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நில அளவைச் சஞ்சிகை

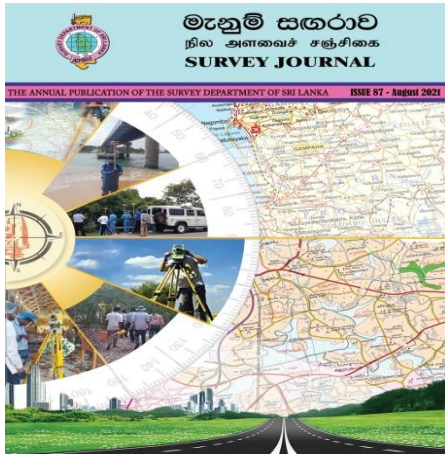
SURVEY JOURNAL

August, 2021

ISSUE 87

Published under the order of Mr. W.T.M.S.B. Tennakoon, Surveyor General of Sri Lanka

The Surveyor General does not necessarily agree with any opinions or recommendations made in this journal, nor do they necessarily represent official policy.



The latest speedy evolution of technology has also impact on the modern land surveying techniques in a massive way and the fresh impression is yet to come day by day.

The New technology, new applications and the road ahead is not a challenge to the Survey Department of Sri Lanka who celebrating its 221st anniversary this year. The surveying profession always play a key role in not only many development projects but also in collecting information of unexpected incidents such as natural disasters, bomb blasting etc.

The photograph collection of the cover page were taken while the crew of the Survey Department is engaging in such events.

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Global Surveyors' Day

Dr.K.Thavalingam, Retired Surveyor General

The Global Surveyors' Day aims to improve Surveying education and competence globally, upkeep the standards of professional surveyors and surveying technologists practiced around the world and dismantle the borders between surveying professionals in different places, thereby enhancing mobility of surveying professionals and ensuring a high standard of professional practice.

21st March has been recognized Global Surveyors' Day that will be celebrated in various countries of the world every year. The Day recognizes the work of surveying, mapping and geospatial professionals. This is a worldwide event initiated by the International Federation of Surveyors (FIG) based in Denmark, the Council of European Geodetic Surveyors (CLGE), and the National Society of Professional Surveyors (NSPS) in the USA. FIG has initiated celebrating this Day by country surveying associations around the world.

Land surveying was used by man in early times- and is still being used. It shows how important land surveying is for our survival. Most people never know about land surveying until they needed it at some point. Many of us hear about land surveying all the time but never really give it much thought. It means surveyors are unobserved and invisible to the public. So, surveyors are by observing Global Surveyors Day, also in Sri Lanka as Surveyors' Day, making the invisible experts to visible experts.

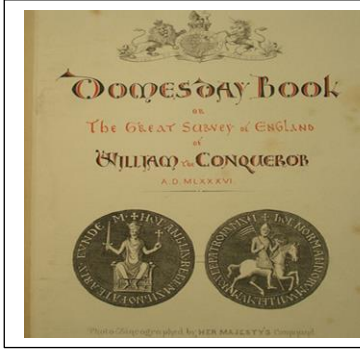
Many historians refer to Land Surveying as the second-oldest profession. The first examples in the history of land surveying date back to the ancient Egyptians during the building of the Great Pyramid at Giza in 2700 BC. There is evidence of the Egyptians using basic geometry to redraw boundary lines when the Nile overflowed its banks. Also, an Egyptian Land register existed as early as 3000 BC. Historical evidence shows that the Roman Empire was the first civilization to employ an official land surveyor within their Empire.

In ancient Babylon, Kudurrus were stone tablets that served as boundary stones upon which details of the property, the surveyor, the owner and property history were all inscribed. These were used upto 1200 BC.(See figure-1)



Figure-1 Kudurrus

Both the Romans and Greeks made use an early surveying instrument called the Groma, which was basically a long staff with a cross bar that measured straight lines and right angles. Chorobates and libella were used for levelling. The dioptra was a different kind of angle measuring instrument. It rested on the ground, and was finely adjusted by tilting and rotating the top part by means of precision screws, it could assess the angle of a stretch of aqueduct by looking through pivoting sights.



(Figure-2)

In England in 1086, William the Conqueror wrote the Domesday Book, which covered all of England and contained the names of the land owners, the amount of land they owned. (See figure-2)

Surveyors in Sri Lanka have contributed greatly to Sri Lanka's phenomenal development over the years using innovation, creativity, a wealth of knowledge and expertise. Sri Lanka as country which had traditions and established systems for measurement of land and demarcation of boundaries was not behind the rest of the world at any time in our history. Some parts of an ancient system of irrigation, consisting of a well-knit pattern of irrigation tanks, feeding canals and distributor channels, are still in constant use indicate that surveying in some form was practiced as an earth science, contributing to the economic development of our country, Sri Lanka, in pre-colonial days.

In the period of Dutch occupation of Ceylon, they had a system of Registration of Land which included the preparation of a survey plan of the land. The registrations were noted in volumes called 'tombos' and they specified the bounds of the land as determined by the Surveyor.

Systematic land surveying began in Sri Lanka after establishment of Survey Department in the year 1800, while Surveying Profession in Sri Lanka became legally recognized in 1889, paving the way for the emergence of the licensed surveyor. Most of the surveys carried out by Survey Department during first fifty years were confined to preparation of title plans for land sales. The details contained in the first title plan prepared by Survey Department are nearly identical with the information provided in statutory plans at present.

Presently, the department is well equipped with latest technology. The strength of the department is exceeding about 6000 staff including technically qualified and dedicated personnel in above fields.

Surveyor General is the head of the department and head of the Surveying and Mapping profession. He / She is the Chairman of the Land Survey Council (established under the Survey Act No: 17 of year 2002) which having legal mandate to regulate private Surveyors in Sri Lanka.

During the last 221 years, under the leadership of 51 Surveyor Generals, as the National Surveying & Mapping organization and as an initiative activator in any land development activity of the country, Survey Department has earned much acclaim for preparation of plans, maps and Land/Geo Information in high quality using up to date technology available.

Global Surveyors Day will highlight the importance of a surveyor, their job and the field work to society all over the world. The role of Surveyors is important for the nation. Private and public sector

Surveyors must have good co-operation and co-ordination to prepare scientific maps and accurate data, needed for the implementation of various projects for the benefit of the people.

The Council of European Geodetic Surveyors represent and promote the interests of the geodetic surveying profession in the private and public sector in Europe. Nearly 100,000 professional surveyors are members in this Council.

The National Society of **Professional Surveyors (NSPS)** is the voice of the professional surveying community in the United States and its territories. Nearly 45,000 professional surveyors are members in this Society.

FIG is an international organization representing the interests of surveyors worldwide. It covers the whole range of professional fields within the global surveying, geomatics, geodesy and geo-information community. It provides an international forum for discussion and development aiming to promote professional practice and standards. It is an UN-recognized non-government organization (NGO), representing more than 120 countries throughout the world.

By the initiative of the Council of European Geodetic Surveyors and the National Society of Professional Surveyors with the endorsement of FIG the Premiere celebration of Global Surveyors' Day 2018 was held at the World Bank Headquarters in Washington, DC., exactly in the middle of the Land and Poverty Conference. As part of the celebrations initiated by FIG, a Round Table was organized to enable surveying professionals to discuss important topics in today's world, followed by an evening reception in Washington DC. At the same time the Global Surveyors' Day - website was launched.

Several other countries, regions and organizations also held events and celebrations on that day in 2018. Surveyors are very honored and thankful that the World Bank agreed to host the Premiere event.

Female surveyors in Surveying Profession

The first known American land surveyor was Alice Fletcher. She worked in mid 1800s. In the early 1900s, women made their first official move into the surveying industry. Irene Barclay became the UK's first female Chartered Surveyor in 1922, qualifying only 3 years after the removal of the Sex Disqualification (Removal) Act 1919. The first female Surveyor General was Ms. Underwood in Australia. She was appointed as Surveyor General of New South Wales, at the age of 32, on 4th of October 2016.

In 1980, 2nd of January, 25 young women were recruited to the Sri Lanka Survey Department to train as lady surveyors. Many people opposed this recruitment. In 1983, 1st of February, Mrs. L.L.S.R. Gunasekara, was appointed as the first female Assistant Superintendent of Surveys in the Survey Department. She left the department very early to emigrate to Canada.

First batch of lady Surveyors in Sri Lanka



First Female Surveyor General of Sri Lanka was Mrs.A.L.S.C. Perera. She was the 50th Surveyor General of Sri Lanka too.



She joined the Survey Department, on the 1st of March 1985, as Assistant Superintendent of Surveys. She became the country's first female Surveyor General in February 2020 after 35 years of service in the department and retired on 31st of May 2021. It was a new look at the Survey Department. In turn it was a new look at the Surveying Profession in Sri Lanka.

Calendar – Surveying / Surveyors' Day around the world

- USA is not only celebrating one day, but since 1984 the third week of March has been dedicated National Surveyors Week to recognize and promote the many contributions by surveyors and the surveying profession in all aspects of life. Nearly 45,000 surveyors are practicing in the USA.
- The Council of European Geodetic Surveyors (CLGE) launched its first day of the European Surveyor in 2012, on 5th of March, on the 500th anniversary of the Flemish geographer and cartographer Gerardus Mercator's birth. Now the Council celebrates Global Surveyors' Day on 21st of March.
- 10th April is celebrated as '**Survey Day**' throughout **India**. This **day** has a special significance in the History of **Surveying** in India as it is on this **day** that Major William Lambton started the GTS (Great Trigonometrical **Survey**) and the work of measurement of the Great Arc from Cape Comorin to Bangalore, on 10th April 1802.
- 19 June – Philippine National Geodetic Engineers Day
- 9 June –Germany Day of Geodesy.
- 3 June– Japan Surveying day.
- July 1st, Mexico National Day of the Engineer
- 24 June Colombia Day of the Surveyor.
- The second Saturday in March is **Land Surveyors Day** in Ukraine. Land Surveyors Day is annually celebrated since 2000. The most notable surveyors are presented with prizes, gifts and awards.

Still several countries celebrate that their National Surveyors' Day on a day of special significance to them. Now is changing and they will also start to celebrate March 21st, Global Surveyors Day.

Declaration of Surveyors' Day in Sri Lanka

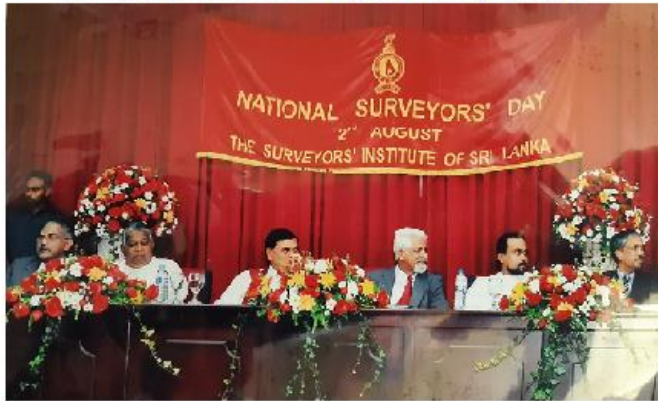
Approval of the Cabinet had been previously granted in 2011 to declare 02nd of August as the National Surveyors' Day in Sri Lanka. It is the day the Sri Lanka Survey Department was established. As the International Federation of Surveyors, declared 21st March every year as Global Surveyors' Day, a proposal made in 2018 by the Minister of Lands and Parliamentary Reforms, to change this date and to declare 21st of March every year as Surveyors' Day of Sri Lanka. This proposal was approved by the Cabinet. Hence, from 2020 onwards the Surveyors' Day in Sri Lanka is on 21st of March.

The Surveyors Institute of Sri Lanka (SISL) initiated and commemorated the first National Surveyors Day on 2nd of August 2011 on a large scale. No celebration in 2012. One of the Licensed Surveyors wrote an article in the Sinhala newspaper in 2012. On 2nd of August 2013, 3rd anniversary of National Surveyors Day was celebrated on a large scale by SISL. Former Hon. Minister Basil Rajapaksa was the Chief Guest at the function in 2013. I attended this function as Surveyor General. Thereafter, no National Surveyors' Day celebration was organized by SISL. Homagama Surveyors' Association organized a seminar and dinner to celebrate the 8th National Surveyors' Day on 2nd of August 2018. No celebration in 2019.

1st National Surveyors' Day -2011

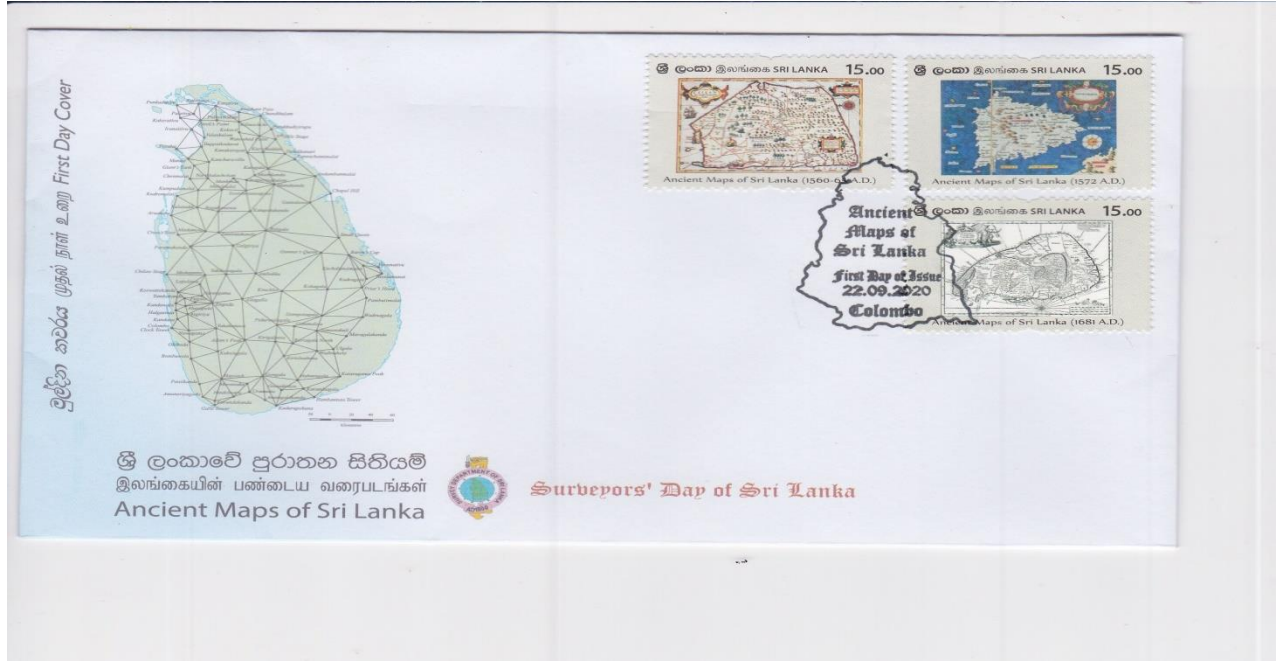


3rd National Surveyors' Day -2013



Surveyors' Day 2020

It was planned to celebrate this day on 21st of March 2020. The program was organized in two parts: first the inauguration function and the second session were the technical and panel discussion. At the inauguration function it was decided to release “First Day Cover” to commemorate the Surveyors' Day 2020. Later this program was cancelled due to Covid-19. As the situation improved towards normal in September 2020, the “First Day Cover” was released on 22nd September 2020 by the Minister of Lands. Surveyors' Day 2021 was not celebrated on 21st of March 2021 due to the situation prevailed in the country.



The above information shows that the Surveyors' Day has not been celebrated annually in Sri Lanka. No one knows why it is not celebrated annually. Lack of funds or lack of interest or lack of coordination or something else. My question is how to ensure the sustainability of this program every year.

How to ensure sustainability?

One has to understand that sustainability requires long term planning. You should know how we can celebrate this day annually. If you have thoroughly thought of how and what you will do in the long run, half your work is done. Once you know the long-term vision, you can easily draft the various actions required to achieve it.

A major step to ensure sustainability is the involvement and participation of key stakeholders in the program. You have to initiate multi-stakeholders' dialogue / discussions to involve relevant people in your annual program.

We have celebrated Surveyors' Day since 1938. Can you believe that? It is an unofficial Surveyors' Day. Once a year, in March, surveyors used to have a get-together at the Institute of Surveying and

Mapping (ISM), Diyatalawa with sports activities and games. The Celebration starts in an unusual way, no assembly, no Chief Guest and no opening ceremony. On the first day of the celebration, surveyors and their families, licensed surveyors and families and their friends come from various parts of Sri Lanka to participate. The first two days' events are Volley Ball, Indoor games, Billiards, Badminton, Basket Ball, Tennis, Net Ball match, athletic games etc. These matches are very interesting and thrilling, because family members, friends and elderly people participate in these events.

On the night of the second day, surveyors celebrate Club Night. It is a very interesting and funny night. Several programmes are organised; musical chairs, tombola, drama, musical show, children's events and ladies' events. It provides a lot of fun to the spectators. On the third day morning at 6.00 AM is a Marathon race for Ladies and Gents.

After this event, all of them proceed to the Play Ground to have Cricket Matches, Pillow Fight, Foot Ball matches and fancy-dress parades etc. There is a tug of war which is a highly exciting event. The spectators continuously cheer the participants. While these events are going on, free-Barrel Beer will be provided for all members and their families who want to enjoy the chill. Cap or t-shirt or both will be distributed to all at concession prices. Third day's night all members organise a Procession to visit all residences at ISM to conclude the celebration. One of the members dresses like "Poosari" to take the lead of the Procession. It is very interesting. My question is, why don't you make on these days as a Sri Lankan style Surveyors' Day to keep the sustainability.

