science.
2. Infrastructure – Civil Engineering work such as Buildings, Roads, Water Works, Irrigation and Energy.
3. Industries – Mechanical and electrical, Services and Manufacturing.
4. Management – Administration, Accounting and Audit, Economics, Marketing and Law.
5. Agriculture – Cereals, Vegetables, Fruits, Forestry, Animal husbandry and Fisheries.
6. Health – Community Medicine, Herbs, Nutrition, Alopathy.
7. Education – Nursery, School, University, Professional, Trade and Crafts, Science, Sports.

Note:

a) *Like a menu system, up to 8-9 sectors.*
Up to 8 - 9 subjects under each sector.
Under each subjects up to 8 - 9 division.

b) *Problems can be grouped under each subject. All field problems to be assigned under a subject for identification purpose.*

Certain projects which are common and desirable to any country could best be considered as a separate category. The following are some of them.

- Museums
- Botanical Gardens
- Zoo
- Auditoriums

- Gymnasium
- Sports pavilions and play grounds
- Temples, Churches, Mosques etc.
- Parks
- Beaches
- Exhibition Centers

Appropriate Technology

Technology could be considered as applied science and also as problem solving process. In the past, technology was considered as applied science and thus teaching of science was given a better treatment. However the system of education and the values it produced has become questionable for development purpose. Hence it is betterr that technology should be viewed as problem solving process.

There are various types of technologies:

1. Modern technology
2. Indigenous technology
3. Low cost technology
4. Intermediate technology
5. Alternate or Radical technology
6. Appropriate technology
7. Survival technology

Each one has its own criteria and uses. Careful thought should be given to the understanding of technology.

Our indigenous or native technologies will have to be given a decent treatment. Most of us neglect or even ridicule the native technologies. On the other hand some of us treat it as mysterious. For about 400 years, our systems of technologies were neglected. At least now we have to fill the gap and filter through scientific reasoning. We have to do it through our own universities and research institution. Instead of this our universities are treating the native systems as outcasts. For example Sidha medicine does not come under the faculty of medicine. Our own educated scientists, engineer, technologists, and even the social scientists are not giving enough attention that the local indigenous technologies and resources deserve.

Transfer of technologies is another field we have to devote more attention. We have to have a hand in the choice of technology, on the costs of technology and on the conditions of transfer of technology and also to make suitable modifications to them when ever necessary.

Development Planning and Technology

Education will have to serve development. All the faculties of higher education will have to involve with interactive discussions and studies about the relevant problems of development.

Here is an outline of tackling any particular problem or project.

Step 1) Identifying the problem and assigning a place in the sector classification.

Step 2) Qualitative and quantitative description of the problem.

Step 3) Formulating any policy or criteria regarding the problem or its solution.

Step 4) Collection of related statistics

Step 5) Collecting and noting down the history of the relevant field under consideration.

Step 6) Reference materials for reports about the status of the problems in other countries.

Step 7) Collecting information on resource such as men, materials and machinery in connection with the solution of the problem.

Step 8) Formulating any required manpower development proposal and training facilities.

Step 9) Formulating appropriate standards and specifications.

Step10) Creating a database regarding the problem and its solution.

Development Plan

- Notice the difference between mass production and production for the masses.
- To give more serious allocation to make multi faceted and integrated development programmes. An example is IRDP (Integrated Rural Development Projects).
- Distribution of income and Benefits. Rich becoming richer is all right but poor becoming poorer cannot be allowed.
- A stitch in time saves nine. Proper maintenance should be considered.
- Penny wise, pound foolish. An improvement in one field should not cause serious damages in another field. Environmental pollution is a case in point.
- To make phased development proposals with proper co-ordination between various sectors and in various stages of development.
- Critical path analysis or PERT analysis to be carried out whenever necessary in order to achieve efficiency.
- Cultural consideration should be given its due place.

Towards a Nano Future!
What is Nano Technology and Why We Need it?

Mr. Ramathasan Thevamaran
Caltech, USA.

We are living in a new era of science and technology where small things have big impacts. Anyone living in this era could not have missed the buzzword Nanotechnology flashing in almost all news media. Even the local newspapers in Jaffna had columns featuring nanotechnology and its importance to our future. Many countries have recognized advanced science & technology as the key for the development and started investing more and more in research and development. In this regard, over the past two decades, nanotechnology has been playing an important role in taking science & technology forward. In fact, with the kind of rapid development in nanotechnology over the past few years, it wouldn't be overstating to say that we are leading towards a nanotech era. If we want this technology to do wonders without ending up as a mere disruptive technology causing crisis, it is very important for everyone to have at least some level of awareness of what we are dealing with.

Before jumping into the details of it, let us first understand what the nanotechnology means. In simple terms, nanotechnology is engineering of the functional systems in a minute scale that is in the order of one to hundreds of a billionth of a meter (10-9 -10-7 meters) or in other words, 1-100 nanometers (nm). When you get into this scale many materials display drastically different properties. As a matter of fact, nature itself has its basic building blocks coming from this nano-scale.

Why should the materials and systems behave differently in nanoscale?

One important parameter that makes the difference is the surface area to volume ratio. This ratio becomes larger and larger as the length scale shrinks. To understand this, imagine you holding a solid football. If you look at the ball, most of the atoms are located inside the volume of the ball and the amount of atoms on the surface of the ball is insignificant compared to what is inside. Hence, the surface atoms interacting with the surrounding air or your hand has very little effect. Now, by some magic if you can shrink the ball to billionth of its original size, what would you have in your hand? First of all, you may need some special instrument to see what it is. But, if you can visualize it all what you would see is a bunch of atoms sticking together like a ball. Now, look at the same thing we were looking at earlier: you will have so many atoms on the surface compared to the number of atoms inside the ball. So, these large numbers of surface atoms interacting with the surrounding can have larger consequences. As a matter of fact, weak forces in nature like van der Waals interactions become dominant than the gravitational forces in that scale. So, now we see how things can change when shrinking the length scale down.

Inspiration from nature.

Nature has been doing this molecular manufacturing for a long time. It's just that we didn't have the right tools to see this. If you ask questions like, how water molecules don't stick to a lotus leaf? Or how is a gecko able to walk on vertical surfaces without any difficulty? Or how does a butterfly get its beautiful colours? , the answer to all these questions lies in the nanoscale. Now since we understand these nanoscale mechanisms and interplay of the forces of nature in the small scales better, we are becoming capable of creating smart materials and systems that are engineered to take advantage of the nanoscale properties. As the resources become largely scarce, this will be the way forward: engineering smart and active materials and system than the passive ones we have currently exploiting the luxury of having resources in abundance. Already, we have a number of products available in the market that have nanoscale functionalization. To name a few, there are many fabrics and cloths available that can repel dust particles or stains that you don't have to wash them at all; self cleaning titanium dioxide nanoparticle enhanced windscreens of vehicles, glass windows of buildings, wall paints and toilet fittings that can repel water molecules or dust particles themselves; sunscreens with zinc oxide nanoparticles that can provide better protection against UV; ultra-light badminton and tennis rackets reinforced with nanofibers; self healing concrete for civil engineering structures that can seal the cracks automatically, among many others. In Sri Lanka itself, the researchers at the Sri Lanka Institute of Nanotechnology (SLINTEC, established in 2008 as a private-public partnership to advance Nanotechnology in the country) have developed several patented technologies such as nanoscale water purification system, third generation efficient fertilizers, carbon nanotube reinforcements for enhancement of solid rubber tires and magnetite nanoparticles for targeted drug delivery for patients.

From these examples you might have already noticed that we are not restricted to molecular manufacturing only, but we can build macro scale engineering systems incorporating the excellent properties of the nanoscale. To give an extreme example, Lockheed Martain, an aerospace company in United States is building F-35-Lightening-II aircraft combining carbon nanotube structural composites in airframe units. Learning from nature, we are developing bio-inspired materials and technologies that have similar complex architectures of nature while providing better performance than what is in nature. As an example, hierarchical composites that mimic the hierarchy in abalone shells or human bone structures have led to extremely lightweight but very strong materials. By engineering smartly with nanotechnology, we can lead to a sustainable future with limited resource depletion and efficient built environment.

Brief history of the way we walked.

The Nobel Laureate and physicist, Richard Feynman ignited the curiosity for the nanotechnology in 1959. He delivered a thought provoking lecture at the annual meeting of the American Physical Society at Caltech where he examined the possibility of going down the length scale and engineering molecular machines that can change our future. The talk was titled 'Plenty of

room at the bottom' indicating unlimited avenues available in the small scales. It took sometime to develop the right tools and capabilities to get to the bottom. Development of Atomic Force Microscope (AFM) and Scanning Tunneling Microscope in the mid- eighties opened up the possibility of visualizing and manipulating matter in atomic scale. With the discovery of bucky balls by Richard Smelly (USA) in 1986, demonstration of atom-by-atom manipulation by IBM scientist in 1990 and discovery of carbon nanotubes in 1991 by Japanese Scientist Sumio Iijima, nanotechnology started getting its worldwide attention. Giant leaps were set out by the $3.63 billion dollars (over 4 years) US National Nanotechnology Initiative by Bill Clinton administration in 2000 with four main objectives:

1. Advance a world-class nanotechnology research and development (R&D) program.
2. Foster the transfer of new technologies into products for commercial and public benefit.
3. Develop and sustain educational resources, a skilled workforce, and the supporting infrastructure and tools to advance nanotechnology.
4. Support responsible development of nanotechnology.

Following discoveries of many more nanoparticles and nano-elecro-mechanical systems (NEMS) along the way now we are stepping into an era where even biological systems can be engineered with extreme control and precision. Scientists at MIT are functionalizing viruses with carbon nanotubes to make greener and powerful batteries. Imagine the record-breaking lithium ion batteries you will be buying in the near future having a special ingredient that are viruses! When celebrating Feynman's vision of 50 years and laying out the big ideas for the future at the TEDx Caltech in 2011, MIT scientist Angela Belcher summed up her talk by stating, 'my dream is to drive a virus powered car'.

Towards the future.

Today we don't have a single field that does not benefit from nanotechnology. Many new fields have emerged into science and technology. Nanotechnology is expected to solve several crisis mankind may face in the near future including but not limited to clean energy, access to drinking water and food, health care and disease control, unavailability of many resources and fossil fuels, and above all, making the earth bear the impact of a 10 billion population by 2050. With the right kind of attitude and taking part in development actively, we do can make changes happen. I would like to conclude this article by remarking up on a crucial statement that it is very important for us to prepare our next generation and enable them with the right attitude and skills for them to lead a bright and sustainable future. Let us be the starting point of the change!

Conjunctive Use of Surface and Groundwater for Economic Food Production

Dr. (Eng.) S.S.Sivakumar:
PhD, MSc. (WRD), BSc.(Eng.), C.Eng, FIE(SL), LMSLAAS, LMIWRS, LMICOLD, BMI&PSI
Senior Lecturer, Faculty of Engineering,
University of Jaffna
sssiva100@yahoo.com

Introduction

It is observed that at present the water that is available is not utilized effectively to achieve maximum productivity in terms of food production. Food scarcity is a pressing problem in many countries of the globe. The problem is, however, particularly serious in less developed countries with low agricultural production combined with a fast growing population. To meet food requirements, efforts should be made to increase the food production, at least several times over the present supply. This can be done by the use of better viable and vigour seeds, development and cultivation of new improved crop varieties, use of proper fertilizers, pesticides, and herbicides, better on-farm water management, better use of agricultural implements, provision of extension services, strengthening of the existing institutions and introduction of new socio-economic legal and organisational support together with proper implementation of suitable alternate policy regarding the conjunctive use of surface and groundwater.

Proper management of water economically, however, is of overriding importance in the production of food. The success and efficiency of most other measures are dependent on the quantity, quality and timing of the irrigation water supply, the way it is used, and the degree of control over it.

Water Resources and its Management Problems

Water is the web of life, but at the same time, it is a limited resource in many areas of the world. Proper economic management of this scarce resource is essential for improvement and sustainability of food productivity. Fresh water being one of the basic necessities for subsistence of life, the human race through the ages has striven to locate and develop it. Over ninety percent of liquid fresh water, available at any given moment on the earth, lies beneath land surface. Unlike other natural resources, water is a unique resource which renews itself. It is due to its constant circulation in the ocean – atmosphere – earth – ocean system. No matter how much water is consumed in daily life, its amount seldom dwindles. With time and under certain conditions water regains its property and becomes fit for reuse. This is probably the reason why water resource appears to be unlimited for a long time.

Water is available on earth in different forms and at different positions. Several types of resources of water on earth include:

- ☐ Fresh surface water in streams, lakes, reservoirs, estuaries, ponds and swamps
- ☐ Fresh groundwater in water table conditions, artesian aquifers, coastal aquifers, fractured rocks, karts and lava aquifers, etc.
- ☐ Precipitation from atmosphere in the form of rain, snow, ice, water vapour, etc.
- ☐ Soil moisture
- ☐ Surface or subsurface brackish waters with varying degree and nature of salinity
- ☐ Sea water, mixed estuarine water or desalinated water
- ☐ Effluent waters which may be partially or fully nontreated

The key consumer of fresh water is agriculture rather than industry. Irrigation fields, orchards and estates claimed almost 80% of the water consumed the world over.

Unfortunately, 97.5% of all water resource on earth is saline. Consequently, fresh water including that in glaciers accounts for only 2.5%. Even here the most accessible one is the 0.3%. Moreover the natural distribution is extremely uneven. This unevenness is aggravated by the still greater unevenness of the geographical distribution of human settlement. Shortage is noticed where there is an excess of population and industry.

Irrigation is necessary in one form or other in all parts of the globe where the mean annual rainfall is less than 250mm. Experience has shown that over most part of the globe one in five years is a dry year and one in ten years is a severe drought year.

Impounding surface water was practiced from ancient times for a variety of purposes such as domestic needs, irrigation, industry and recreation. Groundwater, unlike surface water, is available in some quantity almost everywhere that man can settle in, is more dependable in periods of drought, and has many other advantages such as the fact that it is directly consumable and that comparably less investment is required over surface water and that it has readily absorbable high nutrition content for crop production.

Utilisation of surface and groundwater singly or in conjunction is in vogue according to the relative availability of either in a locality. Of late, accent of intensive exploitation of groundwater has gained credence as a consequence of extreme pressures of population on water resources all over the world. The limited groundwater potential could not withstand the excessive exploitation and fast depleting water level.

Groundwater is an integral part of the hydraulically cycle. Its evaluation, planning and management have to be part of the total system. Most of these issues have therefore to be dealt with at the appropriate level of water resource system planning. Water resource potential assessment, conjunction of surface and groundwater development, groundwater quality assessment, groundwater recharge, conjunctive surface water - groundwater - energy planning, also nave to be taken in to

consideration, while taking a policy decision regarding water resource planning. However, groundwater is a very important component of the water resource system and has special characteristics and management issues.

Necessities of stabilizing agricultural production in Asia where over 40% of the area is drought prone require speedy development of groundwater resources. Even in areas where there are surface water supplies available through major, medium and minor irrigation projects, groundwater is playing an increasingly vital role in supplementing surface water. The importance of the role of groundwater to meet water supply requirements for domestic, rural, urban, industrial and agricultural use needs no emphasis. The increasing demand placed on it has stimulated investigations, oriented towards quantification of the resource, which is basic for the formulation of plans for its exploitation, management and conservation.

The groundwater in a basin is not at rest but is in a state of continuous movement, the increase in the storage volume of the groundwater by the downward percolation of rain and surface water storage, causing the water table to rise. At the same time decrease in the storage volume of groundwater caused by domestic consumption, industrial use, evapotranspiration, discharge to springs, overflow into streams and other natural drainage channels, cause the water table to fall.

When considered over a long period, the average recharge equals the average natural discharge and the state of hydro logic equilibrium exists. The water table is virtually stationary, with seasonal fluctuations around the average level.

Human interference can also cause water table to rise. For example when irrigation is introduced into an area, millions of cubic meters of water is transported to and distributed over that area, which earlier had only scanty rain. Part of it seeps to the underground from the canals and more of it percolates downwards from the irrigated fields. These water losses cause the water table to rise, because the recharge exceeds the natural discharge. This may eventually leads to water logging, in arid areas usually accompanied by salination of the soil which can render once fertile land into waste land, to the detriment of local farmers and even of national economy.

Man's two foes of nature related to water supply are drought and flood. Both cause a water problem. One is a shortage and the other an excess. If proper planning can be done then both the above mentioned dangers lose their destructive effect to a great extent. This is the purpose of integrated conjunctive management in the use of groundwater and surface water.

By a judicial management and use of both surface and groundwater, the water resources can be conserved and utilised economically for food production drive as well as industrial revolution. For a healthy economic growth of a country, management and utilization of the two resources needs to be scientifically planned and managed keeping in view the future demands which are inevitable to increase manifold for domestic, irrigation and industrial purposes.

To address these problems a self financed research was carried out by the writer, selecting a restricted area of 185 square kilometres with more than two thousand dug wells (including forty one observation wells), six medium irrigation schemes and forty minor irrigation schemes in Vavuniya District.

Objective of the research

The main objective of this research is a complete water balance study in a restricted catchment (more than 150 square kilometres) area incorporating few medium irrigation schemes, several minor Irrigation schemes and a large number of dug wells to illustrate:

1. The development of a model to represent all the relevant variables connected with the movement and utilization of surface and groundwater
2. The usage of the above model to study the viability of conserving surface water by storage as groundwater by reducing the extent of cultivation using surface water and increasing the extent of cultivation using groundwater to achieve optimum crop yield
3. The economic viability of achieving optimum crop yield as in (2)
4. The creation of an artificial aquifer boundary to optimize the effectiveness of groundwater use to achieve optimum crop yield
5. The economic viability of the creation of artificial boundary in terms of productivity
6. Combining both 2 and 4 for the increased crop production
7. The economic viability of achieving optimum crop yield as in (6)

For the management and conjunctive use of surface water and groundwater resources in an efficient and economic manner to achieve optimum productivity in terms of food production.

Research Methodology

Many field experiments conducted by agronomists reveal that the increase in yield of a crop depends (in addition to other factors), on dissolved nitrogen in irrigation water supplied. More frequent and less intense irrigation tends to give a better crop yield due to reduced moisture stress, requires less water to fill the root zone to field capacity and reduces solute movement. General relationship between crop yield and water applied to the crop shows a trend to increase linearly up to about 50% of the full irrigation and then going in a convex curvature to the optimum yield and then reduce the yield with increase in applied water.

Farmers whose sole objective is to get optimum net income, tends to irrigate their crop by spending minimum cost for their irrigation water to get optimum productivity of their crop, hence the main methodology adopted in this research regarding the optimum crop yield is economizing the cost of the irrigation water and increasing the extent of cultivation per unit of irrigation water.

A regional aquifer simulation model was formulated in Integrated finite difference method and a non-linear error optimization method was used for calibration of the model to a selected restricted catchment (around 185.23 km2 as shown in figure annexed) in Vavuniya (having a shallowly weathered and rarely fractured crystalline rocks with thin soil mantle).

This model was used to find out an operational policy for conserving surface water by storage as groundwater by reducing the extent of cultivation using surface water and increasing the extent of cultivation using groundwater to achieve optimum crop yield under minor and medium irrigation schemes together with creation of an artificial boundary to lift the water table up.

Summary of Economic Analysis of the Operational Research

From the detailed cost benefit analyses for all the three options of the operational research the following findings were arrived.

- The alternate policy on changing the operational policy of minor and medium irrigation schemes by forgoing cultivation by 25% to 35% gave the benefit cost ratio based on present worth greater than unity with considerable rise in water table. The rise in water table occurred almost above 80% of the observation wells. The rise in water table was around 45% to 65% of the loss in water table between two consecutive seasons
- The boundary treatment showed positive results for the life time of the project exceeding 20 years and for the interest rate of 7.5%
- The combination of the above two alternatives yielded further improvement that, at any time water table will reduce 60% to 70% of loss in between two consecutive seasons in 95 % of the catchment under study.

Summary of the Research Finding

Summarizing all the three alternatives based on the operational research and economic analysis, the first and third alternatives out of the three alternatives mentioned previously would be the most economically feasible alternatives for implementation in any catchment.

- A change in operational policy of minor / medium irrigation schemes by forgoing one third of the cultivation under minor / medium irrigation schemes or keeping one fourth of the storage of minor / medium irrigation schemes at any time will recover an average of 45% to 65% of the loss of water table in any consecutive seasons in almost 80% to 90% of the catchment area under consideration.

- A change in operational policy of minor / medium irrigation schemes by forgoing one third of the cultivation under minor / medium irrigation schemes or keeping one fourth of the storage of minor / medium irrigation schemes at any time together with creating an artificial aquifer boundary to reduce the permeability of the catchment boundary by 40% to 50%, will recover an average of 60% to 70% of water table loss in between two consecutive seasons in almost 95 % of the catchment under consideration.

This will reduce the cost of irrigation water and in turn increase the extent of cultivation per unit of irrigation water. This will increase the crop yield per unit of irrigation water and lead to increase productivity in terms of food production.

Implementation of the Research Finding

This finding can be generalized with respect to time and space with suitable modification and does not require any additional resource to implement, but proper awareness about increase the extent of crop production in one unit of irrigation water, is required to implement this policy in field among the stake holders.

Even now the practice of alternate tract cultivation in different years depending on availability of water in the Irrigation schemes exists. Hence forgoing one third of cultivation extent will not be a serious problem in execution. It must be noted that the extent of cultivation under ground water is increased considerably. Hence this policy implementation is very easy with proper knowledge based awareness among the stake holders.

Conclusion

In many regions in the world there is excess precipitation in one season and less or no precipitation in the rest of the year. This is especially true in the dry zones of Sri Lanka where during the monsoon period of about four months we get most of the rains and practically very minimal rain during the rest of the year. Surface storage is created to hold the excess water during monsoon for use in the non-monsoon seasons and supplementary irrigation for maha season. Where the hydro geologic conditions are favourable it would be possible to consider storing of the excess water in aquifers or keep apart a percentage of surface water to recharge the groundwater during the dry season.

Minor / medium irrigation schemes conserve surface run off and covey most part of it to recharge groundwater and as such serves as a recharge shed for the wells situated in the zone of influence. It is an insurance against water scarcity, as the yield increases considerably for every unit of rainfall. The minor / medium irrigation schemes prevent soil erosion and depletion of soil fertility. In the context of impending water deficiency looming large, construction of minor / medium irrigation schemes will be a dependable infrastructure in the development of water potential in any catchment. Acknowledgement of the remarkable role played by the minor / medium irrigation schemes on replenishment of groundwater and its spread over a large area would be a great asset in planning and execution of settlement and crop production projects.

This research finding shows that a change in operational policy of minor / medium irrigation schemes by forgoing one third of the cultivation under minor / medium irrigation schemes or keeping one fourth of the storage of minor / medium irrigation schemes at any time will gain an average of 45% to 65% of the loss of water table in any consecutive seasons in almost 80% to 90% of the catchment area under consideration.

The reduction of the loss of water table in any consecutive seasons will be between 60% - 70% in almost 95 % of the catchment under consideration by creating an artificial aquifer boundary to reduce the permeability of the catchment boundary by 40% to 50%, in addition to the above change in operational policy of minor / medium irrigation schemes.