Further Surveyors' Day is not only for Surveyors. It is for undergraduate surveyors too. They can celebrate at university level. All surveying companies should support this event to make the profession visible to the public.

"Making Invisible, Visible"



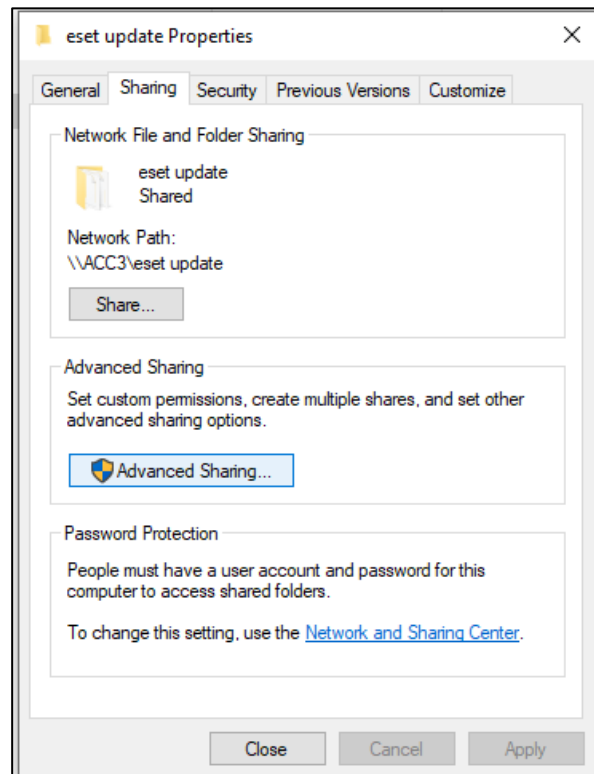
Automatic updating of manually updating version of Eset end point Security Antivirus

Mr. E.M.D.M. Ekanayake, Senior Deputy Surveyor General (Mapping)

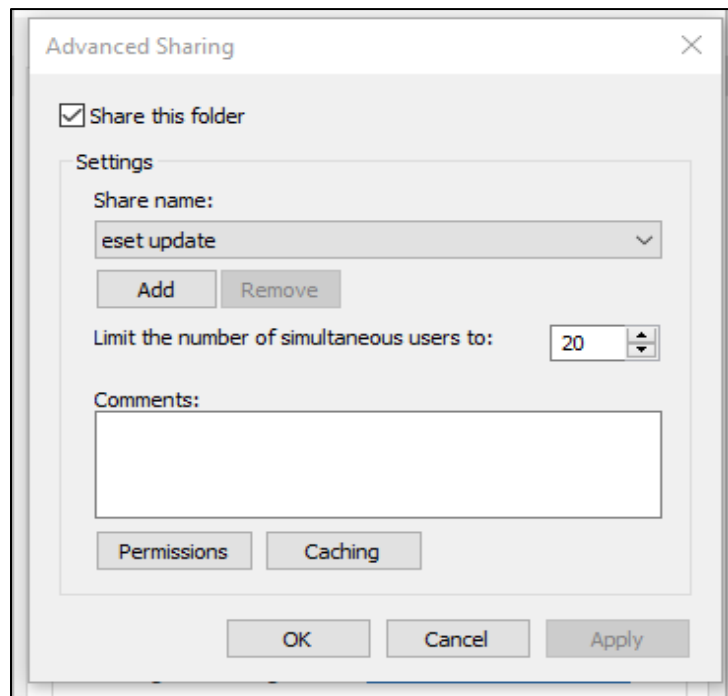
Department has been using commercially available “Eset End point Security” programme (AVP) as a Antivirus and Internet Security solution for computers available in the Department. However, Department has purchased few licenses with online updating facility and more licenses with off line updating facility due to financial constraints. In order to update the AVP of offline computers, it is required to copy “eset update” folder located in C: drive of computer with online updating facility and past to the c: drive of computer with off line facility.

But it is found that the AVP of most of computers installed off line updating facilities are not updated regularly or not at all due to the requirement of human intervesion for this process. Lack of interest as well as lack of knowledge about the process of updating the AVP have become the main reason for this situation. Disclosing computers to the internet without updating their AVP regularly has badly affected to the day to day work of the office. The automation of the manually updating process, using freely available software namely SyncBackFree which can be downloaded from <https://www.2brightsparks.com>, has overcome this situation. The detailed description of the process is indicted below.

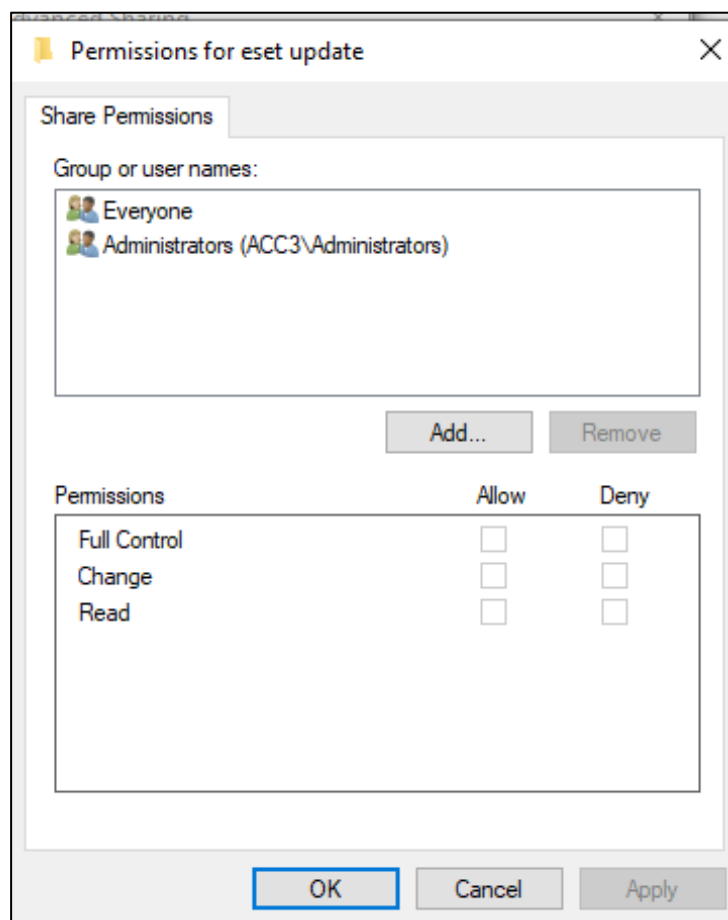
1. Right click on esetupdate folder located in the C: drive of computer where manually updating version of Eset End point Security Anti Virus programme has been installed. Select properties and click on “Sharing” tab to get the following screen.



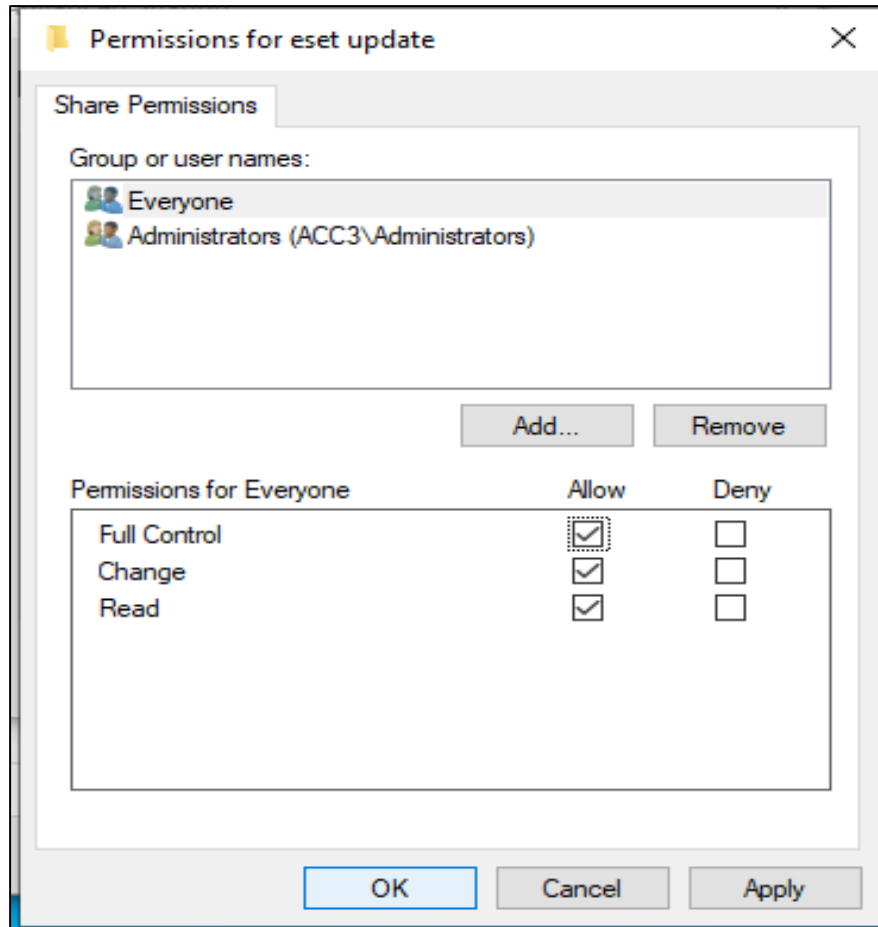
2. Select “Advance Sharing” tab to go to following screen



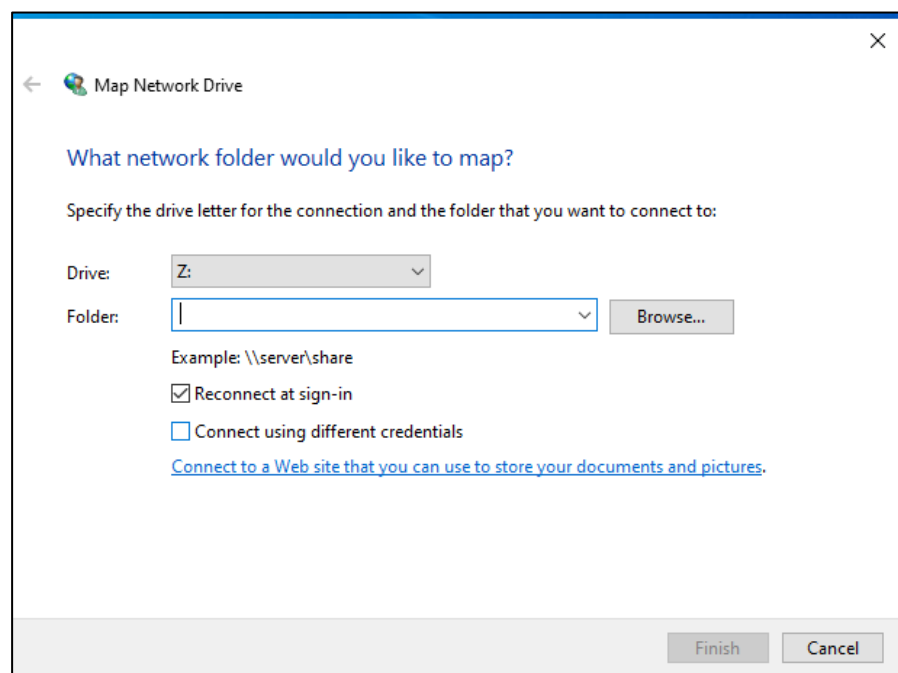
3. Click on “ permission” tab to get the following screen



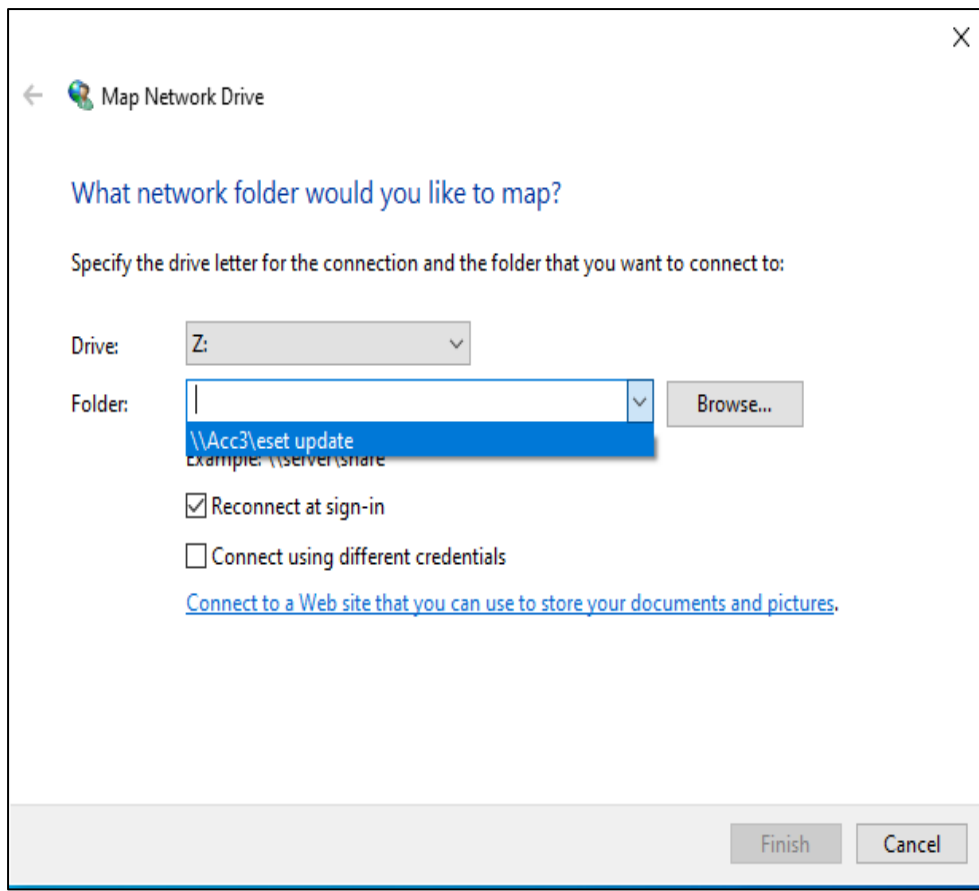
4. Select “ Everyone” under ” Group or user Names” and put a tick under “Allow” against “ Full control” in Permission for Every one area and click “OK”. Click “ OK” for next screen and “ Close” the next screen.



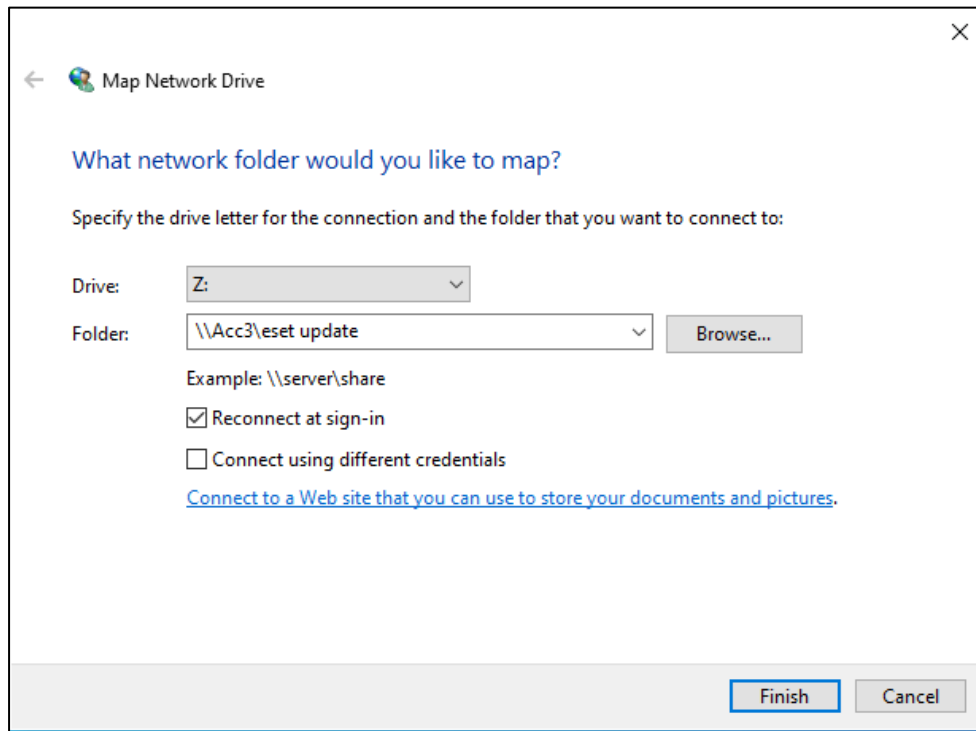
5. Then Right click on “My computer” and select “ Map Network drive” to get the following screen.



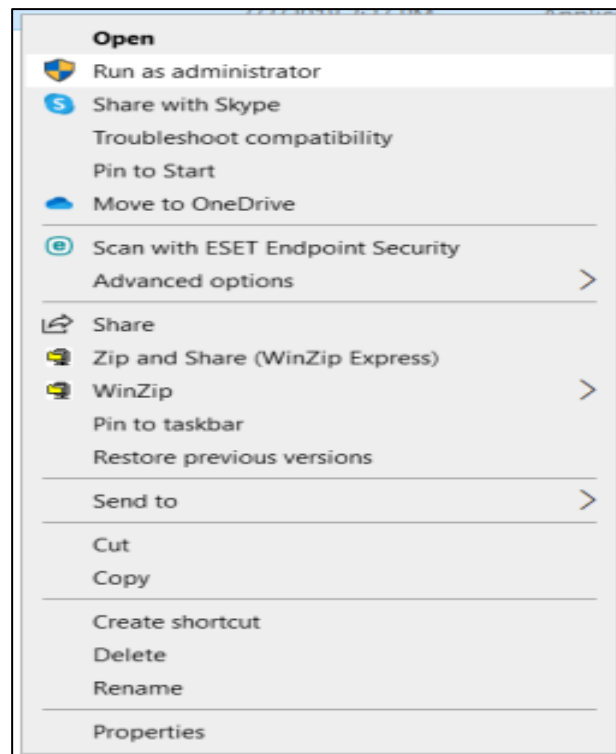
- Expand the drop down menu against the Folder to select the shared folder as shown below.