Growth of a Nation Depends on Effective Economic and Equitable use of Water Resource

Groundwater Studies in Jaffna Peninsula by Water Resources Board

Chameera Illawaturegedara
chameera.personal@gmail.com

Geology in Jaffna peninsula is comprised with five types of significantly distinguished features. Miocene Limestone and the Red bed cover the top middle part of the peninsula while Dune sand/Beach sand restricted into Eastern coastal region and as a thin layer of northern coastal from Karainagar side to Point Pedro. Rest of the inland is occupied by Unconsolidated Brownish Gray coastal sand and marginal areas covered by Lagoon/Estuarine deposits. It's noted that the groundwater quality is varied and interrelated with these geological setup in the region.

Figure: Recently Established Analytical and Microbiological Laboratory facilities in the Jaffna WRB

Water Resources Board is presently engaged in comprehensive studies to assess the spatio-temporal water quality distribution as well as aquifer characteristics in the entire Peninsula.

Jaffna Regional Office of Water Resources Board was renovated and established a new Chemical & microbiological laboratory which is available to carry out the water quality analysis. Modern high-tech exploration equipment for groundwater prospecting & various laboratorial equipment were procured under these studies to perform the project activities. The groundwater assessment studies are also presently been carried out in the selective areas upon the request of interest parties.

Study purpose

The main objective of the DSWRPP (Dam Safety & Water Resource Planning Project) groundwater component and Treasury (of SL government) funded project is the establishment of a monitoring network for long term assessment of hydro-geochemistry in the region. Specific objectives are determination of groundwater use and identification of the influence of agricultural practices, bacteriological pollution and other factors to the groundwater of the Peninsula and

furthermore, to interpret the hydro-chemical evolution of groundwater from the limestone aquifer by determining the chemical characteristics and the most relevant controls on the groundwater composition.

Activities performed

Specific approach was formulated to achieve outputs based on the issues identified and objectives. The main work components of these assessments were i.) Aware the community and stakeholders on present situation, ii.) Identify groundwater flow regime and iii.) Determine the spatio-temporal water quality distribution through detail water quality analysis from the shallower & deeper aquifer systems during dry period as well as wet period. Awareness programs, Preliminary field investigations, base map preparations, water sampling, groundwater level monitoring, in-situ water quality testing, 1-D & 2-D

Geophysical surveys, test bore hole constructions, pumping tests, water quality analysis (physical, chemical, heavy metal, bacteriological and pesticides), DGPS leveling of monitoring points, result analysis and interpretation/ processing work are some of the principal activities included in the entire methodology.

The some of the activities performed are illustrated below in brief.

Fig: In-situ chemical testing, water sampling at the field for chemical, heavy metal and bacteriological analysis.

Geophysical surveys, test bore hole constructions, pumping tests, water quality analysis (physical, chemical, heavy metal, bacteriological and pesticides), DGPS leveling of monitoring points, result analysis and interpretation/ processing work are some of the principal activities included in the entire methodology.

The some of the activities performed are illustrated below in brief.

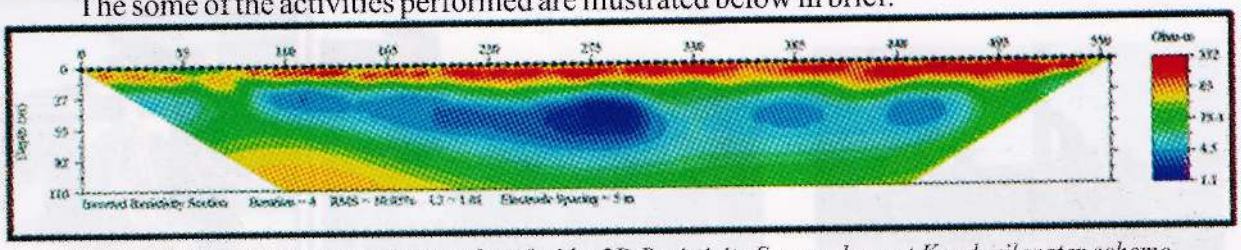


Figure: Different sub-surface layers identified by 2D Resistivity Survey done at Kondavil water scheme

The area is underlain by comparatively high resistive top soil (Red earth) formations followed by karstic Limestone which is more than 100m thick. 1D resistivity survey carried out in different geological natures in the area implies the deeper (>20m-30m) Groundwater quality may be objectionable to the consumers because of the taste.

Fig: 2D Imaging Geophysical survey carried out at Kondavil area

Test Pumping

Figure: Test pumping done at Iyakachchi area. Test pumping carried out at different aquifer types in the area and the analyses results of those tests were used to estimate the aquifer parameters & characteristics.

Leveling of the monitoring points

The below Figure shows Differential GPS surface leveling techniques are being used in Jaffna to assess the high accurate groundwater elevations with respect to MSL. Some of the university staff and undergraduates also participated for the activity.

Findings

The entire Jaffna peninsula is underlined by Miocene limestone formations of karstic nature. The study reveals the high NO3 (12-30 ppm) content in Kondavil lateritic formation where the major water supply scheme is existed. Elevated levels of NO3 could also be detected at certain areas of the region. This is an alarming threat since the hazardous waters are distributed to the entire Jaffna and Nallur areas. High EC and high Cl content in groundwater are associated at the margins of lagoonal boundaries which characteristically reflect the hydrogeological set up of lacustrine deposits. The high mineral enrichment is encountered in these areas may due to lagoon deposits or possibly a threat indicating of saline water intrusion especially along the Karaveddi-Chavakachcheri DSD boundary.

In addition, High potential fresh groundwater bearing zone at Iyakachchi area were identified during the study through geophysics as well as test pumping.

The establishment of monitoring network was finalized for the Peninsula based on the output of these activities. The consolidation process is in progress at present for the verification and revising of the monitoring points selected. In addition to these hydro-geochemical studies in Jaffna, Water Resources Board is planned to expand their studies more towards on quantitative assessment as well through in detail groundwater exploration techniques and other hydrogeological activities.

Reducing "Water Footprint" for a Environmentally Secured World

Deepthi Wickramasinghe, Ph.D
Senior Lecturer, Department of Zoology,
University of Colombo

Water is a single resource with many competing uses worldwide. From ancient times, our lives have been tightly connected to water. People use water for many purposes that include drinking, cooking and washing, but even more for producing things such as food, paper, cotton clothes, etc. People use water indirectly too. For instance, if we buy a pair of shoes, there may be several liters of water used in different stages in the process of making it.

What is "Water footprint" (WF)?

The water footprint is an indicator of water use that looks at both direct and indirect water use of a consumer or producer. This concept was first introduced in 2002 by Arjen Y. Hoekstra as an alternative indicator of water use. The water footprint of an individual, community or business is defined as the total volume of freshwater that is used to produce the goods and services consumed by the individual or community or produced by the business.

Components of Water footprint

Three components could be identified in a water foot print: blue, green, and grey. The blue water footprint is the volume of freshwater that evaporated from the global blue water resources (surface water and ground water). The green water footprint is the volume of water evaporated from the global green water resources (rainwater stored in the soil as soil moisture). The grey water footprint is the volume of polluted water that associates with the production of all goods and services for the individual or community. The gray water footprint can be expressed as the volume of water that is required to dilute pollutants to such an extent that the quality of the water remains at the specified water quality standards.

Why water footprint?

Freshwater is a scarce resource. The water footprint of humanity has exceeded sustainable levels in most of the countries and is unequally distributed among people. There are many spots in the world where freshwater resources are degraded and depleted. Rising demands for fresh water stem from a variety of factors, including population growth; industrial activities; increasing standards of living, particularly in emerging economies; and the effects of climate change. This has far-reaching consequences that touch on many life-support systems of the community.

World water use has been rising rapidly in the last hundred years. From 1900 to 2000, water use for agriculture went from about 500 to 2,500 cubic kilometers per year, while total use increased from around 600 to more than 3,000 cubic kilometres per year. Agricultural sector uses 70% of global water resources.

On top of this, more than one billion people in the world lack access to clean water and this situation is getting worse everyday. Over the next two decades, the average supply of water per person will decrease by third, possibly putting millions of people to an avoidable trouble of surviving.

Water footprint sustainability assessment

Assessing water foot print is important. But what is more important is assessing the sustainable use of fresh water resources, reflecting the efficiency and fairness of the existing water footprints. However, collecting and disseminating meaningful water-related information is a complicated task.

For instance, three types of different sectors of water blue, green and grey could be analysed separately. As mentioned elsewhere, they are water quantity (rain, ground and surface water) and water quality (grey water). In addition, WF could be assessed according to three different geographical scales: micro-level (local), meso-level (river-basin) and macro-level (beyond the river basin). Moreover, it could be determined according to the "Three pillars of sustainability" : from the environmental, social and/or economical perspective . The choice of the three pillars of sustainability suits the purpose of the water footprint as a tool aiming to facilitate the efficient, fair and sustainable use of water resources. Adding to that, Life Cycle Assessment too could be used to this purpose. This could be explained as a systems analysis tool designed specifically to measure the environmental sustainability of products (including water use/ discharge and many other resource uses/emissions) through all components of the value chain.

Some examples are available from different studies that have been carried out world wide. According to an Indonesian study, the water footprints of crops largely vary among provinces. Rice produced on Java has the lowest water footprint of all rice in Indonesia. The green water component is relatively high for all crops; only for rice and soybeans the contribution of irrigation water is relatively high compared with other crops. The products cassava, coconut, bananas and coffee have the largest inter-provincial water flows relative to the water use for production.

Some facts and figures

The water footprint of the global average consumer during the period 1996-2005 was around 1,385 m3/yr. Food consumption attributes to the largest part of a person's water footprint. About 92 percent of the water footprint is related to the consumption of agricultural products, 4.4 percent to the consumption of industrial goods, and 3.6 percent to domestic water use. Moreover,

- 10-20,000 litres of water are used to produce 1kg of beef
- 8,000 litres of water are used to produce a pair of leather shoes
- 2,900 litres of water are used to produce a cotton shirt
- 140 litres of water are used to produce 1 cup of black coffee without sugar• 200 litres of water are used to produce the sugar in 1 can of cola
- Food demand is estimated to double by 2050
- 70% of existing global freshwater is withdrawn for irrigation in agriculture

Water foot print and agriculture

Since all of us, as individuals or as a nation, are dependent on agricultural production, water use in this sector plays a major role in shaping micro and macro economies. Identifying this pressing need, Mekonnen and Hoekstra (2010) investigated water foot prints of different sectors of global agriculture.

With respect to the water footprints of primary crops, this study reveals that the global average water footprint per ton of crop increases from sugar crops (roughly 200 m 3 /ton), vegetables (300 m 3 /ton), roots and tubers (400 m 3 /ton), fruits (1000 m 3 /ton), cereals (1600 m 3 /ton), oil crops (2400 m 3 /ton) to pulses (4000 m 3 /ton). Nevertheless, these figures could vary across different crops per crop category and per production region as well. This study reports the commodities with relatively large water footprints per ton of product : coffee, tea, cocoa, tobacco, spices, nuts, rubber and fibres.

Water foot print and industry

Industrial sector is often seen as an agent who pollute, degrade and overuse water. Assessing industrial effluents and related impacts on water resources is arguably more complex when compared to certain other sectors.

This complexity is due to many factors, including the different and complicated types of pollutants generated from the industry (e.g., phosphates, nitrates, heavy metals, hydrocarbons, etc.); the interactions among pollutants; the variety of ways water quality can be compromised (i.e., contaminant loads, temperature, odor, turbidity), and the various approaches to assess the impacts on the biodiversity, ecosystems and society.

There are many impacts identified to be resulted from industrial processes and activities. They include:

- Eutrophication (overgrowth of algae due to excess nutrient addition)
- Acidification due to emissions of acidifying substances (mostly into the air)
- Ecotoxicity (potential for biological, chemical or physical stressors to affect ecosystems)
- Toxicity for humans- acute and chronic

Nevertheless, industrial water footprint similar to the other sectors too is significant. For instance, net water footprint calculated for beer production, in 2008, in the Czech Republic is 38 billion litres (excluding grey water), equivalent to 45l of water for every 1l of beer. With the inclusion of grey water the water footprint increases to around 39 billion litres or 46l/l.