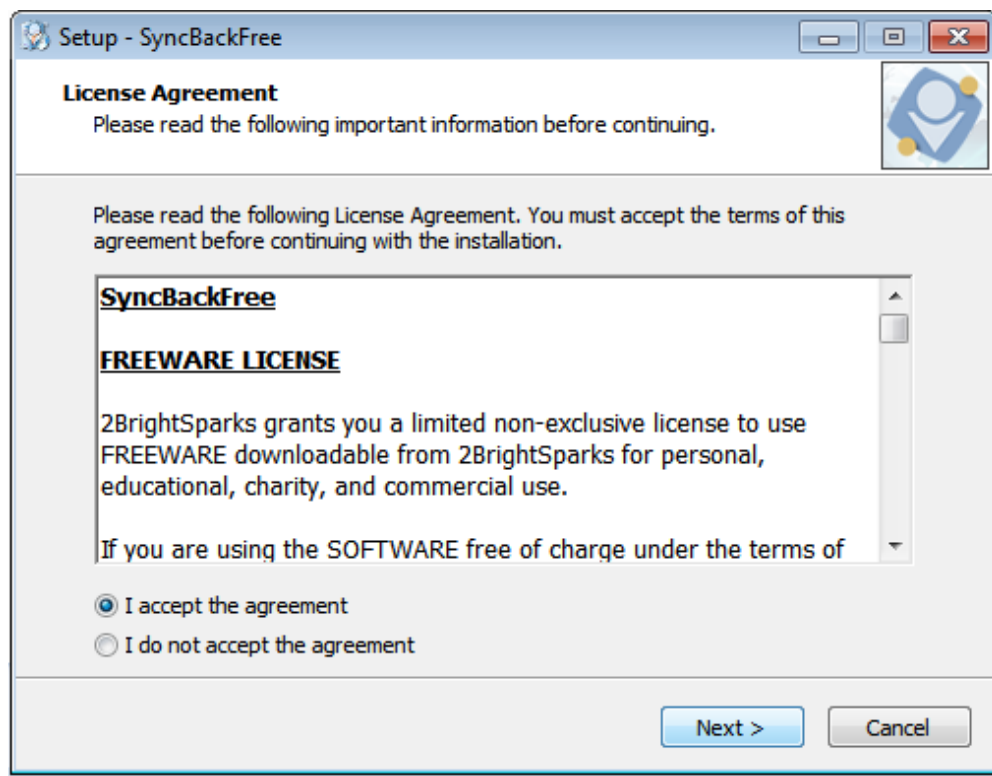
- Put a tick in “ Reconnect at sign-in” box and click on “ Finish”



- Then go to the Computer where automatic updating version of the Eset End point security Anti Virus programme has been installed. Right click on SyncBack_Setup.exe file and select the option” Run as administrator” to Install SyncBackFree software with administrative rights.



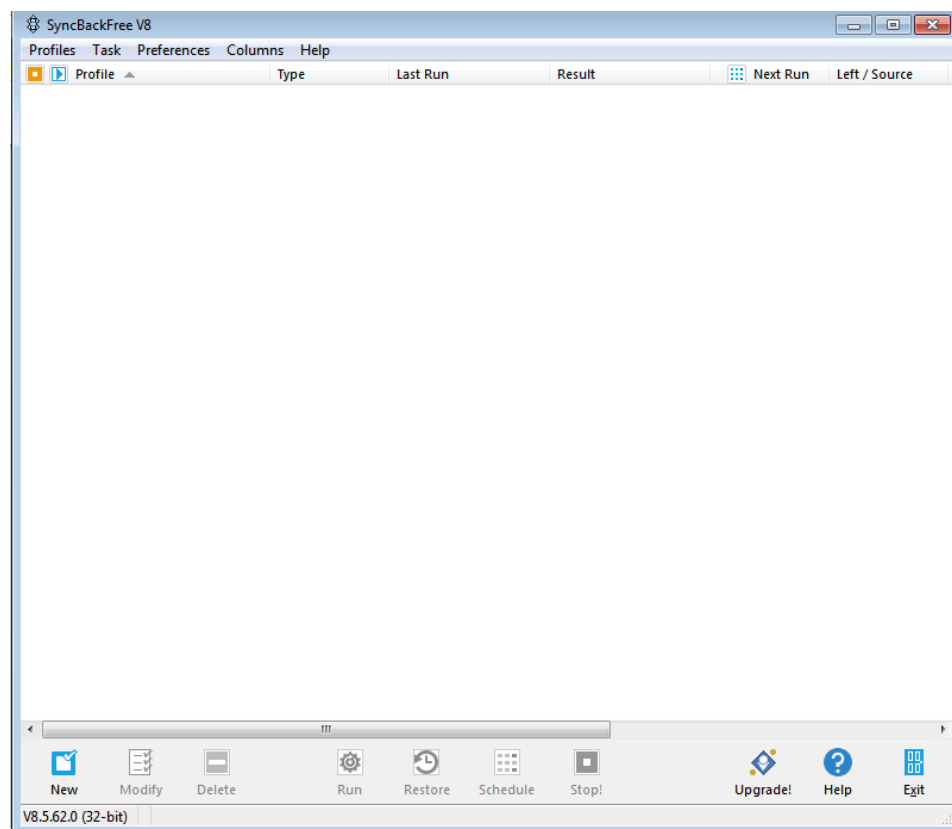
- Accept the agreement and select “Next”



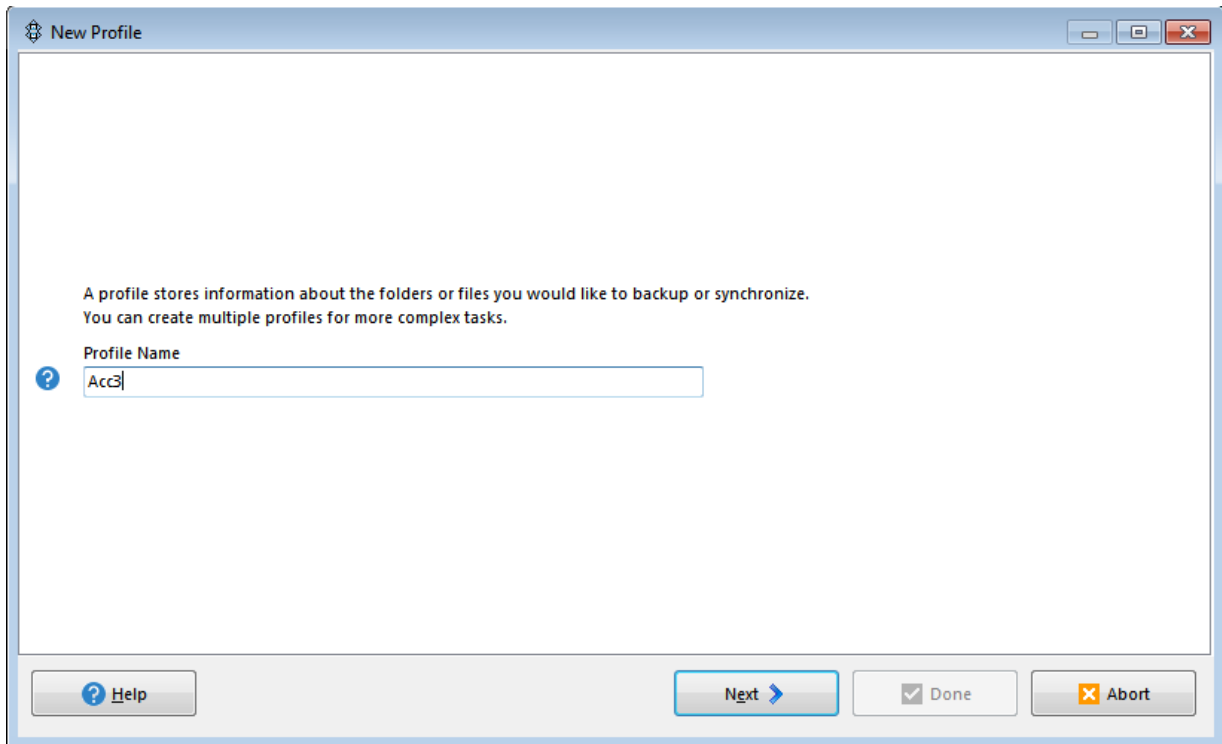
10. Select option “Launch SyncBackFree” and enter “Finish”



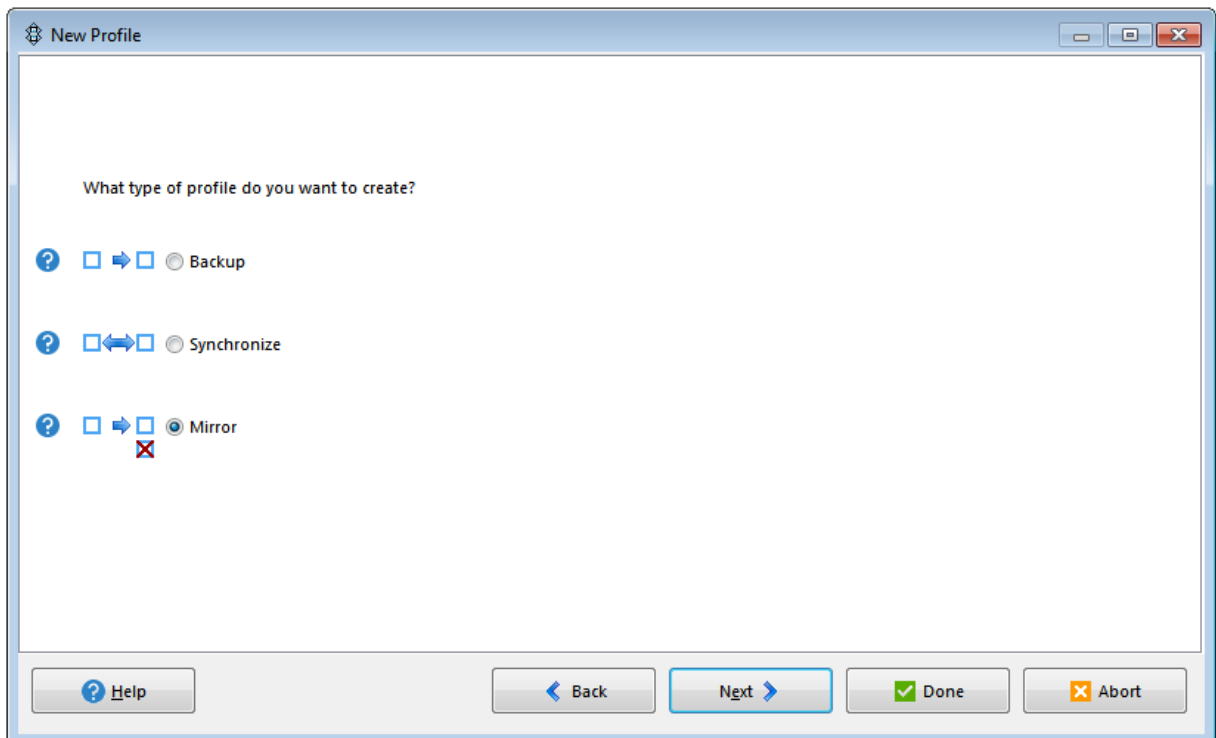
11. Open SyncBackFree to get the following screen.



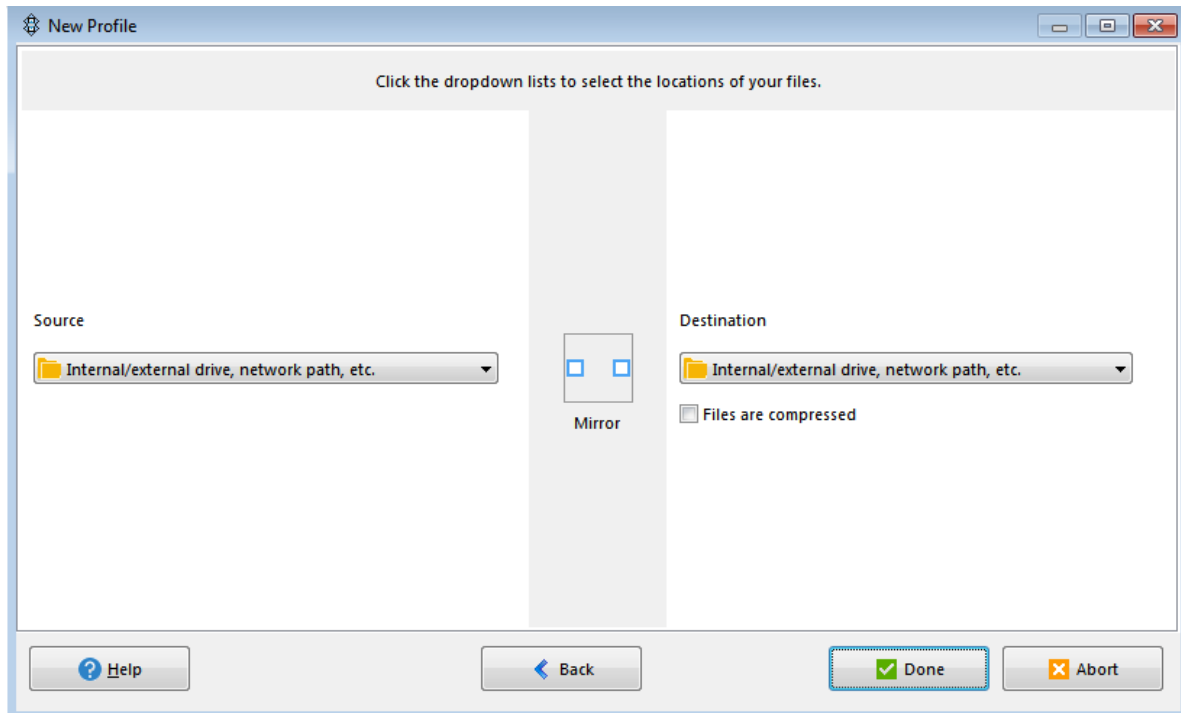
12. Select “new” under profiles tab.



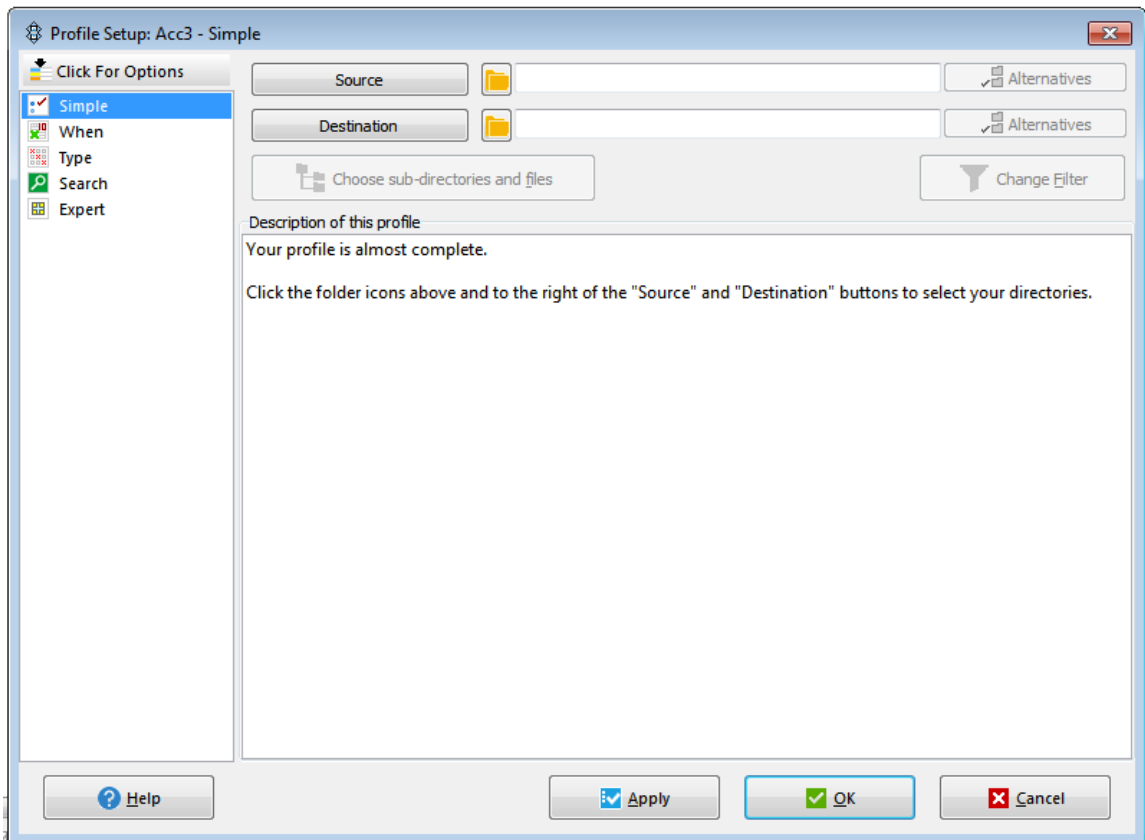
13. Then enter name under profile name and select “Next”.



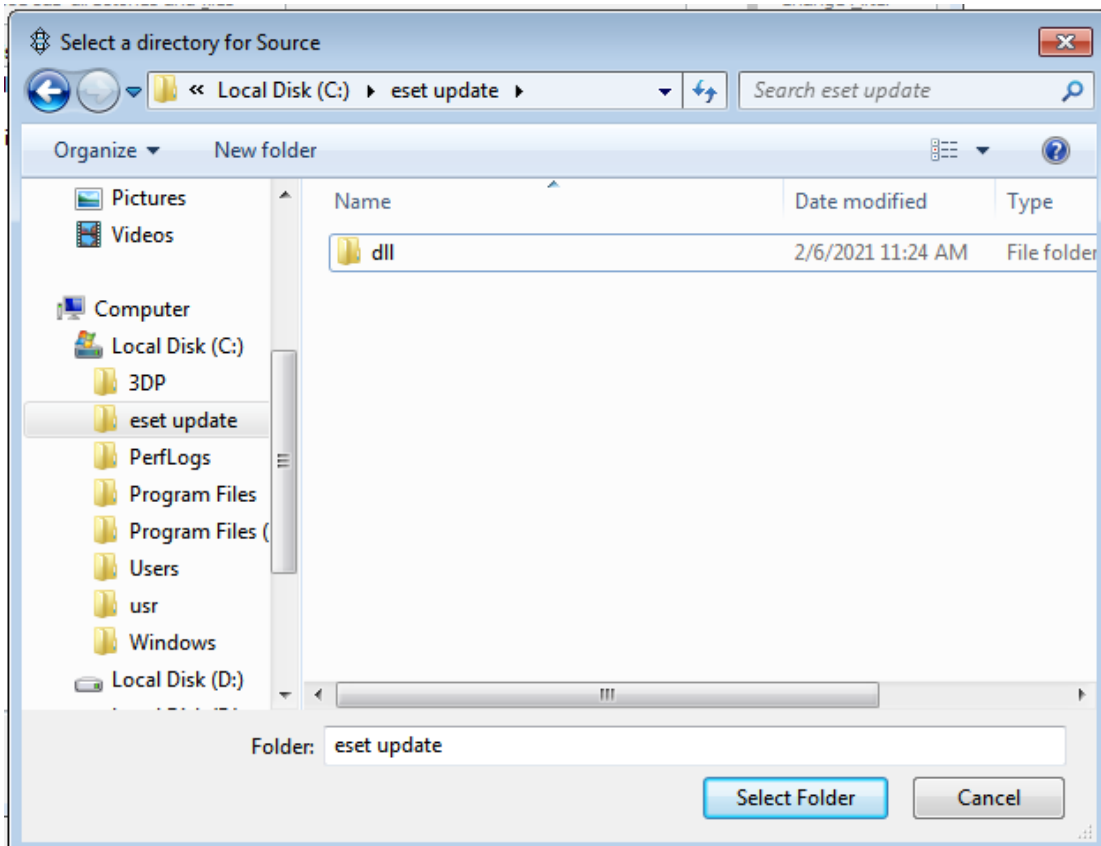
14. Select “Mirror” and then “Next” to get the following screen.



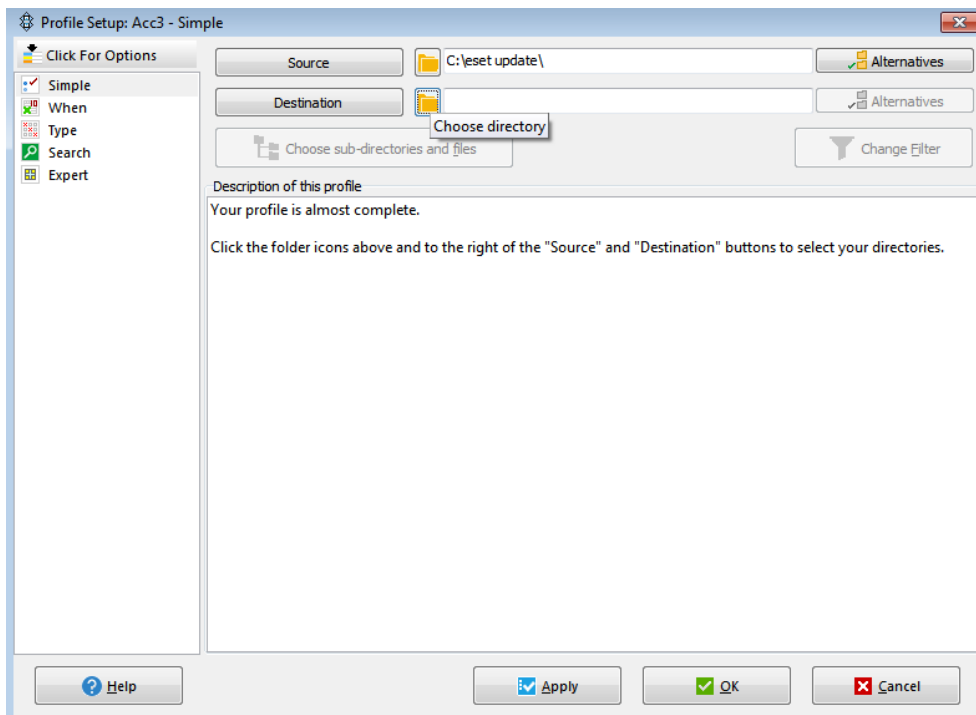
15. Leave default settings and select “Done” and “OK” for the next screen to get the following screen.



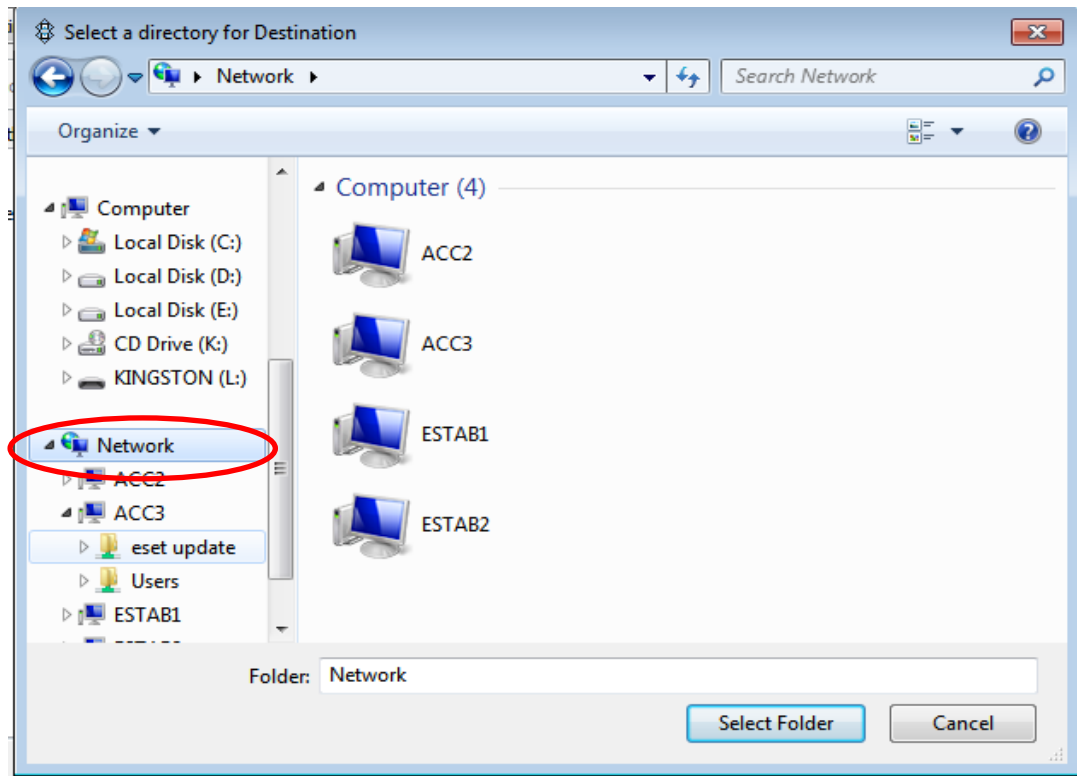
- Then select source as eset update folder located in the C: drive of the computer which has been installed automatic updating facility of the “Eset End point Security” AntiVirus programme.



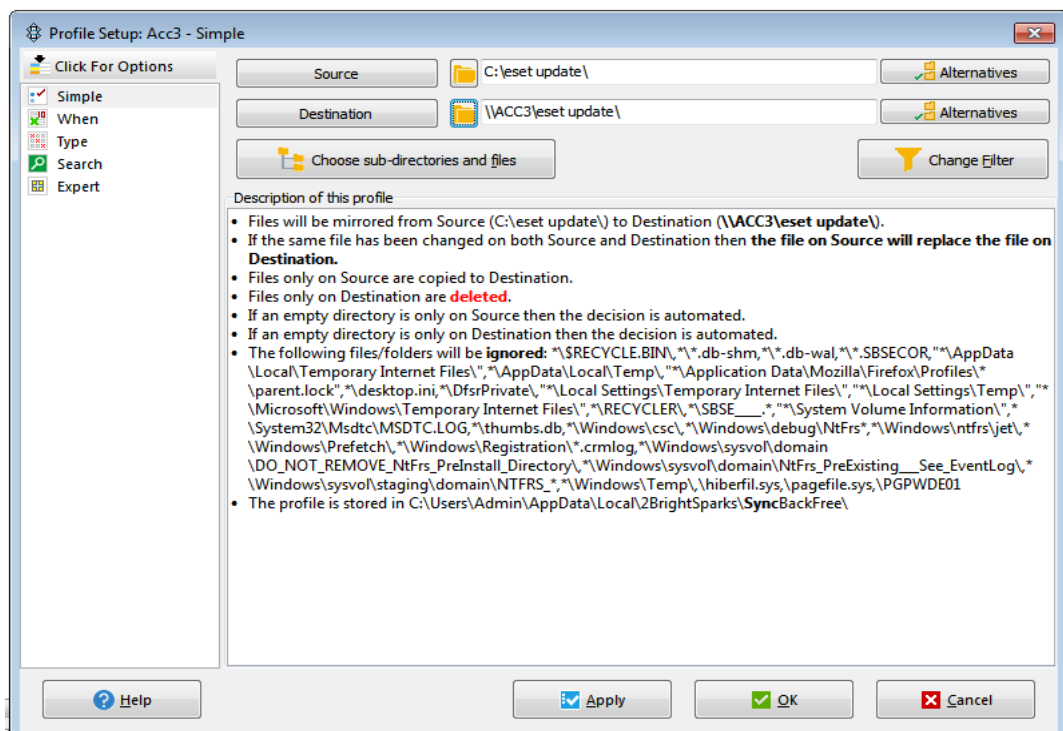
- Click on “Select Folder” Tab to get the following screen.



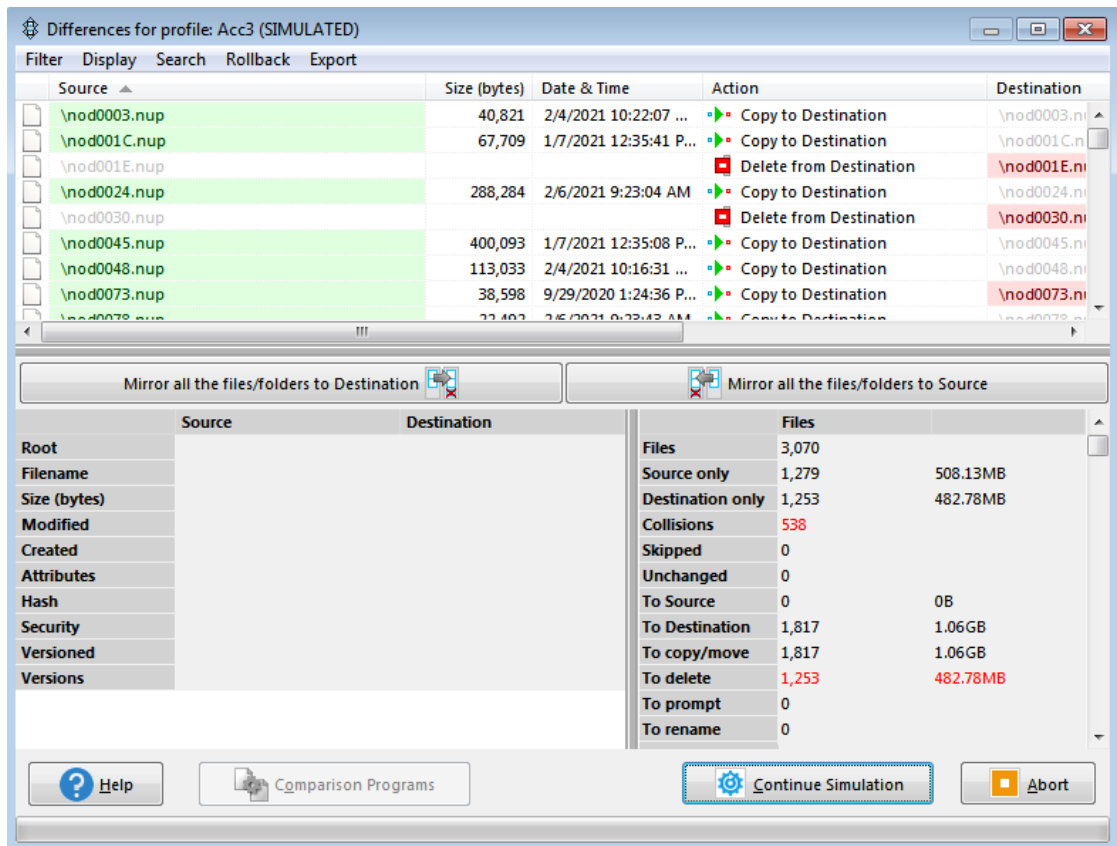
- Click “Destination” tab and select eset update folder of the computer over the Local Area Network where manual version of the Eset End point Security Antivirus programme have been installed as shown below.



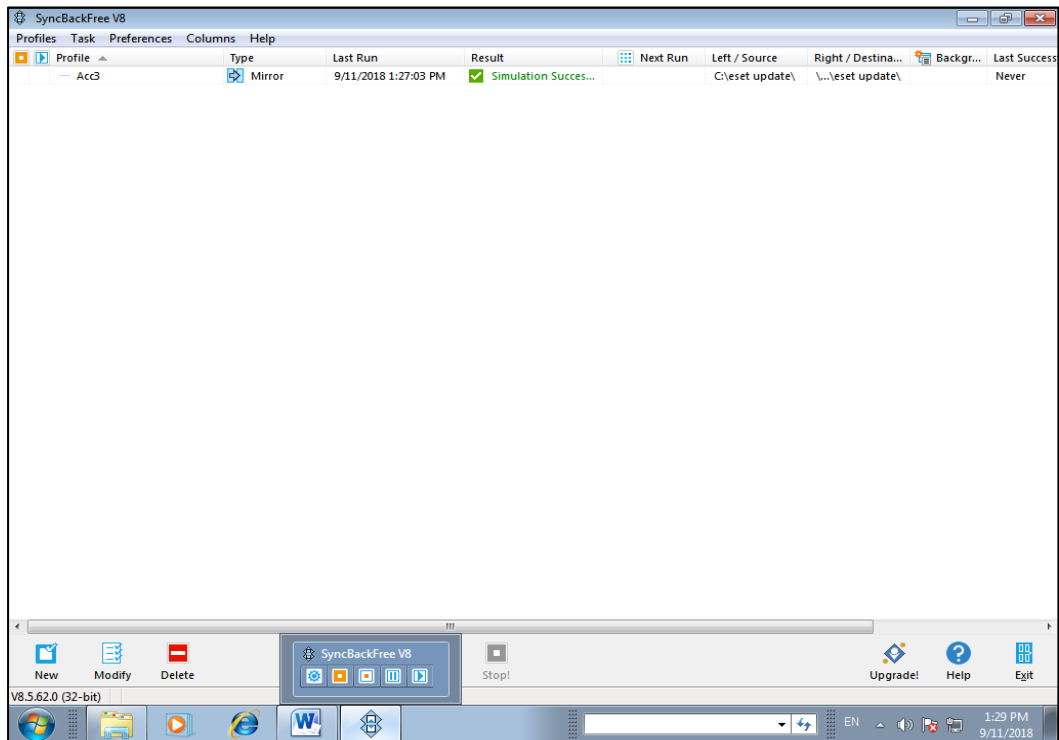
- Click on “Select Folder” tab to get the following screen.