Lets start from home- *Help reducing water foot print*

Not only the industrialists, agriculturists or a government, as responsible citizen, everybody should seriously help in reducing 'direct water footprint' (home water use) and there may be several ways: by installing water saving toilets, , closing the tap during teeth brushing, using less water in the garden and by not deteriorating water by dumping garbage, pollutants and toxic chemicals to water.

Tips to reduce Water Footprint for industries

Audit your water usage. Review all the sources of water use within your plant from intake to discharge. Fully understanding how and where you use water mitigates risk, which could result in operational shut-downs or costly regulatory impacts. There are technologies available to treat water to virtually any specification.

Treat water as a valuable resource. Treated water isn't free, but a valuable resource. It takes energy and technological resources to treat water. We are using treated water not only fro drinking and cooking but to flush the toilette and wash the car!

Reuse and recycle your water. It is unfair to consider that recycling water during the manufacturing process can reduce water by millions of gallons/year, as well as save money, but this is better than nothing. An audit can identify very simple ways to easily capture and reuse water without extensive capital investment.

References

Chapagain, A.K. and Hoekstra, A.Y. (2004) Water Footprints of Nations. Value of Water Research Report Series. No. 16. UNESCO-IHE: The Netherlands.

- Chenoweth, J. (2008) Looming water crisis simply a management problem . New Scientist
- Mekonnen, M.M. and Hoekstra, A.Y. (2010) The green, blue and grey water footprint of crops and derived crop products, Value of Water Research Report Series No. 47, UNESCO-IHE, Delft, the Netherlands
- Hoekstra, AY (2012) "The Water Footprint of Humanity". PNAS. doi:10.1073/ pnas. 1109936109 Ridoutt, B.G., and Pfister, S. (2010) "A revised approach to water footprinting to make transparent the impacts of consumption and production on global freshwater scarcity." Global Environmental Change, 20: pp 113-20
- Smakhtin, V., Revenga, C. and Doll, P. (2004) A pilot global assessment of environmental water requirements and scarcity. Water International, 29(3), pp. 307-317.
- The Economist (2008) Footprints in carbon, nitrogen and water, The Economist.
- WWAP (2009) Water in a changing world: The 3rd United Nations world water development report. UNESCO Publishing, Paris. www.globalwater.jhu.edu
- www. waterfootprint.org
- www.epa.gov/fgc/water.html

Underground Water Resources in the Jaffna Peninsula and the Development of Irrigation Facilities

Prof.R.Sivachandran,
Former Dean,
Faculty of Arts,
University Of Jaffna.
avsrsiva@gmail.com

From historic times, the underground water resources in the Jaffna Peninsula have been the foundation for human settlement. Seventy percent of the population of the Northern Province resides in the Jaffna Peninsula, the peninsula's underground water resources account both for the density of the population and intensive cultivation.

If a line is drawn from Puttalam linking Paranthan and Mullaitivu the areas lying towards the north west of this line have a limestone rock formation dating to the Miocene Age. These rock formations have the capacity to conserve large amount of water underground. Red soil has the quality of allowing water to percolate downwards. Rainwater easily seeps through and is conserved as underground water. Actually the water that seeps down is a layer of potable water floating on saline water. As one goes from the coastal area of the Peninsula towards the centre, this layer thickness the maximum thickness ranges from 100-110. This layer of potable water has been fragmented by the salt-water lagoons in the middle of the Peninsula. If these salt water lagoons can be converted into a fresh water lagoon then the layers of potable waters will merge and form a large layer of good water, thus enhancing the underground water resources several fold.

Limestone rock formations are found at a very deep level in the mainland and in the Jaffna Peninsula at not such a deep level. Therefore in the Jaffna Peninsula deep wells do not have to be dug to obtain good, drinking water. On the other hand, in the mainland areas lying south of the line linking Puttalam, Paranthan and Mullaitivu the limestone rock formation lies very deep underground. Consequently tube wells have to be sunk at great expense to tap the underground water for irrigation purposes. For example in the Kilinochchi district 40 percent of the land area has a layer of limestone rock formation. The balance 60 percent is comprised of Pleistocene Alluvial soil. The underground water obtainable here is free of salinity. Hence even if it is costly, through the sinking of tube wells, a considerable extent of land can be irrigated. In Mannar District, except for 20 percent of the land area, the balance has underground water resources. In this district up to now more than 125 tube wells have been successfully sunk. In the Mullaitivu District underground water resources are available at a very deep level. Tapping this underground water resource will be very expensive.

Resources, its use and management, and the possibilities of developing these resources. In 1965, the Water Resource Board carried out some research on the underground water resources available in Jaffna and the possibilities of sinking tube wells for irrigation purposes but up to date the reports have not been formally published. More than ever before today we are forced to think seriously about the problems caused by the depletion of Jaffna's underground water resources and ways and means of solving these problems. There is also necessity to undertake development in a planned manner.

DEVELOPMENT PROPOSALS

It is a mistake to think that the land under cultivation in the Peninsula can be further increased. This can only lead to disaster consequences. The only course is to modernize existing agricultural practices and the use and management of water resources. The waste of valuable water resources should be avoided at all costs, agricultural practices should be modernized so as to yield maximum returns. Hereafter agricultural extension activities should concentrate on the main land. Since the density of the main land population is low, people should be given incentives to encourage them to settle in the main land. To attract the population to settle in the fertile areas of the mainland, several development schemes should be launched.

The efficiency of land utilization in the Jaffna Peninsula should be maximised. Cultivation in the Peninsula is carried out at great expense; therefore every inch of land must be made to yield the maximum. Agricultural development should be viewed as agro- business. Instead of cultivating paddy in the Peninsula, farmers should be encouraged to concentrate on cash crops and the cultivation of subsidiary food crops, vegetables, fruits etc. This production could serve as the basis for the development of agro industries by supplying the raw materials.

Experts are of the opinion that steps should be taken to replenish Jaffna's underground water resources. The only replenishment available is the meagre rainfall during the north east monsoon period. Special care should be taken to ensure that the rainwater doesn't drain off into the sea but is conserved to augment the underground water resources of the Peninsula. There are 1050 pounds in Jaffna. The built of the water that fills these ponds seeps downwards and replenishes the underground water resources. Some of these ponds are drying up due to sitting and dumping of garbage so that their capacity to let the water seep underground in curtailed. An urgent task is to desilt these ponds which function as a replenishment for Jaffna's underground water resources.

There is a practice here of allowing the soil from the ponds to be taken away for use in garden farms. Great caution should be exercised in this regard. Ponds should not be deepened to the extent where their underground water table is exposed. If that is allowed to happen, underground water will evaporate; therefore permission should be given to remove soil only up to a certain depth.

In the certain areas of the Jaffna Peninsula the top portion of the caverns through which underground water flows is in a state of collapse.

In a study undertaken of the Puttur tidal well it was found that 30,000 to 40,000 gallons of water could be pumped out in ten hours to irrigate garden farms. Such wells (which are also found in Kurmbasiddy, Punnalaikadduvan, Alvai and Karaveddy) can be used not only for irrigation purpose but also for augmenting Jaffna's underground water resources during the rainy seasons, in a systematic manner.

Underground water also flows into the sea through the underground caverns. An example is the water that comes through the kerni at Keerimalai. The caverns, which allow underground water to flow into the sea, should be identified and underground dams built to prevent this recurring. Such proposals have been put forward earlier but unfortunately not implemented.

Anyone who has thought about Jaffna and its planned development for the future could not but come to the conclusion that the salt lagoons have to be converted into fresh water lagoons. Through such conversion (desalination) not only will Jaffna's underground water resources be augmented but also the rain water that drains off into the sea can be a source of replenishment, after desalinization, for Jaffna underground water resources.

As the result, underground water resources will not be fragmented in pockets but will form a continuous layer. Consequently the salinisation of fresh water will become less of a problem than it in now and barren lands will become fertile. The extent of land that can be brought under the plough in the Peninsula will increase and so will the fresh water resources. Desalinization of the lagoons will bring as these benefits. This idea of converting the salt lagoons into fresh water lagoons was put forward nearly a century ago. In 1992 when the dam of the Iranaimadu tank was being constructed the idea was mooted of turning the Elephant Pass lagoon into a fresh water one.

There are 13 lagoons that can be converted into fresh water ones and 33 dams to prevent salt water coming in. Planning for the long term, out of these 13 lagoons, the following four lagoons can be desalinized, without much expenditure – (1) The Elephant Pass west lagoons (2) The Elephant Pass East lagoons (3) Thondamanar lagoon and (4) Upparu lagoon. Several plans were formulated to desalinize the above lagoons and parts of these plans have been implemented. As fisher folk believe that salt water is conducive to the catching of fish, they allow salt water to come in as a result these plans have not been fully successful. It is necessary that the plans be fully implemented. Moreover some of the other lagoons surrounding the Peninsula can be converted into fresh water ones without much expense. For example, the lagoon that separates Velanai and Mandaitive can be easily converted into a fresh water lagoon. By closing the Pannai and Araly causeway, a large fresh water lagoon can be formed south west of Jaffna Town.

Through the implementation of such schemes, not only can the supplies of fresh water be augmented but also salinity can be eliminated, thus making hitherto barren lands fertile one. This will be a blessing for Jaffna starved as it is of arable land a shortage of fresh water.

Those who oppose the conversion of salt-water lagoons into fresh water ones put forward two main objections.

The first objection they put forward is that if the entry of water into the lagoons is blocked, during the dry spell, the lagoon will completely dry up and the strong blowing will create dust storms, thereby polluting the residential environment.

This threat can be easily overcome conserving fresh water in such a manner that there is no complete drying up and by identifying the areas which are prone to drying up completely and growing grass in these areas in systematic manner. The example of the Netherlands is instructive here. There the lagoons have been reclaimed grass systematically cultivated and animal husbandry encouraged.

The second main objection is that the livelihood of people who fish in the salt-water lagoon will be adversely affected. The answer to this objection that groups of people who will be adversely affected should be identified and they should be relocated in suitable coastal area. They should be encouraged to take to deep sea fishing instead of fishing in the shallow lagoon. This will also benefit them economically. Fisher folk who are likely to be affected should be relocated either in the Peninsula or in the Eastern coast of the mainland and encouraged to pursue deep-sea fishing. This might cause difficulties in the short run but in the development of the region in the long term will be highly beneficial.

Generally it can be said that water management has not kept pace with the development of water resources. After the introduction of the water pump it is felt that in Jaffna excessive draw off of water is taking place to irrigate the crops. This is one factor in the increase of salinisation. Farmers in a particular region should be educated about what crop should be used and how much water should be used to irrigate it during a particular season. Such education of farmers is necessary in view of the fact that the prevalent system of irrigation accelerates evaporation. To prevent this, the system of sprinkler irrigation and other modern techniques used in Israel should be adopted.

Planning for the development of water resources calls for the systematic collection of data. This calls for co-operation among experts of several different disciplines, thus it is essentially an interdisciplinary task involving expertise in varied fields ranging from Geography to Agriculture. This interdisciplinary task force should work together as a team to ensure success.

Pictorial Perspectives

KNOWLEDGE BASED ECONOMY SUSTAINABLE DEVELOPMENT AND APPROPRIATE TECHNOLOGY

(Seminar - 72 31.07.2011)

Prof. Tissa Vitharane, Minister of Science and Technology Centre and also the Leader of the LSSP (centre) is leading the discussion on, "Knowledge Based Economy Sustainable Development And Appropriate Technology" with JMF participants.

Mr. Nadarajah Thamilalagan, Jaffna District Coordinator, Ministry of Technology and Research was on his left while Eng. M. Sooriasegaram, was on his right.

STRATEGY FOR THE ESTABLISHMENT OF THE FACULTY OF ENGINEERING IN THE JAFFNA UNIVERSITY

(Seminar - 73 02.08.2011)

Prof. K.Kandasamy (Dean Faculty of Science University of Jaffna) - delivering the keynote address, Honorable Minister Douglas Devananda (Extreme right), Prof. Ms.Vasanthy Arasaratnam (Vice Chancellor University of Jaffna (extreme left) Mr. R.Muthuradnananthan (Retired Deputy General Manager, Ceylon Electricity Board and present Chairman IESL) - Chairperson of this seminar are also in the picture.

REASON FOR THE INCREASE IN CANCER INCIDENCE IN THE NORTHERN PROVINCE

(Seminar - 74 18.08.2011)

Dr. N.Jeyakumaran. Consultant Oncologist at Teaching hospital Jaffna (Seated at the centre with the laptop). was the Guest Speaker at the seminar and he delivered a lecture on, "Reasons for the increase in Cancer incidence in the Northern Province" During his lecture, he emphasized the need for all the professionals in all fields to work together as a team in order to reduce the incidence of cancer in the Northern Province. He further stressed that ground water pollution and excessive usage of pesticides for agriculture have to be controlled to minimize the risk of cancer in the Northern Province.

IDEA TO IMPROVE ACADEMIC & VOCATIONAL EDUCATION IN THE NORTHERN PROVINCE

(Seminar - 75 31.08.2011)

Eng. R.Suntharakumar, the Chairman, Institution of Engineers Sri Lanka (IESL) Northern Province (Center) introducing the Lead Speaker Dr.Ram Subramaniyam BSc.Engineering (Peradeniya), MSc, PhD UK (seated)

IDEAS TO IMPROVE EDUCATION IN THE NORTHERN PROVINCE

(Seminar - 76 11.10.2011)

Lead Speaker Prof. Alex Devaranjan, Syracuse University of New York, addressing the gathering on "Ideas to Improve Education in the Northern Province"

PROGRESS IN THE IMPLEMENTION OF TAMIL & SINHALA AS OFFICIAL LANGUAGES & NATIONAL INTEGRATION EFFORTS

(Seminar - 78 18.12.2011)

Eng. M.Sooriasegaram, expressing his views on the Implementation of Tamil & Sinhala as Official Languages. Hon.Minister. Vasutheva Nanayakara, Minister for National Languages Implementation and National Integration (seated, centre) listening attentively to the discussion.

The meeting was chaired by Mr. S.Krishnananthan Director, Management Development Training institute of the Northern Provincial Council..

"CURRENT STATUS OF GROUND WATER QUALITY OF JAFFNA" & "FOOD POISIONING"

(Seminar - 80 21.01.2012)

The Resource Persons were,

- Dr. (Mrs.) Thusiyanthi Mihunthan - Senior Lecturer Department of Agric Engineering, Faculty of Agriculture, University of Jaffna on "Current Status of Ground Water quality in Jaffna"

- Mr.RMGB. Rajanayake - Senior Analyst Colombo Municipal Council on "FOOD POISIONING"

Some of the participants at the seminar.

URBAN PLANNING

(Seminar - 83 10.02.2012)

A ch. A.Chandrahashan, Architect, from Australia is speaking on "Urban Planning" at the seminar.
E g M.Ramathashan, Managing Director, Euroville Engineers and Constructors (Pvt) Ltd, is also in the picture.

DEVELOPMENT AND INFRASTRUCTURE PRIORITIES

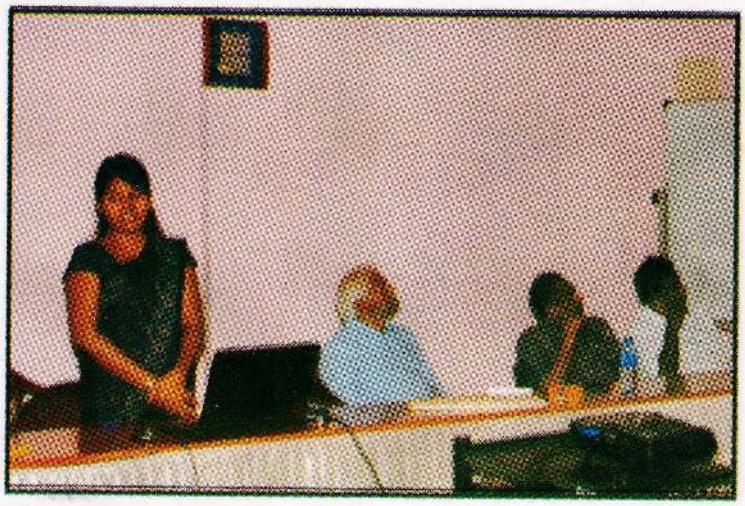
(Seminar - 84 02.03.2012)

Eng. S.Ruththiralingam, delivering the welcome address at the seminar on "Development and Infrastructure Priorities"
Eng. R.Suntharakumar, the Chairman, Instituion of Engineers Sri Lanka (IESL) Northern Province (centre) and the Lead Speaker Eng. Rajan Philips, (at the extreme left) are also in the picture.

During the Seminar, Eng. M. Ramathasan, Managing Director, Euroville Engineering and Constructors (Pvt) Ltd, presented an award to Master Kamalakkannan Kamalavasan from J/Uduppiddy American Mission College in appreciation of his obtaining "First Rank" in the entire Island by scoring the Highest Marks in the August 2011 A/L examination in the mathematics

HUMAN ADORNMENT

(Seminar - 85 05.03.2012)



Miss.Selvamathy Tharmaratnam, B.A (Jewellery Design), Moratuwa University, discussing about enhancing human adornment through jewellery design.

NATION'S HEALTHCARE - AN INTERACTIVE PROCESS BETWEEN MEDICAL CARE & SOCIAL AND ECONOMIC FACTORS

(Seminar - 86 07.03.2012)

Prof (Dr).R.Rajakumar - Cardiologist and Professor at the University of Saskatchewan Canada addressing on "Nation's Healthcare-An Interactive Process between Medical Care & Social and Economic Factors" at the Jaffna Mangers Forum (JMF).

DEVELOPMENT ECONOMICS

(Seminar - 87 30.04.2012)

Hon. Eran Wicramaratne, Member of Parliament delivering a talk on "Development Economics" at the Jaffna Managers Forum (JMF).

MARRIAGES AT LOW AGE CREATE SOCIAL AND HEALTH PROBLEMS!

(Seminar - 88 28.05.2012)

Dr. K.Muhunthan, Consultant and Senior Lecturer in Obstetrics & Gynecology, University of Jaffna presenting his research findings on the social and health problems created by marriages at low ages.

SRI LANKAN EXPERIENCE IN GROUND IMPROVEMENT

(Seminar - 89 22.06.2012)

Dr. (Eng). Udeni P. Nawagamuwa, BScEng. MEng (AIT), Dr.Eng CEng, MIE (SL), Senior Lecturer/Chartered Engineer (Civil) - Department of Civil Engineering, University of Moratuwa, Council member/ IESL, Chairman/CPS, Sri Lanka Association for the Advancement of Science. (Extreme left) presenting a paper on "Sri Lankan Experience in Ground Improvement" in the Construction Industry.

Eng. M.Sooriasegaram, BSc (Eng), MSc, Consulting Engineer, Eng.R.Suntharakumar, the Chairman, Institution of Engineers Sri Lanka (IESL) Northern Province Center, and Prof.Sarath Kotagama, General President, SLAAS are also in the picture.

NANO SCIENCE

(Seminar - 90 04.07.2012)

Prof. V.Thiviyanathan, Department of Nano Medicine, University of Texas Houston, USA (front row, extreme right) is discussing the application of Nano science in Medicine.
Dr. (Ms) Vasanthy Arasaratnam the Vice Chancellor of university of Jaffna looks on.

RECONCILIATION-THE NEED OF THE HOUR

(Seminar - 91 14.07.2012)

Dr. Jayampathy Wicramaratnae President Council (fourth from the left) was the lead speaker, Associated with him were Prof N.Selvakumaran, Faculty of Law, University of Colombo (second from the left) and Emeritus. Prof Ranjith Amarasinghe Political Science, University of Peradeniya (extreme right).

The meeting was chaired by Mr S.Krishnananthan Director, Management Development Training institute of the Northern Provincial Council (centre)

ENGLISH PROFICIENCY AND COMMUNICATION SKILLS MEAN TO SUCCESS

(Seminar - 92 08.08.2012)

Ms. Psyche Kennette, Senior Consultant, GIZ funded Performance Improvement Project sharing her vast experience with the Jaffna Mangers Forum (JMF) Members as a Teacher of English in a number of Asian and African countries.

MrS.Krishnananthan Director, Management Development Training institute of the Northern Provincial Council chaired the meeting

DEVELOPMENT TRENDS IN ASIAN COUNTRIES WITH SPECIAL REFERENCE TO TECHNOLOGIES

(Seminar - 93 13.08.2012)

Mr. Thillinathan Aravinthan, Area Manager, CISCO Singapore is delivering a lecture on "Development Trends in Asian Countries with Special Reference to Technologies"

Eng Thevendrakumar, Regional manager, Water Resources board, Eng.M.Sooriasegaram, BSc (Eng), MSc, Consulting Engineer and Eng.M.Ramathasan, Managing Director, Euroville Engineering and Constructors (Pvt) Ltd (from left to Right in the front row) were listening attentively.,

LIFE AND EDUCATION IN LONDON

(Seminar - 94 07.09.2012)

Mr. Saravanapavan Theepan, 4th Year Undergraduate Student, Department of Civil and Environmental Engineering, Imperial College, London (Seated in the front row with the LAPTOP) was sharing his experience as a student in London.

SUSTAINABLE SOCIAL DEVELOPMENT

(Seminar - 95 09.09.2012)

Mr. M. A. Allam, Director General, National Institute of Social Development (NISD) was the lead speaker on Sustainable Social Development at the Jaffna Mangers Forum (JMF).

Mr. S.Krishnananthan, Director, Management Development Training institute of the Northern Provincial Council chaired the meeting

EARLY DETECTION OF ORAL, BREAST AND CERVICAL CANCER

(Seminar - 96 28.09.2012)

Dr. Rangaswamy Sankaranarayanan, MD, Chief of the Cancer Screening Group, International Agency for Research on Cancer Lyon, France, the lead speaker was delivering a speech on "Early Detection of Oral, Breast and Cervical Cancer"

The Group of experts and the Members of JMF who had participated at the seminar on "EARLY DETECTION OF ORAL, BREAST AND CERVICAL CANCER".

Seated from Left to Right Emeritus Prof. P.Balasundrampillai, Dr.Suraj Perera (consultant community physician national cancer control programme), Dr.K.Sivaraja (WHO consultant), Dr.K.Sivapalan (Former Dean faculty of Medicine, University Of Jaffna), Dr.Rangaswamy Sankaranarayanan, MD, Chief of the Cancer Screening Group, International Agency for Research on Cancer Lyon, France, Dr. Kaniska Karunaratne (Consultant Gynaeoncologist, National Cancer Institute, Maharagama, Srilanka) and Dr. (Ms) N.Paranagama (Director Cancer Control Programme, Srilanka)

NATURAL SCIENCE AND ASTRONOMY

(Seminar - 97 01.10.2012)

Mr. M.Thavarajah, Ex. Parliamentarian was making an audio visual presentation on the latest astronomical developments with appropriate scientific explanations

DENGUE CONTROL

(Seminar - 98 28.10.2012)

Dr. S.Sivaganesan, MBBS (CEY) MSC, Regional Epidemiologist, was the lead speaker at the seminar on "Dengue Control".