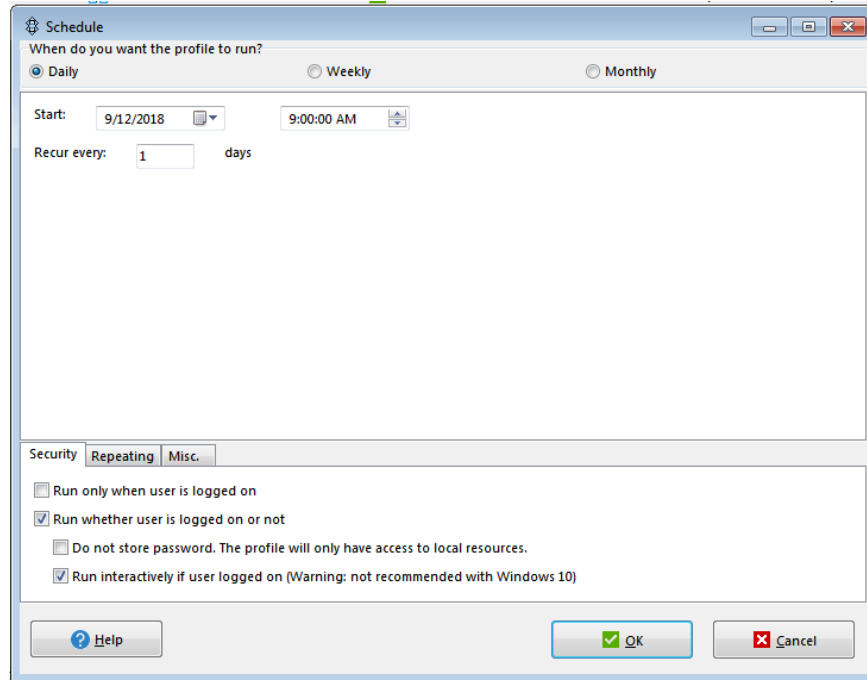
20. Select “Apply” and “OK” in next three screens and “Yes” to the final screen to get the following screen.



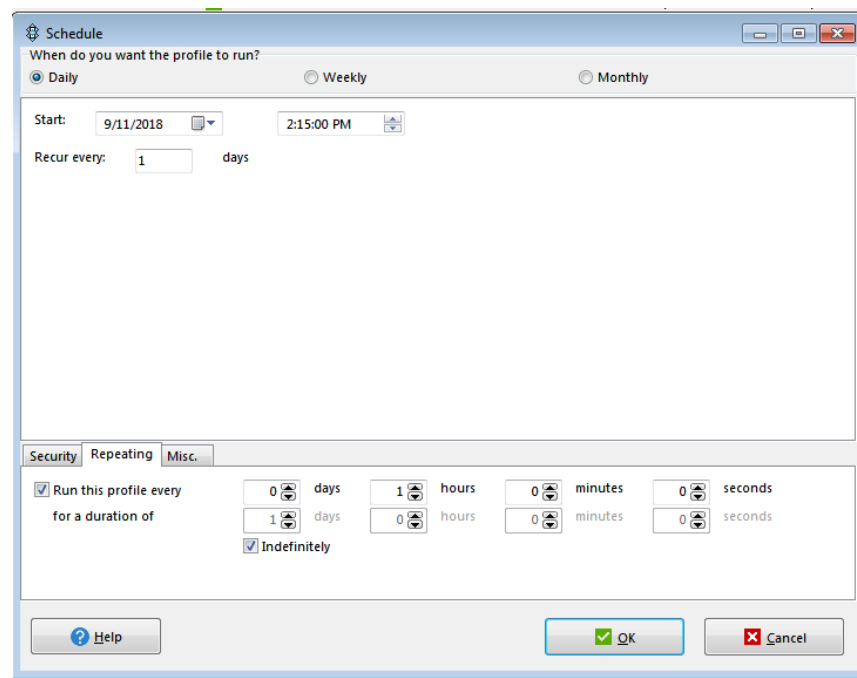
21. Click on “Continue Simulation” for the next screen



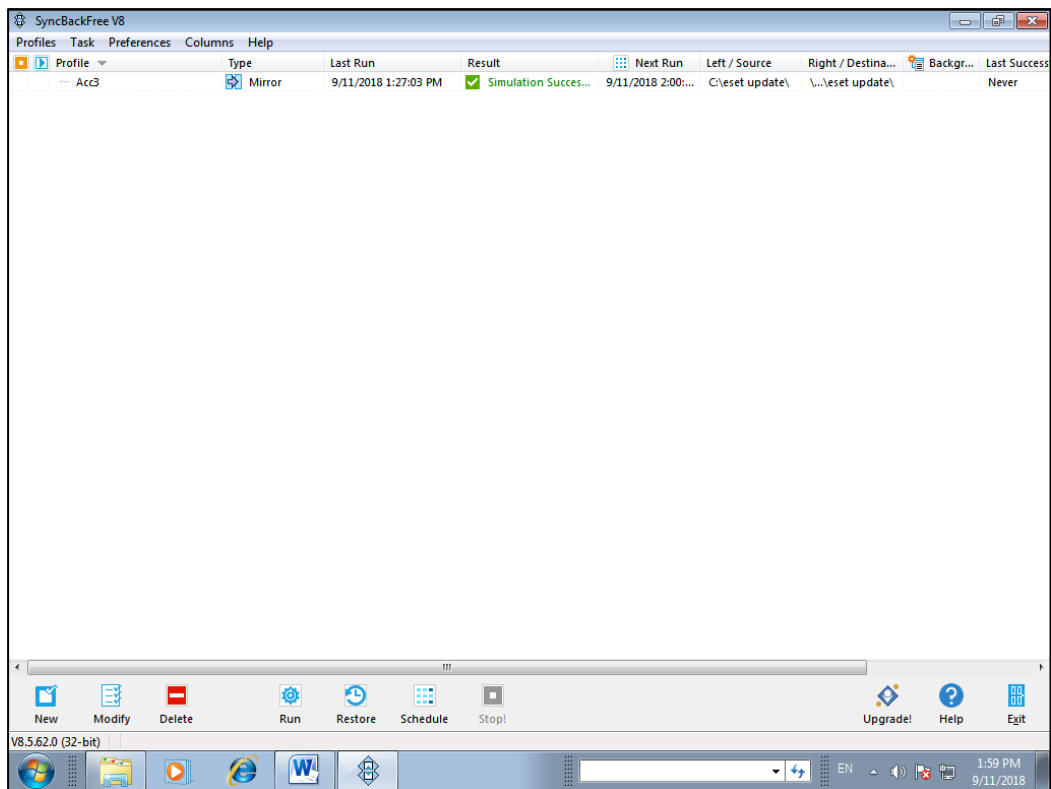
22. Select the relevant profile by clicking on the profile name and select “Schedule” tab and then “Ok’ for the next screen, to set updating frequency and other settings required to automatically update the “eset update” file of the computer with manual updating version of the Antivirus programme has been installed, to get the following screen.



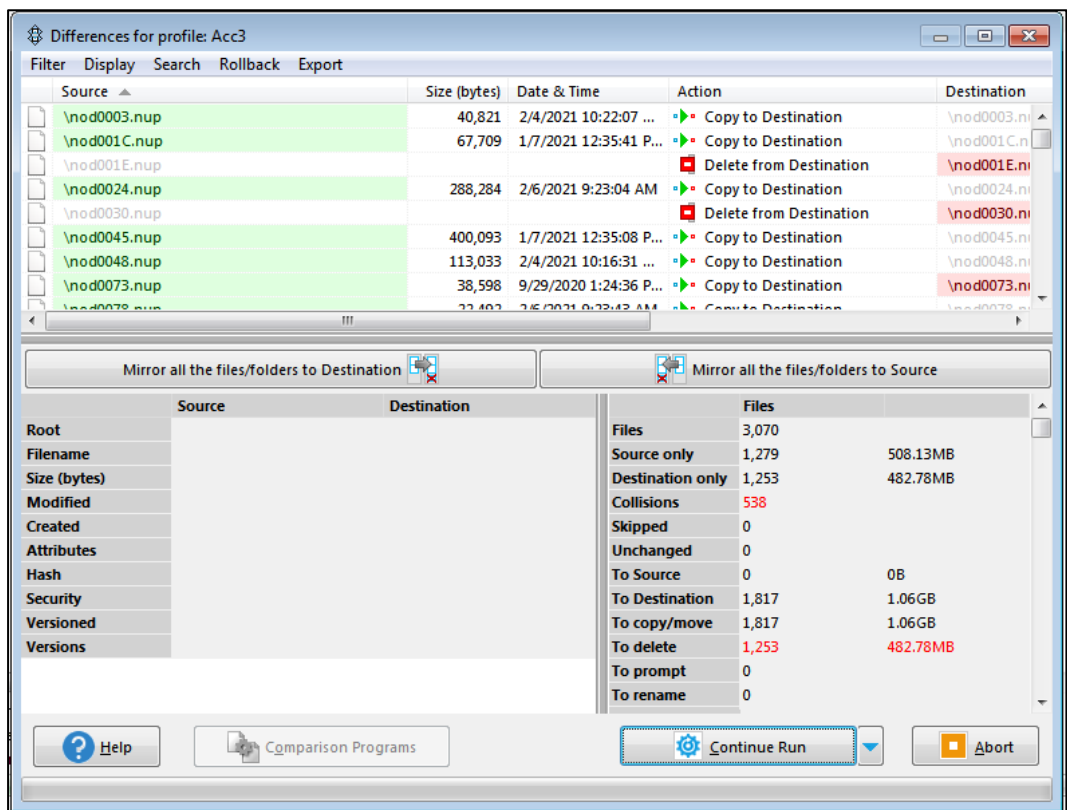
23. Select default settings under “Security” tab and click on “Repeating” tab. Tick on check boxes for section of options “Run this profile for every” and “Indefinitely”. Set only 1 hour in the first row as shown below.



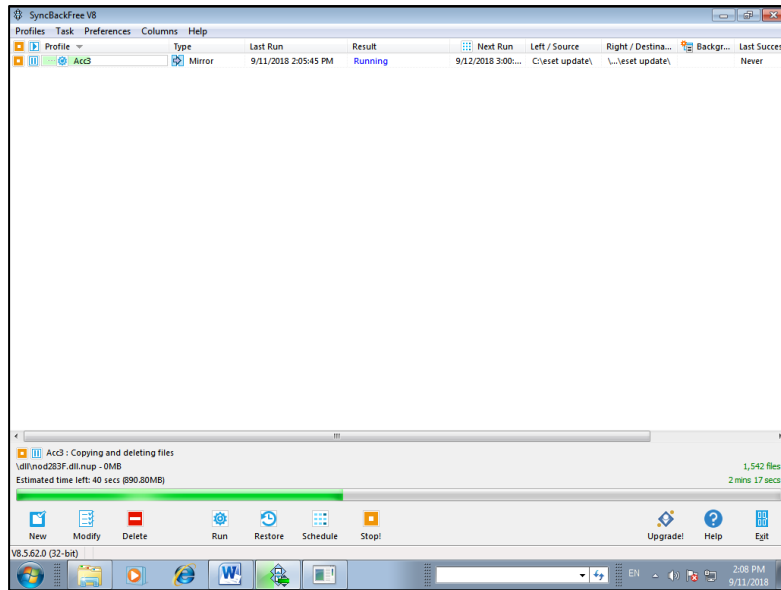
24. Click “OK” for all screens to get the following screen.



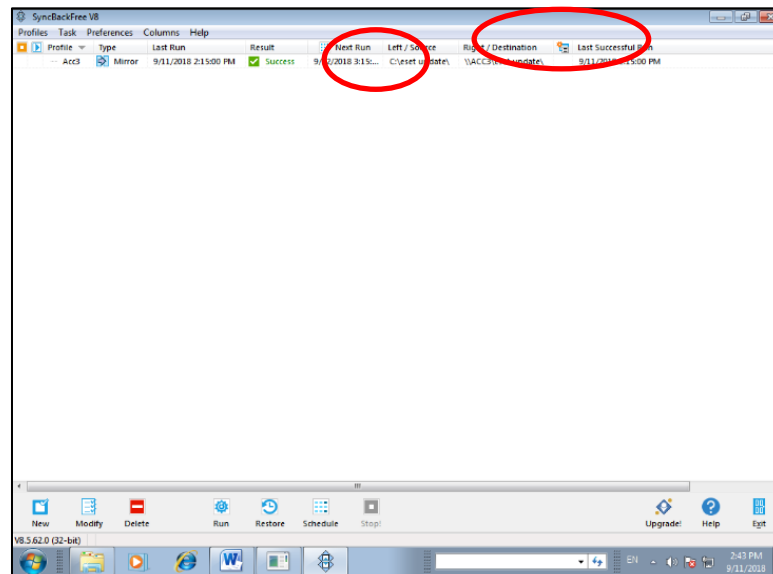
25. Select “Run” to get the following screen



26. Select “Continue Run” and “Yes” in the next screen for following screen.



27. Last successful run time and Next run time can be seen in the screen below.



මැනුම් හා සිතියම්කරණයේ තිස් තුන් වසරක අත්දැකීම් (හතරවන කොටස)

එස්. කේ. විජයසිංහ මයා - විශ්‍රාමික අතිරේක සර්වේයර් ජනරාල්

4.1. ක්‍ෂේත්‍ර පුහුණුව : දෙවන කොටස

මැනුම් හා සිතියම් ගතකිරීමේ ආයතනයේ උසස් ඩිප්ලෝමා පාඨමාලාව අවසන් වීමෙන් පසුව කලින් අර්ධයක් නිමකල ක්‍ෂේත්‍ර පුහුණුවේ දෙවන කොටස සඳහා අනුයුක්ත කෙරුණේ කුරුණෑගල දිස්ත්‍රික්කයේ ගොකරැල්ල ප්‍රදේශයයි. සුපුරුදු පරිදි දියතලාව සිට කුරුණෑගල දක්වා දුම්රියෙන් ප්‍රවාහනය කරන ලද භාණ්ඩ දෙපාර්තමේන්තු වාහනයකින් ගොකරැල්ල ප්‍රදේශයේ කුලියට ගත් කුඩා නිවසට ගෙනයන ලදී. දුම්රියෙන් එවන ලද භාණ්ඩ කුරුණෑගලට පැමිණෙන තෙක් දින කිහිපයක් දුම්රිය දෙපාර්තමේන්තුවේ සේවය කල එවකට කුරුණෑගල දුම්රිය ස්ථානයේ නිල නිවාසයක පදිංචිව සිටි මගේ පාසැල් මිතුරෙකුගේ නිල නිවසේ නවාතැන් ගනිමු. මෙවර අප කණ්ඩායමේ එක් එක් අය එක් එක් ස්ථාන වලට අනුයුක්ත කර තිබූ බැවින් කඳවුරු කම්කරු සමඟ සියළු කටයුතු තනිව කරගෙන යාමට සිදුවිය. දෙපාර්තමේන්තුවට බැඳුණු පසු ප්‍රථම වරට තනිවම කටයුතු කරගෙන යාමට සිදුවූ එම අවස්ථාව එක් අතකින් තරමක අභියෝගයක්ද විය. ගොකරැල්ල ප්‍රදේශයේ පදිංචිව සිටි ජෝන්ස් රජයේ මිනින්දෝරු වරයෙකු එවිට සහායට සිටියේය. රාජකාරි කටයුතු සඳහා මෙන්ම පෞද්ගලික අවශ්‍යතා සඳහාද ඔහුගෙන් ලද උපදෙස් මහෝපකාරී විය. එවර මා වෙත පැවරී තිබුණේ දෙපාර්තමේන්තු භාෂාවෙන් විකීර්ණ මැනුම් ලෙස හඳුන්වනු ලබන (sporadic) මැනුම් කිහිපයකි.

මෙහිදී විශේෂයෙන් සඳහන් කලයුතු කරුණක් නම් සාමාන්‍ය සම්ප්‍රදාය වෙනස්ව යමින්, මෙම පුහුණු කාලය තුළ මගේ අධීක්ෂණ කටයුතු සිදුකරන ලද්දේ කුරුණෑගල දිස්ත්‍රික් මිනින්දෝරු අධිකාරී වරයා විසින්මය.එමගින් ඔහු, මැනුම් කටයුතු පුහුණු කරන අතර තුර අධීක්ෂණ කටයුතුද පුහුණු කරන ලදී.

4.2. නිත්‍ය තනතුරේ රාජකාරි වලට අනුගත වීම සහ මාළුමුහුණේ ජීවිතය

මේ වනවිට දෙපාර්තමේන්තුවේ වෙනත් මිනින්දෝරු කණ්ඩායමක් (survey party) අනුයුක්තව සිටි කුරුණෑගල දිස්ත්‍රික්කයේම “මාළුමුහුණ” කාර්යාලයේ අධීක්ෂණ නිලධාරී පුරප්පාඩුවක් ඇතිවූ අතර මාස 3 කින් පමණ ක්‍ෂේත්‍ර පුහුණුවේ දෙවන කොටස අවසන් කර එම මිනින්දෝරු කණ්ඩායම අධීක්ෂණය කිරීමට තාවකාලිකව එම කාර්යාලයට අනුයුක්ත කෙරිණ.

මාළුමුහුණ කාර්යාලය කලක සිට පවත්වාගෙන ගොස් ඇත්තේ ඉංග්‍රීසි භාෂාවෙන් pre fabricated hut ලෙස හඳුන්වනු ලබන පුටු කඳවුරකය. එහි බිත්ති, දොර ජනෙල් මෙන්ම වහලයද යකඩ බට සහ ටකරම් තහඩු වලින් නිමකර ඇත. කුඩාරම් යුගයෙන් පසුව ඊට වඩා ස්ථිර ගොඩනැගිල්ලක් ලෙස මෙම පුටු කඳවුරු දෙපාර්තමේන්තුව විසින් පවත්වාගෙන ගොස් ඇති අතර මෙය ලියන වකවානුව වනවිටත් මෙවැනි පුටු කඳවුරු බොහොමයක් දිවයින පුරා ස්ථාන කිහිපයක කාර්යාල ලෙසත් නිල නිවාස ලෙසත් භාවිත කරයි. ඉස්තොප්පුවක්, සාලයක්, නිදන කාමරයක්, කාර්යාල කාමරයක්, මුළුතැන් ගෙයක්, වැසිකිලියක් ආදියෙන් සමන්විත වූ අප පුටු කඳවුරේ බිමට සිමෙන්ති යොදා තිබූ අතර, විදුලි ආලෝකයෙන්ද සමන්විත විය. සිවිලිමක් ලෙස තල අතු වලින් සකසන ලද පැදුරු ආවරණයක් යොදා තිබුණි. ඉබ්බාගමුව සිට මඩගල්ල දක්වා දිවෙන බස් මාර්ගයට මීටර් 100 ක් පමණ දුරින් කුඹුරක් මැද සවිකර තිබූ මෙම පුටු කඳවුර අවට එතරම් ගස් නොතිබුණු බැවින් වියලි කාලයට පැවති අධික උණුසුමෙන් ආරක්ෂා වීමට මෙම සිවිලිම බොහෝ ප්‍රයෝජනවත් විය. අසල පිහිටා තිබූ ලිදකින් ජලය ලබාගැනීමට හැකි විය. බස් මාර්ගයක් අසල කඳවුර පිහිටා තිබුණු බැවින් ගමනාගමනය පහසු විය.