POSITIVE THINKING & LLRC REPORT- AN OVERVIEW

(Seminar - 99 04.11.2012)

Dr.R.Bala - Eye Surgeon UK. (not in the picture) was the lead speaker on "Positive Thinking" and Mr.A.C.George Former In Service Advisor for Economic Studies at the Zonal Education Office, Jaffna and Lecturer in Economics at the National Institute of Education delivering a lecture on the follow up actions taken on the Lessons Learnt and Reconciliation Committee report

SCIENCE AND DEVELOPMENT

(Seminar - 100 28.10.2012)

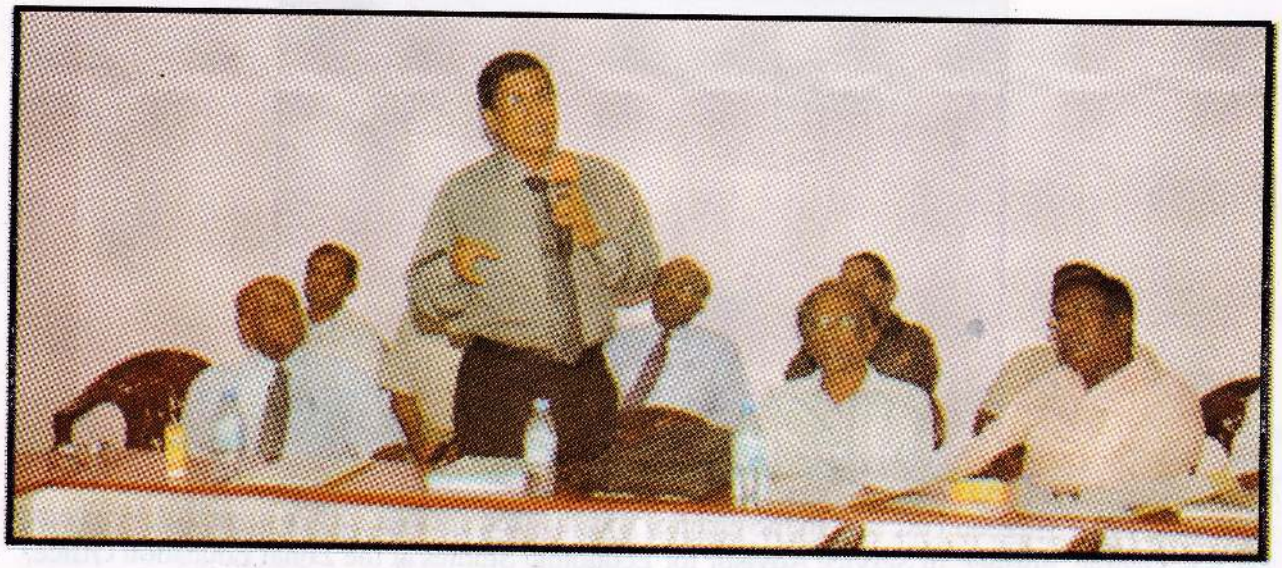
The names of the Resource Persons and the topics delivered by them at the 100th Seminar are given below

Prof. S.S.Rajendran
National University of Singapore.
"YOUR SUCCESS IS IN YOUR MIND"

Dr. R.Surendrakumar, MD (Com. Med.),
Department of Community and Family Medicine, Faculty of Medicine, University of Jaffna.
"WATER RELATED DISEASES"

Dr. S.S.Sivakumar
Senior Lecturer, Faculty of Engineering, University of Jaffna
"CONJUNCTIVE USE OF SURFACE AND GROUND WATER TO IMPROVE ECONOMIC FOOD PRODUCTIVITY"

Eng. M.Thillainathan
Appropriate Technologies
"INTERNATIONAL PROCUREMENT"



Dr. S.S.Sivakumar Senior Lecturer, Faculty of Engineering, University of Jaffna), making his presentation on "Conjunctive use of surface and ground water to improve economic food productivity" 100 at 100th &

Mr. N.Sivaratnam, Rtd AGM, Bank of Ceylon, Northern Region and founder member of JMF is making his introductory speech at the 100th seminar

A section of the participants actively listening to the proceedings of the 100th seminar.

The price winners from Jaffna Hindu College with members of Jaffna Managers Forum

As part of the 100th Seminar celebration, gifts were given on behalf of Bank of Ceylon, by Mr.S.N.Manikkasinghe, Operations Manager (Northern Province), BOC to Mas. Ratnasingam Senthuran from Jaffna Hindu College who bagged a silver medal for Sri Lanka in high jump at the 2012 Adidas All Schools Track & Field Championships held on Sunday, 11th November 2012 at the Lakeside Stadium Albert Park, Melbourne.

Eng.M.Ramathasan, Managing Director, Euroville Engineering and Constructors (Pvt) Ltd presenting a gift to Mas.A.Abinanthan, one of the two students from Jaffna Hindu College, who were members of the Sri Lankan team that participated at the 9th International Maths and Science Olympiad (IMSO 2012) held in Lucknow, India from 29th October to 1st November 2012 and who a silver medal.

Prof. S.S.Rajendran, National university of Singapore was presenting a gift to Mas. I.Ilangeethan, the other student from Jaffna Hindu College, who won a bronze medal at the same Olympiad.

Deepest Condolences

JAFFNA MANAGERS FORUM (JMF) expresses their condolences to the family of Dr.Ram Subramaniyam on his recent demise.

Dr.Ram Subramaniyam Bsc, (Engineering) (Peradeniya) Msc, Phd (Uk) had emigrated to united Kingdom soon after his graduation from University of Peradeniya but continued to keep in touch with his relatives and friends in his country of birth

Dr Ram Subramaniyam was the lead speaker at our 75th seminar on "Ideas to Improve Academic and Vocational Education in the Northern Province" on 31st August 2011. His presentation was highly appreciated by the forum.The members of the JMF were shaken to hear that he is no more His sudden loss irreparable and we miss his advice, and companionship at a time of great need to our community. We are saddened to hear of his sudden loss.

Appreciation

Late Mr. Kanagaratnam Kugathas of Jaffna

Jaffna Managers Forum expresses sincere thanks to Mr. Kanagaratnam Kamalathas domiciled in Canada for the donation given to JMF on the occasion of the 100TH Seminar in remembrance of his recently departed younger brother Mr. Kanagaratnam Kugathas of Canada.

LIST OF SEMINARS & MEETINGS OF JAFFNA MANAGERS FORUM

1 To 100 (24.03.2007 - 12.12.2012)

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
1	24.03.2007	FINANCIAL & CAPITAL MARKET	Mr.N.Sivaratnam Rtd AGM-Bank of Ceylon Northern Region.	BOC Northern Region
2	31.05.2007	PROJECT MANAGEMENT	Prof.V.P.Sivanathan -Department of Economics, University of Jaffna. Eng.M.Thillainathan -Appropriate Technologies	BOC Northern Region
3	14.07.2007	MANAGEMENT INFORMATION SYSTEM	Mr.S.Garigaraganapathy Bsc(Hons) -Lecturer, Advanced Technical Institute. Mr.I.Pratheepan, -Lecturer, Advanced Technical Institute. Eng.M.Ramathasan -Managing Director, Euroville Engineers and Constructors (PVT) Ltd.	BOC Northern Region
4	26.09.2007	PREVENTION OF STREES AMONG MANAGERS	Dr.P.Luxman -Cardiologist, Jaffna Teaching Hospital	BOC Northern Region
5	27.10.2007	NEW COMPANIES ACT	Mr.C.V.K.Sivagnanam -Rtd. Commissioner - JMC Mr.V.Niranjan -Bartleet Religare Securities (Pvt) Ltd.	BOC Northern Region
6	24.11.2007	CLEAN WATER MANAGEMENT & WATER BORNE DISEASE IN JAFFNA PENISULA.	Dr.D.A.Ketheeswaran -RDHS, Northern Province. Dr. (Mrs) Thusiyanthi Mihunthan -Senior Lecturer, Department of Agric Engineering, Faculty of Agriculture Engineering, University of Jaffna.	Kleenwell Northern Region

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
7	22.12.2007	NANO TECHNOLOGY & ELECTRONIC BANKING	Mr.R.Thevamaran -Undergraduate Student, Department of Civil Engineering, Univercity of Peradeniya. Mr.K.Balasubramaniam - Rtd AGM-Bank of Ceylon Northern Region. Mr.S.Sunthareswaran -Manager, Hatton National Bank, Chunnakam. Mr.S.Raveendra -Senior Manager, Commercial Bank Jaffna. Mr.S.Aravinthan -Manager, Seylan Bank, Jaffna. Mr.S.Srinivasan -Lanka Clearing House.	BOC Northern Region
8	20.02.2008	HUMAN RESOURCE MANAGEMENT	Prof.M.Sinnathampy -Senior Lecturer, Department of Education, University of Jaffna. Mrs.Thevaranjeni Sivaskaran -Senior Lecturer, Head, Department of Management, University of Jaffna. Dr.T.Velnampy -Senior Lecturer, Department of Management, University of Jaffna. Mr.S.Muthukumarasuwami -Deputy Commissioner, Labour Department. Mr.S.Sunthareswaran -Manager, Hatton National Bank, Chunnakam.	Commercial Bank Northern Region

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
9	22.03.2008	ORGANIC FARMING	Prof.G.Sivamathy Sivachandran -Dean, Faculty of Agriculture, University of Jaffna. Dr.G.Mukunthan -Head, Agriculture Biology Mr.S.Sivakumar -Deputy Director, Department of Agriculture.	HNB Northern Region
10	27.04.2008	NATURAL DISASTERS	Emeritus Prof.P.Balasuntharampillai -University of Jaffna. Dr. A.Ketheeshwaran. -Regional Director of Health Services. Dr. R.Srikaran. -Department of Chemistry. Eng.S.Ananthasayanan. -Consulting Engineer.	BOC Northern Region
11	19.05.2008	HEALTH & NUTRITIONS	Dr.S.Getheswaran -Consultant Physician, Teaching Hospital Jaffna. Dr.N.Jeyakumaran. -Consultant Clinical Oncologist, Teaching Hospital Jaffna. Dr.S.Premakirishnan -Consultant Anaetesiologist, Teaching Hospital Jaffna.	BOC Northern Region
12	12.07.2008	MICRO FINANCE AND RURAL ECONOMY	Dr.Vathsala Amirthalingam -Dept Of Animal Husbandry, Thirunelvely. Mr.V.Arulanantham, -Manager, National Savings Bank, Jaffna. Mr.S.B.Arasakumar, -Manager, Bank of Ceylon, Chunnakam.	BOC Northern Region

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
13	28.08.2008	PLANNING ON RURAL DEVELOPMENT	Mr.K.Sivalingam -Rtd Deputy Director , Planning, Northern Provincial.	BOC Northern Region
14	15.09.2008	MODERN APPROACHES IN MANAGEMENT	Dr.K.Kuhathasan -CEO: Cenlead	BOC Northern Region
15	17.10.2008	MODERN APPROACHES IN MANAGEMENT	Mr.Daniel Thambirajah Mr.Daniel Niruban Muttiah	Commercial Bank Northern Region
16	12.12.2008	RECENT FLOODS IN JAFFNA "NISHA'	Eng.K.Karunanithy -Irrigation Department Eng.T.Brathithasan -National Water Supply & Drainage Board Mr.V.Visvalingam -Deputy Project Director, Reawakening Project. Eng.M.Ramathasan -Managing Director, Euroville Engineers and Constructors (PVT) Ltd. Mr.M.S.Saravanapavan -Commissioner, Jaffna Municipal Council Eng.R.Muthuratnananthan/ Eng.S.Ganaganesan -Ceylon Electricity Board Mr.V.Pushpanathan -Metrological Department	HNB Assurance & Euroville
17	20.01.2009	LEADERSHIP IN TURBULENT TIMES	Mr.S.Ragavan -Past District Governor, Lions Clubs International. -Director Bartleet Finance Plc	Commercial Bank Northern Region

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
18	09.02.2009	GLOBAL FINANCIAL CRISIS	Prof.M.Nadarajasundaram -University of Jaffna Prof.P.Sivanathan -Department of Economics Mr.S.Raveendra -Senior Manager, Commercial Bank Jaffna. Mr.V.Arulanantham -Manager, National Saving Bank, Jaffna. Mr.V.Niranjan -Bartleet Relegare Securities (Pvt) Ltd. Mr.R.Vijayakumaran -Senior Lecturer, Department of Management Studies, University of Jaffna.	BOC Northern Region
19	25.02.2009	ROLE OF BANK OF CEYLON FOR THE DEVELOPMENT OF NORTHERN PROVINCE	Mr.C.Samarasinghe -Deputy General Manager, Product & Development Banking Bank of Ceylon. Mr.W.D.F.Wimalaratne -Deputy General Manager, Human Resource Bank of Ceylon. Mr.M.Kiritharan -Deputy General Manager, Chief Legal Officer Bank of Ceylon. Mr.H.M.A.B.Weerasekera -Deputy General Manager, International & Treasury Bank of Ceylon.	BOC Northern Region

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
20	07.03.2009	SENIOR CITIZENS ISSUE	Emeritus Prof.P.Balasuntharampillai -University of Jaffna Dr.S.Premakirishnan -Consultant Anesthesiologist, Teaching Hospital, Jaffna. Mr.K.Sivalingam -Rtd.Director Planing,Kachcheri, Jaffna.	Lions Club
21	09.05.2009	LEADERSHIP DEVELOPMENT	Mr.S.Raghavan -Head of Exports, Commercial Bank.	Commercial Bank
22	03.06.2009	DISCUSSION ON VOCATIONAL TRAINING	G.M.P.A.Gallaba -HRD & Admin, Vocational Training Authority. C.R.Samaraveera -Director Training, Vocational Training Authority.	Euroville
23	13.06.2009	NUTRITIONAL CARE FOR HEALTH	Senior Prof.(Ms).Vasanthy Arasaratnam -Vice Chancellor, University of Jaffna.	BOC Northern Region
24	01.07.2009	DEVELOPMENT OF THE NORTHERN PROVINCE	Dr.Gamini Wickeramasinghe -Chairman, Bank of Ceylon.	BOC Northern Region
25	06.07.2009	MICRO FINANCE	Mr.N.Sivaratnam -AGM, Bank of Ceylon, Jaffna. Mr.S.B.Arasakumar -Manager, Bank of Ceylon, Chunnakam.	BOC Northern Region
26	19.07.2009	MICRO FINANCE	Mr.W.M.Karunarathne -Director, Regional Developmant, Central Bank of Srilanka.	BOC Northern Region
27	31.07.2009	LEADERSHIP DEVELOPMENT	Lion "Chuck" Wijeyanathan(MJF) -Lions International	Commercial Bank Northern Region

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
28	16.08.2009	STUDENT QUALITY CONTROL CIRCLE (SQCC)	Mr.Chandra Athulathmudali(MA , MSC)	HNB Northern Region
29	26.08.2009	MICRO FINANCE	Mr.Chandula Abeyawickrama -DGM, Hatton National Bank Plc.	HNB Northern Region
30	11.09.2009	INVESTMENT OPPORTUNITY IN THE NAMAL ACUITY VALUE FUND - THE FIRST LISTED UNIT TRUST IN SRILANKA	Mr.Jeyawarman -Director, Namal Acuity Fund.	HNB Northern Region
31	03.10.2009	HIGHER EDUCATION OPPORTUNITIES	Prof.M.Sinnathampy -University of Jaffna.	Euroville
32	17.10.2009	THE ROLE OF NATIONAL DEVELOPMENT BANK(NDB) IN NORTHERN DEVELOPMENT	Mr.Iran Wickremaratne -CEO, National Development Bank Plc.	NDB Northern Region
33	25.10.2009	INTRODUCTION TO INTERNATIONAL ORGANIZATION FOR STANDARDIZATION(ISO)	Mr.Kulasinham Vivekananthan -B.Sc. Chem. Special PG Dip-Com.Tech., M.Sc., MBA ISO 9001 - QMS Lead Auditor IRCA (UK) -Operations Manager, Management Systems Certification DET NORSKE VERITAS (DNV)	Euroville
34	08.11.2009	CHALLENGES TO HEALTH SECTOR DEVELOPMENT	Prof.Ms.Lalitha Mendis -Emeritus Professor , University of Colombo. -Precident, Sri Lanka Medical Council.	Euroville
35	22.11.2009	INTRODUCTION TO PRECAST AND PANEL BOARD PRODUCT TO JAFFNA REGION	ENG.Palitha Ranashinghe -C.Eng, MIESL, MIIESL, -General Manager, DURRO Building Systems (Pvt) Ltd, Colombo.	Euroville

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
36	03.12.2009	INTRODUCTION TO INSTITUTE OF PERSONAL MANAGEMENT(IPM)	Mr.C.Gannile -Council Member, Institute of Personal Management.(IPM) -Director, Human Resource, Securities and Exchange Commission (SEC)	IPM
37	05.12.2009	MOTIVATION TECHNIQUE FOR HIGHER PRODUCTIVITY	Dr. K. Kuhathasan -CEO: Cenlead	BOC Northern Region
38	09.12.2009	MORE BEYOND THE RIVER FOR JAFFNA	Eng.Duleep Goonewardene -DGM, National Water Supply & Drainage Board	Euroville
39	23.12.2009	QUICK BOOK ACCOUNTING PACKAGE IN BUSINESS DEVELOPMENT	Mr.Jayaram Dinesh -Manager Quick Book - Accsoft Solution (Pvt) Ltd Mr.Prabasana Manorajah	Euroville, Commercial Bank Northern Region & HNB Northern Region
40	28.12.2009	ELECTRICITY TRAIFF	Eng.J.Nanthakumar -Chief Engineer, System Control, Ceylon Electricity Board.	BOC Northern Region & IESL Northern Region

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
41	16.01.2010	COMMUNITY MOBILIZATION FOR DENGUE CONTROL	Dr.N.Sivirajah (MBBS, DTPH, MD) -WHO Consultant, Dr.R.Surenthirakumar (MBBS, M.Sc Community Medicine, MD PGIM Trainee) Dr.S.Sivaganeshan (MBBS, M.Sc Community Medicine, MD PGIM Trainee) Dr.N.Rajeskannan(MBBS, M.Sc Community Medicine, MD PGIM Trainee)	Euroville
42	14.02.2010	PRIVATE & PUBLIC PARTNERSHIP FOR HEALTH SECTOR DEVELOPMENT	Dr.M.C.Weerasinge -Senior Lecturer, Dept Of Community Medicine, University of Colombo	Euroville
43	29.01.2010	FUND MANAGEMENT & INSURANCE	Mr.M.Jagannath -CEO & MD ,Life Insurance Corporation Lanka Ltd,(LICL) Mr.V.Niranjan Bartlett Religare Securities (Pvt) Ltd. Mr.K.Rajeeswaran -Senior Manager, Life Insurance Corporation.	Life Insurance Corporation of Lanka Ltd.
44	06.03.2010	THERMAL INSULATION FOR BUILDINGS	Eng.Upatissa abeyakoon MBA(UK) -Sales Manager, Macbertan.	IESL
45	03.04.2010	INVESTING IN CAPITAL MARKET	Mr.S. Jayavarman -Chief Executive Officer, National Asset Management Ltd.	Euroville
46	10.04.2010	INSTITUTE OF PERSONAL MANAGEMENT(IPM) - THE NATION'S LEADER IN HUMAN RESOURCE MANAGEMENT	Mr.C.Gannile -Secretary, Institute of Personal Management.	IPM

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
47	18.04.2010	INTEGRATING THE SUSTAINABILITY INTO THE DEVELOPMENT OF NORTHERN REGION	Mr.Arular Arudpragasam -Consultant, Sustainability Development. Director General, Global Sustainability Initiative	Euroville
48	26.04.2010	CAPITAL MARKET IN JAFFNA	Mr.Dhammika Perera -Director Investigation, Securities and Exchange Commission (SEC) Mr.Chandu Epitawala -Director Surveillance, Securities and Exchange Commission (SEC) Mr.Vajira Wijegunawardane -Director, Capital Market Development, Securities and Exchange Commission (SEC) Mr.Namal Kamalgoda -Director Research & Policy., Securities and Exchange Commission Mr.Thusara Jayarathne -Colombo Stock Exchange. Mr.Gordon Nadesan, -CT Smith Stock Broker Mr.B.Saimathavan -Financial Services Academy. Securities and Exchange Commission (SEC)	SEC

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
49	08.05.2010	FOOD SAFETY MANAGEMENT	Mr.Ramakrishnan Sankaranarayanan -Lead Auditor & Lead Trainer, QMS/EMS/ACCP ISO 22000, BRC Food/lop Ms.Shyama Wijayathugga -BSc (SL), Mphil Microbiology (UK), Lead Auditor ISO 22000:2005. ISO 9001:2008, Dutch HACCP Option.	Celinco Insurance Plc.
50	13.05.2010	POSITIVE THINKING FOR MANAGEMENT	Mr.B.K.Jegathesa -Brahma Kumaris Raya Yoga Centers in Sri Lanka.	Peoples Bank Northern Region
51	23.05.2010	PERSONAL SOCIAL AND ORGANIZATIONAL VALUES	Mr.B.K. Ganesh -Senior Lecturer, Brahma Kumaris Raya Yoga Centers in Sri Lanka.	Peoples Bank Northern Region
52	07.06.2010	SEWERAGE AND WASTEWATER TREATMENT	Eng R.Selvakumaran -Director, DAARSEE International Thiruchchi, India.	CEB Northern Region
53	21.06.2010	ROLE OF FINANCIAL MARKET IN NORTHERN DEVELOPMENT	Mr.Rajendra Theagarajah -MD/CEO, Hatton National Bank Plc	HNB Northern Region
54	23.06.2010	CHANGING OPERATIONAL POLICY OF MINOR TANK TO IMPROVE FOOD PRODUCTIVITY	Dr.(Mr) S.S.Sivakumar -Project Director, ENREP.	IESL Northern Region
55	26.06.2010	VALUES IN HEALTH CARE	Dr.S.Kaladevi Sivayoganathan(MBBS) -Consultant Eye Surgeon Dr.S.Chandramohan	Peoples Bank Northern Region

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
56	01.07.2010	CEMENT STABILIZATION OF RDA ROAD BASES	Mr.V.Mohan -Deputy Project Director, Asian Development Bank Projects.	IESL Northern Region
57	12.07.2010	IDEAS FOR SOLID WASTE MANAGEMENT IN THE JAFFNA PENINSULA TRASH INTO CASH(LESSON FROM HIROSHIMA)	Eng Duleep Goonewardene -Deputy General Manager (RCS(N) Office, NWSDB)	Union Bank Northern Region
58	20.08.2010	EXPLORING POSSIBILITIES OF THE WAY FORWARD ON THE ESTABLISH FACULTY OF ENGINEERING ATACATO UNIVERSITY OF JAFFNA	Dr.A.Adputharajah -(BSC .Eng, PHD (UMIST)C.Eng, MIG(SL),Senior Member of the IEEE, Senior Lecture Faculty of Engineering ,University of Paradeniya.	Euroville
59	29.10.2010	LEADERSHIP AND PRODUCTIVITY	Dr. K. Kuhathasan -CEO: Cenlead	Euroville
60	11.11.2010	LOW COST ELECTRIC LIGHTING USE OF LED WHERE IS NO ELECTRICITY SUPPLY	Eng.S.Rajendran -Rtd. Engineer Eng.S.Balasubramaniyam -Rtd. Engineer UK	Euroville
61	12.11.2010	OPPORTUNITIES FOR HARMONIZING THE COMMUNITIES IN THE POST CONFLICT ENVIRONMENT	Mr.Nelson John -Chief Political Officer US Embassy Mrs.Pathmini Rajadurai -Polticle Advisor, US Embassy	Euroville
62	19.11.2010	ROAD SAFETY IN JAFFNA-ROLE AND RESPONSIBILITY OF STAKEHOLDERS	Eng.M.Sooriasegaram, -Bsc, Bsc (Eng), Msc, Consulting Engineer.	Janasakthi Insurance Plc.
63	08.12.2010	BRIDGE PROJECTS IN USA	Eng.Bala Sivakumar.P.E -Vice President, Director-Special Bridge project, HNTB Corporation, New York, USA	Euroville