රජයේ මිනින්දෝරුවරුන් පස් දෙනෙක් සහ මිනින්දෝරුවරියන් දෙදෙනෙක් අධීක්ෂණය කිරීම රාජකාරිය විය. රාජකාරියට අයත් වූයේ මෙම මිනින්දෝරුවරුන්, ඒ වනවිට ලැබී ඇති මැනුම් ඉල්ලීම් වැඩ වලට අනුයුක්ත කිරීම, ඔවුන් එදිනෙදා ඉටුකරනු ලබන වැඩ ප්‍රමාණයන් පිළිබඳව පරීක්ෂා කර ප්‍රමාණවත් ලෙස වැඩ කරවා ගැනීම, ඔවුන්ගේ මැනුම් කටයුතු වල තෝරාගත් නියැදියක නිරවද්‍යතාවය ක්‍ෂේත්‍රයේ පරීක්ෂා කිරීම, මැනුම් කර අදින ලද පිඹුරු වල නිරවද්‍යතාවය සහ විවිධ රෙගුලාසි වලට අනුකූලතාවය පරීක්ෂා කර එම පිඹුරු සහ අදාල

ලිපි ලේඛන ගොනුව සම්මත කිරීම ආදිය වේ. එයට අමතරව ඔවුන්ගේ සහ ඔවුන්ට අනුයුක්තව සිටි එවකට හැඳින්වූ පරිදි මැනුම් කම්කරුවන්ගේ පරිපාලනයද රාජකාරියේ කොටසක්විය. මා විසින් පරීක්ෂා කර සම්මත කරන ලද පිඹුරු, කුරුණෑගල දිස්ත්‍රික් මිනින්දෝරු අධිකාරී වරයාගේ වැඩිදුර පරීක්ෂණයට ලක්වන අතර ඔහුගේ අනුමැතිය ලැබීමෙන් පසුව නීත්‍යානුකූල පිඹුරක් බවට පත්වේ.

එවකට කුරුණෑගල දිස්ත්‍රික් මිනින්දෝරු අධිකාරී වරයා, දියතලාව මැනුම් හා සිතියම්ගත කිරීමේ ආයතනයේ මුල් වසරේ පුහුණුව ලබන වකවානුවේ අප හට දේශකයෙකු ලෙස කටයුතු කරන ලද්දෙක් විය. ඔහු දක්ෂ නිලධාරියෙකු, දක්ෂ පරිපාලකයෙකු, දක්ෂ කළමනාකරුවෙකු මෙන්ම දක්ෂ දේශකයෙකුද විය. නීති රෙගුලාසි පිළිබඳ හසල දැනුමකින් යුක්ත විය. මැනුම් කටයුතු කිරීමේදී තාක්ෂණය පිළිබඳව මෙන්ම නීති රෙගුලාසි පිළිබඳවද හොඳ දැනුමක් තිබිය යුතුය. ඒ අනුව බලන කල, ප්‍රථම වරට අධීක්ෂණ රාජකාරී කටයුතු කිරීමේදී දක්ෂ නිලධාරියෙකු යටතේ කටයුතු කිරීමට ලැබීමට භාග්‍යයක් විය. මිනින්දෝරු වරුන්ගෙන් වැඩ ගැනීම ඔහු විසින්ම කළමනාකරණය කළ අතර මා හට ඉතිරි වූයේ ඔවුන්ගේ මැනුම් කටයුතු වල තෝරාගත් නියැදියක නිරවද්‍යතාවය ක්‍ෂේත්‍රයේ පරීක්ෂා කිරීමත්, මැනුම් කර අදින ලද පිඹුරු වල නිරවද්‍යතාවය සහ විවිධ රෙගුලාසි වලට අනුකූලතාවය පරීක්ෂා කර එම පිඹුරු සහ අදාල ලිපි ලේඛන ගොනුව සම්මත කිරීමත් වේ. මුල් යුගයේ මා විසින් සම්මත කරන ලද පිඹුරු කුරුණෑගල දිස්ත්‍රික් මිනින්දෝරු අධිකාරී වරයාගේ පරීක්ෂණයට ලක්වීමෙන් පසුව ඔහු විසින් හඳුනාගත් යම් යම් අඩුපාඩු නිවැරදි කිරීම සඳහා ආපසු එවනු ලැබූ අතර ක්‍රම ක්‍රමයෙන් වැරදි ප්‍රමාණයන් අඩුවී වසර අවසන් වනවිට කිසිම අඩුපාඩුවක් හඳුනාගත නොහැකි වන තරම් නිවැරදිව පිඹුරු සම්මත කර යැවීමට හැකිවිය. ඒ ඔහු හඳුනාගන්නා ලද වරදක් නැවත සිදුනොවීමට කටයුතු කිරීම නිසාත් හඳුනාගත් වරදක් නිවැරදි කිරීමට පෙර ඒ පිළිබඳව සියළු කරුණු ඔහුගෙන් විමසා අවබෝධ කරගත් නිසාවෙනි. එයට අමතරව මා යටතේ රාජකාරී කල එහෙත් අත්දැකීම් බහුල ජ්‍යෙෂ්ඨ මිනින්දෝරු වරුන්ගෙන්ද උගත යුතු දැ බොහෝවිය. ඒ සඳහා යොදාගනු ලැබුවේ සාකච්ඡා මාර්ගයයි. මසකට වරක් පමණ එවැනි සාද සාකච්ඡා මගේ කඳවුරේදී පවත්වන ලද අතර මට මෙන්ම එවකට නවකයින්ටද එමඟින් ලබාගත් දැනුම බෙහෙවින් ප්‍රයෝජනවත් විය.

රාජකාරී වාහනයක් නොතිබූ බැවින් සියළු රාජකාරී ගමන් සිදුකරන ලද්දේ බස් රියෙනි. වාසනාවකට මෙන් කණ්ඩායමේ සිටි මිනින්දෝරුවරුන්ගෙන් දෙදෙනෙක් හැර අන් සියළු දෙනා බස් ධාවනය කළ මාර්ගයක් අසල නිවාස කුළියට ගෙන තම කාර්යාල පවත්වාගෙන යන ලදී. බස් මාර්ගයට කිලෝමීටර 3 ක් හෝ 4 ක් දුරින් ඉහත දෙදෙනාගේ කාර්යාල පිහිටා තිබුණි. එම දුර පයින්ම යා යුතු විය. පරීක්ෂණ කලින් දැනුම්දෙන ලද දිනයක යොදාගන්නා බැවින් කණ්ඩායමේ කම්කරුවෙකු බයිසිකලයකින් ලහම බස් නැවතුම්පොලට ගෙන්වාගෙන යාමට පසුව පුරුදු විය. මසකට වරක් මගේ අධීක්ෂණ නිලධාරියා වන කුරුණෑගල දිස්ත්‍රික් මිනින්දෝරු අධිකාරී වරයා පරීක්ෂණය සඳහා පැමිණි අතර එදිනට ඔහුගේ වාහනයෙන් ඔහුත් සමඟ ගමන් කිරීමේ අවස්ථාව උදාවිය.

මා හට වාහනයක් ලැබුනේ කණ්ඩායමට වැටුප් ගෙවීම සඳහා යාමට පමණි. එකල වැටුප් සහ සංයුක්ත දීමනා ඇතුළු වෙනත් සියළුම දීමනා ගෙවන ලද්දේ මුදලිනි. වැටුප් ගෙවන දින, බස් රථයකින් කුරුණෑගල දිස්ත්‍රික් මිනින්දෝරු කාර්යාලය වෙත ගමන් කල අතර කණ්ඩායමේ මිනින්දෝරු වරුන් හා වරියන්ද එදිනට ලේඛන ලබාගැනීම වැනි විවිධ රාජකාරී කටයුතු සඳහා දිස්ත්‍රික් මිනින්දෝරු කාර්යාලය වෙත පැමිණීමට පුරුදුව සිටියහ. උදේම පැමිණ දිස්ත්‍රික් මිනින්දෝරු අධිකාරී වරයා හමුවී ඒ වනවිට පැනනැඟී ඇති ගැටළු පිළිබඳව සංවාදයක යෙදී වැටුප් වෙක්පත්ද රැගෙන බැංකුව වෙත යනු ලබන අතර ඒ සඳහා ජ්‍යෙෂ්ඨ මිනින්දෝරු වරයෙකුගේද සහාය ලබාගනී. ඒ එකල විශාල මුදලක් වූ රුපියල් ලක්ෂ එක හමාරක් පමණ නිවැරදිව ගැන කාර්යාලයට ගෙන ඒමට අවශ්‍ය නිසාවෙනි. දිස්ත්‍රික් මිනින්දෝරු කාර්යාලය වෙත එකතු වූ මිනින්දෝරුවරුන් සියළු දෙනා සහායට ගෙන එක් එක් මිනින්දෝරු කණ්ඩායමට (කම්කරුවන් ඇතුළුව) ගෙවිය යුතු මුදල් වෙත වෙනම කවර වලට බහා හැකි ඉක්මනින් ආපසු යායුතු වේ. ඒ අප පැමිණෙන තෙක් මිනින්දෝරු කණ්ඩායම් බලා සිටින බැවිනි. එකල, අප වෙත දෙපාර්තමේන්තුවෙන් රාජකාරී ගමන් සඳහා ලබා දී තිබූ හම් බැගයට වැටුප් සහිත කවර දමා නගරයේ රථ බීම හලෙන් ගත් බෝතලයකුත් එම රාජකාරී මල්ලටම දමාගෙන කුරුණෑගල සිට මාළුපිටිය දෙසට යාමේදී මුලින්ම පසුකරන්නේ මිනින්දෝරුවරියන් දෙදෙනාගේ කාර්යාලයන්ය. එම කණ්ඩායම් දෙකට වැටුප් කවර ලබාදී අත්සන් ලබාගත් පසුව අපගේ කලබලය අවසන්ය. ඊ ලඟට හක්වටුණා ඔය පාලම පසු කරද්දී ඔබේ

ජලය පිරි ඇත්තම් වාහනය පසෙක නවත්වා රුපියල් ලක්ෂයකට අධික මුදලක් අඩංගු හම් බැගය වාහනයේ කොකැනක හෝ සහවා ස්නානය කරනු ලැබේ. එසේ මහදිගට වැටුප් කවර බෙදමින් ගොස් ගමන නිමවන්නේ දුරස්ථම මිනින්දෝරුවරයා සිටි මොරගොල්ලාගම නම් ස්ථානයේදීය. ඒ වනවිට වෙලාව තීරණය වන්නේ මහදිගට ලැබෙන සංග්‍රහ අනුවය. සමහර දිනවල දිවා ආහාරය ගන්නාවිට සවස හය හෝ හත පමණ විය.

4.3 සියඹලාණ්ඩුවේ ජීවිතය.

1987 වසරේ අනුයුක්ත කර තිබුනේ එවකට අති දුෂ්කර සේවා ස්ථානයක් වූ මොණරාගල දිස්ත්‍රික්කයේ සියඹලාණ්ඩුව ප්‍රදේශයටය. සුපුරුදු පරිදි දුම්රියෙන් බදුල්ල දක්වා භාණ්ඩ ප්‍රවාහනය කර එතැන් සිට වෙලරයක් සහිත ජීප් රථයකින් සියඹලාණ්ඩුවට ප්‍රවාහනය කරන ලදී. ඒ වන විට කිහිප වරක් දුම්රියෙන් භාණ්ඩ ප්‍රවාහනය කර තිබුනු බැවින් බඩු පොදි බැඳීම සහ ප්‍රවාහනය පිලිබඳ මනා අත්දැකීමක් අපට මෙන්ම අපගේ කඳවුරු කම්කරුවන්ටද ලැබී තිබිණ.

සියඹලාණ්ඩුවේදී නවාතැන සහ කාර්යාලය පවත්වා ගෙන යාම සඳහා මුතුකණ්ඩිය වාරිමාර්ග යෝජනා ක්‍රමයට අයත් කුඩා නිවසක් තෝරාගන්නා ලදී. රාජකාරි ජීවිතයේ මුල් වරට අප කණ්ඩායමටම වෙන්වූ ජීප් රථයක්ද ලැබිණ. ඇමෙරිකන් ජීප් නමින් හඳුන්වන ලද එම රථයේ වර්ගයක් දැන නොසිටි අතර වහලය කැන්වස් රෙද්දකි. එවක අද මෙන් නොව මාර්ගය ඉතා අබලන් තත්ත්වයේ වූ බැවින් මොණරාගල සිට කිලෝ මීටර 40 ක් පමණ වූ ගමනට පැය එක හමාරක් පමණ ගත විය. ඉන්ධන ලබාගැනීම සඳහා පවා මොණරාගලට යායුතු වූ බැවින් නිතරම පාහේ මොණරාගල නගරයට යාම සිටින්නක් විය. ඉන්ධන ලබාගැනීමේ සීමා පනවා නොතිබුණු අතර ඇනවුම් මගින් ඉන්ධන ලබාගතයුතු විය. ජංගම දුරකථන නොමැති එකල දුරකථන ඇමතුමක් ලබා ගැනීමට පවා මොණරාගල නගරයට යායුතු විය. අම්පාරට ඇත්තේ කිලෝ මීටර 50 කි. වාහනය අළුත් වැඩියා කටයුතු සඳහා බොහෝ අවස්ථා වල කිලෝමීටර් 50 ක් පමණ දුරින් අම්පාරේ පිහිටි වාරිමාර්ග දෙපාර්තමේන්තු යාන්ත්‍රික වැඩපොල වෙත යවා එම අළුත්වැඩියාවන් ඉටුකරගන්නා ලදී.

දෙපාර්තමේන්තුවට බැඳීමට පෙර සිටම මා හට හොදින් වාහන ධාවනය කලහැකි වූ අතර රියදුරු බලපත්‍රයද ලබාගෙන තිබුණි. එකල නිලධාරීන්ට වාහන පැදවීම තහනම් යුගයකි. වාහනයේ රියදුරු මහතා තරමක වයස් ගත මෙන්ම අණ්ඩපාලයෙක් බව ඉක්මනින්ම වැටහුනු අතර රාජකාරි ගමන් යා හැකිව තිබුනේ මට අවශ්‍ය අවස්ථාවේ නොව රියදුරුට අවශ්‍ය වෙලාවටය. ගාල්ල ප්‍රදේශයේ පදිංචි පුද්ගලයෙකු වූ ඔහු සියඹලාණ්ඩුව වැනි දුෂ්කර පලාතක සේවය කරන බැවින් සහ මට වඩා වසර ගණනාවක් වයසින් වැඩි බැවින් අවවාද හෝ දඩුවම් කිරීමද සුදුසු නොවේ. එසේ වුවද ඔහු මගේ උපදෙස් යටතේ කටයුතු කරනු විනා මා ඔහු යටතේ කටයුතු කල යුතුද නොවේ. දිනක් කලින් යොදාගත් ගමනක් සඳහා ප්‍රමාදවී පැමිණ ගමනේ යෙදෙන අතර “මගේ රාජකාරිය ඔබට කලහැකිද ?” කියා මා විමසුවිට ඔහු පැවසුවේ “කිසිසේත්ම කල නොහැකි” බවය. මගේ ප්‍රතිචාරය වූයේ “මට ඔබගේ රාජකාරිය සහ මගේ රාජකාරිය යන දෙකම කලහැකි” බැවින් මා ලබාදෙන උපදෙස් අනුව වෙලාවට රාජකාරිය සඳහා වාර්තා කල යුතු බවයි. එම සිද්ධියෙන් පසුව නියමිත වෙලාවටත් කලින් ඔහු පැමිණීමට පුරුදු විය එවකට මොණරාගල මිනින්දෝරු කණ්ඩායම භාරව සිටියේ අපට කණ්ඩායම් දෙකකට පෙර බැඳුණු, පසු කලෙක සර්වේශ්‍ර ජනරාල් පදවියටද පත්වූ අයෙකි. ඔහු නවාතැන් ගෙන සිටියේද මොණරාගල දිස්ත්‍රික් මිනින්දෝරු කාර්යාල පරිශ්‍රයේම පිහිටි ටකරම් වලින් සාදන ලද පෙරසවි නිවසකය. මොණරාගල ගිය බොහෝ දිනවල ඔහුගේ ආගන්තුක සත්කාර ලබමින් එහි රාත්‍රියක් ගත කිරීම සිටින්නව පැවතුනි. සවසට බියර් බෝතලයකින්ද සප්පායම් වී රාත්‍රි ආහාර ගැනීම මොණරාගල නවතින දිනයක, දින වර්ෂාවේ සාමාන්‍ය අංගයක් විය.