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
64	15.12.2010	MONDRAGON-METHOD OF INDUSTRIALIZING NORTH	Eng.S.Balasubramaniam -Rtd.Engineer, UK	Euroville
65	18.12.2010	HAZARD HEALTH PROBLEM & SAFETY AT WORK PLACE	Prof.SR De A Seneviratne, -MBBS, MD (Com.Med), MMed (Dundee), Faculty of Medicine, University of Colombo.	Srilanka Insurance Corporation
66	30.12.2010	SUSTAINABLE INFRASTRUCTURE DEVELOPMENT FOR PIPE BRONE DRINKING WATER SUPPLY	Eng.S.G.G.Rajkumar -AGM, National Water Supply & Drainage Board	IESL Northern Region
67	11.01.2011	BRAIN AWARENESS DAY	Prof.Ann Kato -Department of Neuroscience, Faculty of Medicine, University of Geneva, Switzerland. Prof.Gabor Kato -Formerly from the Department of Anstomy, McGill University, Montreal, Canada & CEO of Neurotech, Geneva, Switzerland. Dr.Ranil De Silva -Senior Lecturer, Department of Anatomy, Faculty of Medical Science, University of Sri Jayrwardenepura.	Euroville
68	22.01.2011	CAREER GUIDANCE IN THE FIELD OF CONSTRUCTION INDUSTRY	Prof.Chitra Weddikkara -University of Morattuwa.	
69	04.02.2011	GERIATRIC CARE (ELDERS CARE) EXPERIENCE IN NORTH AMERICA	Dr.S.Somesan -Consultant Geriatric, Floride, USA. Dr.Sachi Kuhananthan -Consultant Geriatric, Floride, USA.	Union Assurance Plc

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
70	12.03.2011	AN INTRODUCTION TO TAMIL WIKIPEDIA	Arch.R.Mayooranathan -Architect (in UAE)	Euroville
71	30.05.2011	IDEAS OF REBUILDING NORTH	Prof.Alex Devaranjan -Syracuse University of New York	IESL Northern Region
72	02.07.2011	KNOWLEDGE BASED ECONOMY, SUSTAINABLE DEVELOPMENT AND APPROPRIATE TECHNOLOGY	Prof.Tissa Vitharane -Minister of Science and Technology and the Leader of the LSSP	Euroville
73	02.08.2011	STRATEGIES FOR ESTABLISHMENT OF FACULTY OF ENGINEERING IN JAFFNA UNIVERSITY	Hon.Douglas Devananda -Ministry of Traditional Industries and Small Enterprise Development	Euroville
74	18.08.2011	REASON FOR INCREASE IN CANCER INCIDENCE IN NORTHERN PROVINCE	Dr. N.Jeyakumaran -Consultant Oncologist at Teaching hospital Jaffna.	Euroville
75	31.08.2011	IDEAS TO IMPROVE ACADEMIC & VOCATIONAL EDUCATION IN NORTHERN PROVINCE	Dr. Ram Subramaniyam -BSc.Engineering (Peradeniya), MSc, PhD UK.	IESL Northern Region
76	11.10.2011	IDEAS IN IMPROVE EDUCATION IN NORTHERN PROVINCE	Prof.Alex Devaranjan -Syracuse University of New York	IESL Northern Region
77	03.12.2011	2012 BUDGET - CLAIMED TO MADE SRILANKA THE WONDER OF ASIA	A.C.George -In Service Advisor for Economic Studies at Jaffna Zonal Education Office, Economics Lecturer at the National Institute of Education	IESL Northern Region
78	18.12.2011	PROGRESS IN THE IMPLEMENT OF TAMIL & SINHALA OFFICIAL LANGUAGES &THE NATIONAL INTEGRATION EFFORTS	Hon. Minister Vasutheva Nanayakara -Minister for National Languages Implementation and National Integration	Euroville

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
79	28.12.2011	USAID - Sri Lanka VEGA/BIZ+ Program Overview	Mr.Nathan A.Jones -U.S.Agency for International Development. Mr.Todd Sorenson -Deputy Director for South and Central Asian Affairs, USAID Office, Washington. Mr.Mark Silva -Office Director, Democracy and Governance, Programs, USAID/Srilanka.	Euroville
80	21.01.2012	CURRENT STATUS OF GROUND WATER QUALITY OF JAFFNA AGRARIAN "FOOD POISING" "LEATHER PRODUCTION"	Dr. (Mrs) Thusiyanthi Mihunthan -Senior Lecturer Department of Agric Engineering, Faculty of Agriculture Engineering, University of Jaffna Mr.RMGB. Rajanayake -Senior Analyst Colombo Municipal Council Dr. Posithe Premaratne –Properiter Sterlings Shoe Manufacturers	Euroville
81	27.01.2012	INSURANCE LIFE & GENERAL	Mr.S.Bimal -From Australia	NDB Aviva Insurance.
82	02.02.2012	PROPOSED EVENTS FOR IT SME'S IN JAFFNA	Mr.David Charles -Project Officer ICTA	BOI
83	10.02.2012	URBAN PLANNING	Arch.A.Chandrahashan -Architect, From Australia	Euroville
84	02.03.2012	DEVELOPMENT AND INFRASTRUCTURE PRIORITIES	Eng. Rajan Philips, -From Canada	IESL Northern Region

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
85	05.03.2012	HUMAN ADORNMENT	Miss.Selvamathy Tharmaratnam -B.A (Jewellery Design), Moratuwa University	Euroville
86	07.03.2012	NATION'S HEALTHCARE-AN INTERACTIVE PROCESS BETWEEN MEDICAL CARE & SOCIAL & ECONOMIC FACTORS	Prof (Dr).R.Rajakumar - -Cardiologist, Professor of University of Saskatchewan Canada	Euroville
87	30-04-2012	DEVELOPMENT ECONOMICS	Hon.Iran Wicramaratne, -Member of Parliament Sri Lanka	Euroville
88	28-05-2012	MARRIAGES AT LOW AGE CREATE SOCIAL AND HEALTH PROBLEMS	Dr.K.Muhunthan, -Consultant and Senior Lecturer in Obstetrics & Gynecology, University of Jaffna	Euroville
89	22-06-2012	SRILANKA EXPERIENCE IN GROUND IMPROVEMENT	Dr (Eng). Udeni P. Nawagamuwa, -BScEng. MEng (AIT), Dr.Eng CEng, MIE (SL), Senior Lecturer /Chartered Engineer (Civil) - Department of Civil Engineering, University of Moratuwa, Council member/ IESL, Chairman/CPS, Sri Lanka Association for the Advancement of Science.	IESL & Eurrouvile
90	04.07.2012	NANO SCIENCE	Prof. V.Thiviyanathan -Department of Nano Medicine, University of Texas Houston, USA. Prof.P.Ravirajan. -B.Sc.(Hons, Jaffna), M.Sc.(Pera), DIC, Ph.D (London) Head, Department of Physics, University of Jaffna.	Commercial Bank

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
91	14-07-2012	RECONCILIATION-THE NEED OF THE HOUR	Mr.Jayampathy Wicramaratnae -President Council. Prof.Rangith Amarasinghe -Dept of Polticle Science University of Peradeniya) Prof S.Selvakumaran, -Formar Dean, Faculty of Law, University of Colombo.	Euroville
92	08.08.2012	ENGLISH PROFICIENCY AND COMMUNICATION SKILL MEAN TO SUCCESS	Ms.Psyche Kennette -GIZ	HNB
93	13-08-2012	DEVELOPMENT TRENDS IN ASIAN COUNTRIES WITH SPECIAL REFERENCE TO TECHNOLOGIES	Mr.Thillinathan Aravinthan -Area Manager, CISCO Singapore.	N.I.T (Pvt) Ltd
94	07.09.2012	LIFE AND EDUCATION IN LONDON	Mr.Saravanapavan Theepan -4th Year Undergraduate Student, Department of Civil and Environmental Engineering. Imperial College, London.	Euroville
95	09.09.2012	SUSTAINABLE SOCIAL DEVELOPMENT	Mr. M. A. Allam -Director General, National Institute of Social Development (NISD)	Euroville
96	28.09.2012	EARLY DETECTION OF ORAL, BREAST AND CERVICAL CANCER	Dr.Rangaswamy Sankaranarayanan -MD, Chief of the Cancer Screening Group, International Agency for Research on Cancer Lyon, France.	Lions Club

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
97	01.10.2012	NATURAL SCIENCE AND ASTRONOMY	Mr.M.Thavarajah. -Ex. Parliamentarian.	Euroville
98	28.10.2012	DENGUE CONTROL	Dr.T.Kumanan -Consultant, Jaffna Teaching Hospital. Senior Lecturer, Faculty of Medicine, University of Jaffna. Dr.R.Surendrakumar MD (Com. Med.) Department of Community and Family Medicine, Faculty of Medicine, University of Jaffna. Dr.Sivaganesan -MBBS(CEY)MSC , Regional Epidemiologist.	Euroville
99	04.11.2012	LLRC REPORT & POSITIVE THINKING	Mr.A.C.George - -(Retired) In service advisor for Economic studies at Jaffna, Zonal Education office, Economics Lecturer at the National Institute of Education Dr.R.Bala -(Eye Surgeon UK.)	Euroville

SEMINAR NO	DATE	NAME OF THE MEETING	LEAD SPEAKERS	SPONSORS
100	12.12.2012	SCIENCE AND DEVELOPMENT	Prof.S.S.Rajendran National University of Singapore. Dr.R.Surendrakumar MD (Com. Med.) Department of Community and Family Medicine, Faculty of Medicine, University of Jaffna. Dr. S.S.Sivakumar Senior Lecturer, Faculty of Engineering, University of Jaffna Eng.M.Thillainathan Appropriate Technologies	

Acknowledgment

We acknowledge with thanks, the Resource Persons for their valuable presentations, the participants who had made the proceedings of the Seminars lively by their active participation and the sponsors of all the hundred seminars

We also express our thanks to the photographer Mr. N.Ramanathan for providing pictorial evidence of all our activities.

Further we extend our thanks to the authors for their prompt response with quality articles which had enriched our values.

Furthermore we thank the numerous advertisers and the well-wishers for their financial contribution. We sincerely thank the "Guru Printers" for the excellent professionalism exhibited in the production of the Magazine within a short period.

Moreover, we profusely thank the Senior Advisor, Mr. Walter Keller and the Team Leader Ms Psyche Kennett of the GIZ-Performance Improvement Project for facilitating the Jaffna Managers Forum for obtaining sponsorship from GIZ-PIP for meeting the entire cost of the Magazine.

We acknowledge with thanks GIZ-PIP for their sponsorship of the magazine.

Finally we thank those (if any) we had inadvertently omitted to thank by name.

We apologize for any errors and discrepancies that had crept due to oversight.

Editorial Committee
Jaffna Managers Forum

JAFFNA MANAGERS FORUM

JMF

No. 17, Agrarian Services Lane, Nallur, Jaffna

Tel /Fax: 0212227012

e-mail: bmsjaffna@yahoo.com

Web Site : www. jaffnamanagersforum.com

ISBN:978-955-4760-00-4

9 789554 760004

GURU PRINTERS