සියඹලාණ්ඩුව මිනින්දෝරු කණ්ඩායම මිනින්දෝරුවරුන් 9 දෙනෙකු සහ ක්‍ෂේත්‍ර පුහුණුව ලබන අප කණ්ඩායමට පසුව බැඳුණු පරිවාස කණ්ඩායමේ 4 දෙනෙකුද ඇතුලත්ව 13 දෙනෙකුගෙන් සමන්විත විය. පරිවාස කණ්ඩායමේ 4 දෙනා මාස කිහිපයකින් දියතලාවට පිටත්ව ගිය බැවින් දීර්ඝ කාලීනව මිනින්දෝරුවරුන් 9 දෙනෙකු කණ්ඩායමට ඇතුලත් විය. ඉතා ජ්‍යෙෂ්ඨතම මෙන්ම ඉතා කණ්ඩායම නිලධාරීන්ගෙන් සමන්විතවූ සියඹලාණ්ඩුව මිනින්දෝරු කණ්ඩායමේ කණ්ඩායම් නිලධාරීන්ට අවශ්‍ය උපදෙස් ලබාදීම සඳහා ජ්‍යෙෂ්ඨතම නිලධාරීන් යෙදවීමට පියවර ගැනුනි. ජ්‍යෙෂ්ඨතම නිලධාරීන් දෙදෙනාම මැනුම් කටයුතු සඳහා අතිශයින් දක්ෂ

අවංකව සේවය කල නිලධාරීන් වූ බැවින් ඔවුන් විසින් ලබාදෙන උපදෙස් සහ ආදර්ශය නවක මිනින්දෝරුවරුන්ට මෙන්ම නවක සහකාර මිනින්දෝරු අධිකාරී වරයෙකු වූ මටද මහෝපකාරී විය. සියලුකාණ්ඩුව කණ්ඩායමේදී සම්මත කරන ලද පිඹුරු එකක් වත් මිනින්දෝරු අධිකාරී විසින් පරීක්ෂා කිරීමෙන් පසුව සංශෝධන සඳහා ආපසු නොලැබුණු අතර, ඒ ඒවායේ ඇති නිරවද්‍යතාවය නිසාද නැතහොත් වැඩිදුර පරීක්ෂාවට ලක් නොකල නිසාද යන්න පැහැදිලි නැත.

සියලුකාණ්ඩුව මිනින්දෝරු කණ්ඩායමෙහි රාජකාරි භාරගත් මුල් දිනවල කණ්ඩායම් පරීක්ෂණයක් (Group Inspection) සඳහා දිස්ත්‍රික් මිනින්දෝරු අධිකාරී සියලුකාණ්ඩුවට පැමිණීමට නියමිතව තිබිණ. සියලුකාණ්ඩුව මිනින්දෝරු කණ්ඩායමෙහි රාජකාරි භාරගත් පසුව පැවැත්වෙන පළමු රැස්වීම බැවින් සහ එදිනට කණ්ඩායමේ සියළුම දෙනා එකට හමුවන බැවින් හොඳ දිවා ආහාර වේලක් සුදානම් කලයුතු විය. එකල, කුකුල් මස් ව්‍යංජනයක් යනු විශේෂ අවස්ථාවකදී පමණක් පිළියෙල කරනු ලබන්නකි. විදුලි බලය නොමැති සියලුකාණ්ඩුවේ ශීතකරණ නොමැති බැවින් බ්‍රොයිලර් මස් ලබාගත නොහැක. එහෙත් ගම්මාන වල නිවාස වල ඇතිකරන ගම් කුකුළන් සිටින අතර ඔවුන් දිවාකල දුව පැන ඇවිද ආහාර සොයා කා රාත්‍රියට ගසක අතුමන නිදාගනී. කැලේ හැඳෙන සතුන් බැවින් දිවාකල අල්ලා ගැනීම අපහසුය. රාත්‍රියේ නිදාගත් කල පහසුවෙන් අල්ලා ගත හැක. කුකුළාගේ හිමිකරුවන්ට ගෙවීමට අමතරව, ගසට නැග අල්ලා දෙන තැනැත්තාටද සුළු ගෙවීමක් කල යුතු වේ. 15 දෙනෙකුට පමණ දිවා ආහාරය සුදානම් කලයුතු බැවින් කුකුළන් දෙදෙනෙකු මාරිඅරාව ගමෙන් පණපිටින් ගෝනියක දමා ගෙනැවිත් තිබිණ. කණ්ඩායම් පරීක්ෂණය අවසානයේ කුකුල් මස් සමඟ දිවා ආහාරය ගෙන අවසන් විය. නිකමට මෙන් ගෝනිය පරීක්ෂා කිරීමේදී දකින්නට ලැබුනේ තවත් කුකුළෙකු ගෝනිය තුල සිටින බවය. සිදුව ඇත්තේ, ආහාර පිළියෙල කල තැනැත්තන් දැක ඇත්තේ එක් කුකුළෙක් පමණි. අහම්බෙන් පණ බේරාගැනීමට හැකිවූ කුකුළාට අහය දානය දී මුදාහරින ලද නමුත්, බොහෝ කාලයක් අප නවාතැන අසල ගැවසුනු එම සත්ත්වයා පසුකලෙක අතුරුදහන් විය.

එකල කොළඹ සිට සියලුකාණ්ඩුවට යාමට බස්රථයෙන් ගමන්කිරීමට පැය 12 ක් පමණ ගතවිය. උදෑසන 6 ට පිටකොටුවෙන් ආරම්භ කරනු ලබන අම්පාර බලා යන සමුද්‍රසිරි නමැති බස්රිය සියලුකාණ්ඩුවට ලඟාවන්නේ සවස 5.30ට පමණය. එපමණ කාලයක් එකදිගට ඉඳගෙන සිටීම හෝ සිටගෙන සිටීමද අපහසුය. රාත්‍රී ගමනාගමනය පහසු වුවත් උඩවලවේ ප්‍රදේශයේදී මංකොල්ල කෑමේ සිද්ධි වාර්තාවී ඇති බැවින් හැකිතාක් දුරට දිවා කාලයේ ගමන් කිරීම පුරුද්දක් කරගෙන තිබින.

සියලුකාණ්ඩුවේදී අත්විඳි දුෂ්කරතම කාර්යය වූයේ බීමට ජලය සොයා ගැනීමයි. ඒ සඳහා උපයෝගී කරගනු ලැබුවේ දෙපාර්තමේන්තුව විසින් සපයා දී තිබූ ජල පෙරණයයි. එය අල්එවක් රහිත, බඳ මහත, කට කුඩා, ජෝගුවකට සමාන වූ අතර බඳ පිහන් මැටි වැනි පෙරීමේ හැකියාව ඇති ද්‍රව්‍යයකින් නිමවා තිබුණි. මෙම පෙරණය (ජෝගුව) ජලයේ ගිල්වා තැබීමෙන්, විසරණය නම් ක්‍රියාවලිය මඟින් පිරිසිදු ජලය පෙරණය තුලට එකතු වේ.

මෙම ජලය පානය කිරීමේ ප්‍රථිඵල ඉක්මනින්ම අත්විඳීමට ලැබුණු අතර, එය අවසන් වූයේ වකුගඩුවක ගල් ඇතිවීම නිසා ගල් ඉවත් කිරීමේ ශල්‍යකර්මයකටද භාජනය වීමෙනි. අද මෙන් නොව එකල ඒ සඳහා පැවති එකම විසඳුම ශල්‍යකර්මය විය. එවකට සිටි දක්ෂතම ශල්‍ය වෛද්‍යවරයෙකු විසින් සිදුකරන ලද එම ශල්‍යකර්මයට පැය 4 ක් පමණ ගතවී ඇති අතර වකුගඩුවට ලඟාවී ඇත්තේ දකුනු පස තුණටිය අඟල් 8 ක පමණ දිගකට කපා ඉළ ඇට කුඩුවේ අන්තිම ඉල ඇටය වන එල්ලී ඇති ඉල ඇටය (Hanging Rib) කපා ඉවත් කිරීමෙනි. ඉවත් කරන ලද ගල, හැඩයෙන් සහ ප්‍රමාණයෙන් ලොකු වෙරළ ඇටයක ස්වරූපය ගැනුනි. සාම්ප්‍රදායක මැනුම් නොයෙදා දියවෙන මැනුම් යොදා ඇලවෙන ලෙස වසා ඇති එම ශල්‍යකර්මයේ කැළළු අදටද දැකිය හැක. එම ශල්‍යවෛද්‍යවරයා ගේ විශේෂත්වය වන්නේ ඔහු ප්‍රතිපත්තියක් ලෙස ශල්‍ය කර්මයකදී රෝගියෙකුට රුධිරය ලබා නොදීමයි. එහෙත් ඒ සඳහා ඉතා අරපරිස්සමින් ශරීරය කැපිය යුතු වේ.

ඉහත ශල්‍යකර්මයෙන් පසු ශල්‍ය වෛද්‍යවරයා අනුමත කළ අසනීප නිවාඩු කාලයෙන් පසුව මාසයක කාලයක් සැහැල්ලු සේවා පදනම මත නිවසට නුදුරුම දිස්ත්‍රික් කාර්යාලය වන ගම්පහ කාර්යාලයට අනුයුක්ත කරනු ලැබීය. එහිදී කරන ලද්දේ ගම්පහ දිස්ත්‍රික්කයට අනුයුක්තව තිබූ සහකාර මිනින්දෝරු අධිකාරීවරුන් විසින්

සමමත කර දිස්ත්‍රික් මිනිත්දෝරු අධිකාරි වෙත අනුමැතිය සඳහා එවන ලද පිඹුරු පරික්ෂා කර ඒවායේ අඩුපාඩු නිවැරදි කර දිස්ත්‍රික් මිනිත්දෝරු අධිකාරි වෙත යොමු කිරිමයි. එමඟින් පිඹුරුවල ඇති වැරදි සහ අඩුපාඩු පිලිබඳව බොහෝ දෙය ඉගෙන ගත හැකිවිය.

4.4 කුලියාපිටි ජීවිතය

රිලඟ වසරේ, එනම් 1988 වසරේ වාර්ෂික ස්ථාන මාරුවීම් මත නැවතත් කුරුණෑගල දිස්ත්‍රික්කයේ කුලියාපිටිය කණ්ඩායම අධීක්ෂණය කිරිමට අනුයුක්ත කෙරිණ. එහිදී කුලියාපිටිය නගරයට නුදුරු නිවසක් කුලියට ගෙන කාර්යාලය සහ පදිංචිය පවත්වාගෙන ගිය අතර නැවතත් මාළුය කාර්යාලයේදී මගේ ඉහළ නිලධාරියා වූ කුරුණෑගල දිස්ත්‍රික්කයේ මිනිත්දෝරු අධිකාරි වරයා යටතේම නැවත කටයුතු කිරිමට හැකියාව ලැබීමෙන් රාජකාරි කටයුතු සහ දැණුම තවදුරටත් ඔපමටටම් කර ගැනීමට හැකිවිය.

එහෙත් මෙම සේවා ස්ථානයේ කටයුතු මාස නවයකට පමණ සීමා විය.

මතු සම්බන්ධයි.....



Concept Paper for ISM Agro-GIS Education and Research Programme

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ISM AgroGIS Education and Research Programme

1. Introduction

In far history, during the Great King; Parakramabahu era Sri Lanka, called as “Thambapanni” had been prestige with “Peradiga Dhanyagaraya”. This gives us the impression that the country had been sustainably developed in the far history, with paddy *and* agriculture products and the country was self-sufficient with locally made food. However, since the 19th century, the world society has experienced the agricultural revolution to overcome the common truth that death by starvation was not uncommon in most part of the world.

In recent history, since a few decades back, national agricultural production in Sri Lanka has been declined at a greater scale due to various reasons such as; lack of farmers’ interest on conventional mechanisms, unaware of crop suitability for soil & geological conditions, lack of information systems for regional/national crop yield prediction and planning to prepare for better marketing approach etc., This bitter truth is being analyzed by the intellectuals in different aspects. However, being the geo-spatial data specialist and as the pioneer institution in Sri Lanka; Institute of Surveying & Mapping (ISM) concerns the matter as a critical issue which needs to consider as the challenge of the era.

Furthermore, Former Hon. Minister of Higher Education; Dr. Bandula Gunawardane, at his visit to ISM with Former Hon.Minister of Land; Mr.S.B.Dissanayake accompanied with respective secretaries to both the ministries on 6th January, 2020 expressed his willingness to convert the institution to university status with the intention of introducing the extended surveying related curriculums in ISM academic forum to incorporate the regional social economic parameters for enhancing the regional inhabitants’ living status. Therefore, in concern with the respective regional needs, agriculture as the main income of the people in Uva province, the proposed Agro-GIS education and research programme would greatly empower the region as a long-run effective project to educate the regional manpower.

With a long term vision to support the national agriculture and irrigation sectors through modern GIS and Remote Sensing technology, the Institute of Surveying and Mapping is learning its responsibility towards the growth of respective state-of-the-art technology for improved agricultural infrastructure planning, livestock management, crop yield prediction etc. Even-though many educational and training institutions and also the universities are very much concerned with theoretical aspects of agricultural engineering whilst enabling technology, it is the bitter truth that national agriculture is yet being functioned with primitive and conventional production tracks. There are various issues in the plantation industry that are encountered by the cultivators and also the research institutions due to less awareness and lack of applicable mechanism on GIS and Remote Sensing technology.

ISM AgroGIS education and research proposal is planning to begin with initiatives for integrating agriculture with GIS and Remote Sensing technology. This research-based, project-oriented educational programme aims at the agricultural sector employees and the growers in the region and planning for national propaganda.

Use of advanced GIS and satellite remote sensing technology in the agricultural sectors is a crucial need and a vital challenge of the era for the growth of the national GDP. Therefore, employees in the agricultural sector who work with conventional methodologies should be intrigued with possible GIS and remote sensing applications. Within the context of enormously developed GIS and Remote Sensing technology, ISM as the institution, strengthened with respective technology; realises its responsibility in educating the agriculture sectors, taking as the challenge of the era for national growth.

In concern with the Sri Lanka mapping history for hundreds of years, 1-inch map series and 1:50,000 metric map series had played a vital role in agriculture mapping. Conventional mapping with showing of land-use and land-cover patterns with descriptive agriculture related representation had vastly benefited the relevant stakeholders. As such, an excellent practice of linking the national agriculture and geo-spatial mapping sector, the Agricultural Based Mapping Project (ABMP) launched in the 1980s, using the highest technology had in that time; aerial photography and stereo map compilation is a salient manifestation of best link with the prevailing technologies.

This concept paper proposes the needs of a new approach in the geospatial education forum in order to provide prospective GIS and Remote Sensing technology towards the national Agriculture sector development and how ISM shall propose to promote a few short courses in the theme of Agro-GIS.

Basic GIS applications shall be customized at the “ISM-Agro-GIS” Project area. The project shall be further extended to Kahagolla Agricultural Research farm with related GIS infrastructure development in collaboration with respective research staff. As a pilot and research based educational programme, both the institutes shall collaboratively utilize the available resources and technologies for improving the needs for national research based educational programmes.

Ref; Brief description of “Agro-GIS enabling technology” is annexed for further references.

2 Objectives;

Following objectives are mainly expected through introducing the concerned project proposal.

1. To Promote GIS and Remote Sensing applications in Agriculture sectors for improving the national agriculture production
2. To promote GIS and Remote Sensing based educational and research programmes in ISM curriculum.
3. To Establish and Maintain the Agro-GIS Project site in ISM to develop capacity building programmes with practical solutions related to GIS and Remote Sensing.
4. Build up the knowledge sharing and capacity building programmes among the stakeholders.

3. Stakeholders

In concern with national agricultural issues, the proposed project shall be a great impact to facilitate GIS and Remote Sensing modern technology towards the prospective stakeholders over the country. Therefore project shall be extended to various stakeholders in related fields. However, at the initial

stage, following stakeholders shall take part in join collaboration for concept designing and modeling of agriculture entities;

	Stakeholder Institution	Organization
1	Institute of Surveying & Mapping	Survey Department
2	Regional Agriculture Research & Development Centre, Kahagolla	Agriculture Department

It is expected that various organizations, functioning with agriculture, plantation, livestock farming related industries and research institutes will be prospective stakeholder in future directives. Furthermore, small scale cultivators and farmers would also be prospective stakeholders as representation of the general public.

4. Agro-GIS Study Courses

Few study courses have been designed to conduct within the ISM premises enabling practical training facilities at the ISM Agro-GIS project site. Educational curriculums for the respective courses have been designed as a collective mission of the academic and research personnel from both ISM and Kahagolla Agriculture Research farm.

Study Courses

	Duration	Course Name	Course Content
1	1-Day	Introduction to Agro-GIS	GIS thro. Agricultural point of view, GNSS and Remote Sensing applications in Agriculture. Internet and Mobile GIS for Agriculture.
2	5-Days	Agro-GIS Data Science	Introduction to Geospatial data, Data classification, Data Modeling for Database, Spatial Data modelling over agriculture theme, Location based services, GNSS and Remote Sensing applications in Agriculture.

Detailed course content of each subject and the expected learning outcomes are annexed.

5. Agro-GIS Projects Site:

Proposed Agro-GIS education and research programme would become a reality with real time application scenarios that provide practicals related with GIS and Remote Sensing data which will be dynamically updated from the project site. Hence, ISM has founded a project site within the ISM premises and further extended towards Kahagolla Agriculture farm site.

A land about 3-acres as shown in the figure-1, has been allocated and being developed with landscaping and planting of pears and Mandarin to the northern side of the ISM premises. The plants have been donated by the Kahagplla Agriculture research farm with regards the prospective needs as detailed in this submission. In concern with the mutual understanding of ISM staff and the ISM-welfare society, Project-site maintenance is continued with financing out of the public funds.

The project site is an ideal landscape with changed elevation above a small stream. Therefore the needs in many practical tasks can be arranged to cater for engineering surveying too. It is expected that the Agro-GIS training programmes will mainly be based on engineering surveying with geomorphology studies. The area was covered with thick jungle and cleared for the same purpose.

Maintenance of the project site shall be conducted by the ISM resource management staff as their regular accomplishment. It is worthwhile to state that the project site and the crops belong to ISM property and the expected yield would be utilized by the ISM staff as of the instructions by the Director-ISM. The Director-ISM shall have the sole authority for upgrading and maintenance of the project site.



Figure-1; Project Site - Aerial View

6. Agro-GIS Sustainability and Motivation

Agro-GIS as a productive solution in agricultural economic growth that will boom the sector in following aspects;

- Basic planning and decision making for land suitability and infrastructure development.
- Monitoring and management of industrial issues and disaster recoveries..
- Marketing strategy formulation.
- Relaxing over user satisfactory systems and time saving.
-

In general, sustainability of any programme is not merely a matter of its importance. Therefore, it is necessary to plan for motivation factors. Motivation factors related with the proposed Agro-GIS education and research programme can be learned in following aspects.

a. Financing for education and research programme.

Related subjects shall be included in ISM educational curriculum so that the study courses will be conducted on ISM accepted charge basis. Subsequently, research opportunities will be commenced in due course as a cooperative solution with Kahagolla Agriculture Farm sector and other potential applications that would be requested by prospective client organizations.

b. Adaption of Agro-GIS related modern technology.

Prospective improvement of GIS technology and agriculture related applications should be continuously adapted through international and local knowledge sharing and capacity building programmes.

c. Interactive client services for supporting the national key issues

It is expected that the mechanism proposed, via the education and research programmes would promote prospective clients' demands. Hence, the prospective stakeholders individually or as an organization shall take part in specific projects which shall be accompanied with a financial proposal.

d. It is also proposed that the prospective projects shall utilize the expertise knowledge avails in both the stakeholder organizations. However, it will be considered to hire the expertise from retired surveyor professionals considering their knowledge and experience in respective fields.

e. In concern with the national and international Agro-GIS related issues, ISM shall commence stakeholders' collaborative researches, feasibility studies and fact finding reports etc. as private-public-partnership basis in order to cater the clients' demands.

7. Current Issue and Needs of Agro-GIS intervention

Weligama Coconut Leaf Wilt Disease

The disease was found in 2006 in Weligama in Southern province. Since then biological investigations have been carried out and remedial actions were taken by the Coconut Research Institute (CRI) and related stakeholder communities. Most productive precaution identified is to cut

and destroy the deceased trees and isolation of affected plants. An inventory has been maintained to list out the addresses of the affected trees.

However, with the current status, the decease has been spread over the adjoining three districts; Matara, Hambantota & Galle.

Therefore, the coconut growers association has requested the Surveyor General to carry out a GIS based study for analysing and monitoring the temporal parameters and ecological aspects of spreading the disease.

The above context is totally related with Agro-GIS applications. Therefore, the Surveyor General has directed the request to the director-ISM for conducting of Agro-GIS based collaborative project to document the respective geospatial data and designing of interactive database solution.

At present the ISM in collaboration with CRI is discussing to draft a database solution in respect of the same burning issue.

8. Discussion and Remarks

Agro-GIS; as modern web based, GNSS integrated user friendly systems are becoming well popular among the world agriculture community. The cost of agricultural products is becoming too high with unbearable inflation. However, in Sri Lanka, the farmers income rates and social status are comparatively at a lower stage and most of the people in the agriculture industry are very unsatisfactory. Therefore, the responsible professionals and organizations should find methodology and mechanisms to upgrade the social economic status of the farmers and planters.

Integration of modern technology in the field of agriculture can be learned as the most important issue in this era. Therefore, the efforts in the geo-spatial data forum which enables smart GIS and Remote Sensing applications, must be a reality with true project oriented and should be productive for economic growth of the respective stakeholders.

There are many application software used around the world in respect of Agro-GIS. Meanwhile, general GIS application software too can be customised to suit the specific needs. However, it is necessary to study the specific requirements and defining the specific entities to achieve expected sustainability.

As the proposal is application oriented research and education programme, it is expected to plan for a few short courses initially and consider extended long term certificate courses in due course.

As detailed under sustainability and motivation, it is necessary that the proposed Agro-GIS should cater the national issues related with livestock farming, plantation and small scale cultivation too. As the proposed project is collaborated with the Kahagolla agriculture research division, achieving their respective goals and application designing would be realistic.

Annexures;

1. Agro-GIS Enabling Technology

Agro-GIS Enabling Technology

Annexure-1

Introduction

Agro-GIS can explicitly be elaborated as Geographical Information System which relates the agriculture parameters through various aspects. As the GIS is very popular amongst the Geo-spatial data community with its advanced technology linked with many other interactive data sources play a dramatic role via internet protocol. As such the terminologies; Web-GIS, Mobile-GIS, Internet-GIS are becoming the hand pick tools for many applications. While the Global Navigation Satellite Systems (GNSS) and Satellite Remote Sensing prove the real time global positioning at high accuracy status, every aspects of GIS applications become a realistic for spatial data users. These technological provisions inspire the field of agriculture with integrated user friendly systems which are well popular among the world agriculture community. Therefore, this submission elaborates a few collection of enabling technological aspects, which privilege in the field of Agro-GIS. It is noteworthy to mention that the Agro-GIS enabling technology provisions used by world community are extremely vast and unable to collect in to one single document. Therefore this effort is just to inspire and motivate the local readers' mindset towards respective researches and innovations.

GIS applications play an important role in the production of crops, both locally and across the globe. Through assisting farmers in increasing production, reducing costs, and providing an effective means of managing land resources, GIS has become an increasingly invaluable resource. Its applications come in a variety of forms, including precision farming, drone and satellite technologies and the capabilities of Geographical Information Systems themselves.

More complex spatial analyses for agriculture might compare variables like soil type, wind direction, rainfall amount, slope, aspect, topography, or elevation to assist with crop management, site suitability, and drainage planning, as well as risk prevention from flood, drought, erosion, and disease.

GIS can help a farmer adapt to these different variables, monitor the health of individual crops, estimate yields from a given field, and maximize crop production.

Precision Farming

Sensors on satellites, tractors and in fields are constantly collecting data. GIS and other technologies shape this data into information that is accessible and interpretable by farmers and land managers to make efficient and informed decisions.

The use of precision GPS by farmers has become an essential tool in the agriculture industry. The technology has many cost saving and productivity advantages for farmers, as well as benefits for the community and the environment. A key example being its use in fertilizing crops, where machine sensors gather information about the crops, and the GPS records the exact position where it's applied in the field. The technology then aids the application of fertilizer only to the areas where it is needed, and can vary the rate of application to target nutrient-deficient sites. This saves money on fertilizer product, as well as the environment from over application and runoff into local streams and rivers.

Variable rate technology (VRT) is the component of precision agriculture, which really enables the data to be put directly to use. It joins farm machinery, control systems, and application equipment to apply

precise amounts of growing inputs at exact times or locations. Precision farming with VRT has both economic and environmental advantages. Applying seed, fertilizer, nutrients, or pesticides only where and when they are needed can have a substantial cost savings for the farmer and boost revenues.

Additionally, negative environmental impacts from over application of some chemicals are alleviated, and the use of certain chemicals could potentially be eliminated entirely based on data analysis. Persistent dilemmas like nitrogen application can also be addressed, helping the farmer find the right amount between excessive and insufficient. Once a system is in place, a precision agriculture operation follows a closed loop cycle that would look something like: collect/analyze data, plan the harvest, apply the plan, and analyze the results for the following season.

Real-Time Mapping

The use of satellites and drones has dramatically grown in the past few decades. With one of the key farming challenges being the availability and management of water for agricultural purposes, satellite technology can collect real-time data from the Earth's surface to assess and monitor the condition of the land. Soil Moisture Ocean Salinity (SMOS), vegetation growth using satellite imagery, and applying the Normalized Difference Vegetation Index (NDVI), as well as a variety of other factors, can all be used to help estimate crop productivity and monitor drought and flooding on a global scale.

Drone technology is useful in collecting more local field data such as; plant height and biomass, flora counts, disease and weed presence, nutrient values, elevation and volume calculation. Drones can replace time-consuming tasks, normally performed by scouring fields on foot, to assess qualities of the flora and vegetation present. Farmers are thus able to cover more ground, inspecting the health of the crops using aerial imagery and other data that the drone can record.

For these purposes, and many more, satellites and drones can be used by farmers to make real-time actionable decisions. Monitoring yields, applying nitrogen, using precision water sensors and identifying critical areas for intervention are all valuable uses that this technology can provide. Just one basic drone can provide farmers with the ability to make many powerful decisions that will impact the health and productivity of their land.

Forecasting for National Issues

In the United States of America, the National Agricultural Statistics Services (NASS) have developed an online mapping application called CropScape. This application can provide area estimates of crops, estimate the type of crop growing and how large the size of its yield could be. Not just for privatised use, government agencies have used **CropScape** data to assess such national issues as; food security, pesticide control and changes to land-use.

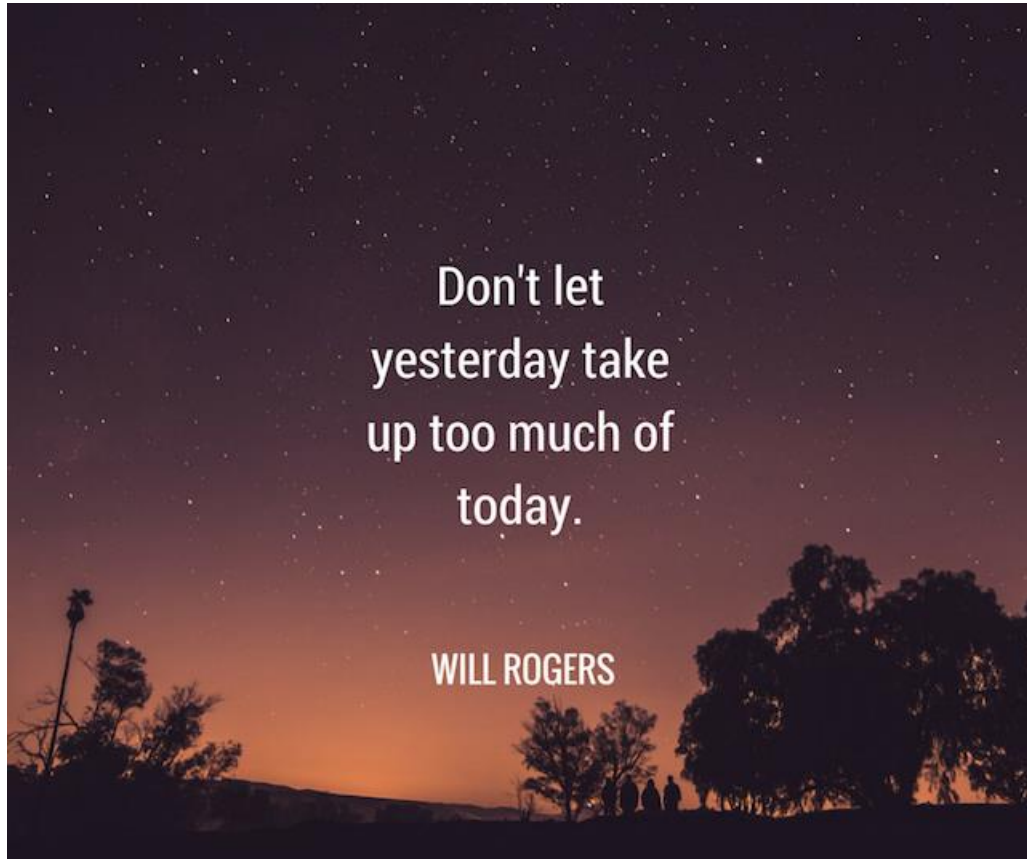
Meeting the Future Demand for Food

For today's governing agencies, the need to secure the necessary food sources to support the continuous rise in population has been a growing concern. It has been estimated that the current production of crops will need to double by 2050 in order to meet future needs for food. For such purposes, GIS is not only being used for real-time analyses, but also to compare historical data. Satellite imagery can be

used to assess historical trends of agricultural land use over time. This can help to predict and plan for the amount of arable land needed to supply food to the future populations.

Raising Awareness

One of the most important functions of GIS and mapping is to be used to raise awareness of such issues as food scarcity, and “*locating areas that are in need of assistance. Web mapping tools like the Institute of the Environment and the University of Minnesota’s Feeding the World map and the Food and Agriculture organisation of the United Nations (FAO)’s World Hunger Map provide a unique view of global food production.*” Though establishing the underlying causes of food insecurity, GIS data and technology are helping to safeguard the areas and communities affected by food scarcity.



Metric Calibration Base at the Institute of Surveying and Mapping, Diyatalawa

Mr. Mahendra de Alwis, Chartered Surveyor and Visiting Lecturer (Retired Superintendent of Surveys)

It is indeed with great pleasure that I set out to put down some of the salient features that comprised the construction of the Metric Calibration Base at the Institute of Surveying and Mapping Diyatalawa.

1971 dawned and batch No T4 moved in, the UNDP Project “UN/ISM” was to wind up by the end of the year and the ISM, exclusively with the Survey Department staff, was to continue from early 1972. The construction of the Metric Calibration Base for the purpose of Standardizing metric tapes was proposed in 1970. This was designed by Prof. Claud B. Noailles. All directions were also made available made by him. The construction was during the period January to August 1971. What is seen on the surface is nothing compared to the work done, during the construction below the surface of the Calibration Base. The Calibration Base was constructed by me. The site selected was near building No 24A.

Dr. Per Olof Fagerholm, Project Manager, UN/ISM has given mostly the outline. The site was approved by Project Co-Manager Mr. Elmore M. Perera. The necessary directions, advice and guidance were given by Prof. Noailles and I carried out the construction, along with my other work as an Instructor at the ISM, including everything related to my class of students in Batch T4. The six (6) drawings below give an indication of the magnitude of the construction. I shall try to make a little more elaborate account of the works done, if the need arises in a separate article, but would like to make mention herein of the fact that the group of Menum Sahayakas including those with special skills that worked with me on this work, performed with dedication and devotion! I can never forget the incident, where Survey Labourer Mr. K. A. Wipulasena, Menum Sahayake, suffered a severe “slipped Disc” and had to be hospitalized. He was bed-ridden for more than a month! I visited the patient daily. Although he was in the gang of Oi/c Camp, I had to do everything necessary to get Mr. Wipulasena’s accident leave authorized, together with matters pertaining to the Workers Compensation Ordinance.

The steps taken before the actual construction were as follows:-

1. Selection and marking two sites (One for Surface Taping and the other for Taping in Catenary)
2. Setting out and levelling the site
3. Digging with precision and also preparing Moulds
4. Purchasing and transporting materials etc.
5. Constructing reinforcement for the slab.
6. Constructing monuments
7. Constructing a drain across the calibration base
8. Excavation for monuments
9. Digging the trench with absolute precision for the slab
10. Excavation for supporting blocks
11. Sieving and washing sand
12. Cleaning broken metal and finally “Positioning” monuments with absolute precision during the construction

The 100 meters T-shaped (inverted T) reinforced concrete slab, projecting ¼” was built “in SITU” in 14 parts (sections) with gaps of ¼” as expansion joints and at each expansion joint a supporting block was placed immediately underneath the slab, with an asphalt filling at each ¼” expansion joint, to accommodate the expansion and contraction and asphalt paper placed immediately beneath the slab.

The reinforcement was by way of three iron bars held in the form of a triangle and running along each section of the slab in concrete mix. The slab carries 10 meters unit brass plates, flush with the slab, the “O” Mark Pillars at the two ends. The 50 Meters Pillar and the Anchorage Pillars also at the two ends beyond the “O” Mark Pillars and 3 Tension Pillars in appropriate positions. They have been buried in concrete in their correct relative positions with absolute matriculation. Brass plates with “O” marks have been fixed a-top the “O” Mark Pillars. The 10 Meters unit brass plates too have been positioned with absolute precision. All these positioning and processes had to be carried out before the concrete hardened. All the pillars referred to above were constructed “pre-fab” in accordance with the precise dimensions indicated in the drawings, in respect of each of the pillars. At the same time, aspects such as Temperature (using Thermometers) Tension (using Spring Balances), Atmospheric Pressure (using Aneroid Barometers), Alignments (using T 16 Theodolite) and Horizontality (using the NA 2 Automatic Level), all at one and the same time and before the concrete hardened, were in fact making the construction really challenging and nerve-rendering.

The prior preparation and “turning out” metal items and making appropriate purchases in the company of Prof. Noailles were indeed rewarding. Sieving and washing the sand (to desalinate), cleaning the broken metal and stones, digging appropriate pits for the concrete mixture carrying the pillars, digging Trenches to prevent roots of trees harming the slab, building a brick wall surrounding the slab and getting the retaining wall by the side of Diyatalawa - Bandarawela main road done up for greater stability, were some of the other items that were necessarily attended to by me. I have made a long story short. The whole process is better imagined than described. The Calibration Base thus constructed is generally for “Surface Tapping” but could be used for other purposes as well.

Another Calibration Base for chaining in CATENARY was also planned, but it did not see the light of day. Towards the latter part of the year, my engagement took place. In early 1972 I assumed duties as an Instructor in Surveying, on “secondment” at the Polytechnical Institute, Badulla, but commuted from Diyatalawa for duties. In 1973 we shifted to Bandarawela and in January 1974, shifted back to Diyatalawa and remained there till 1978. During the period I was Oi/c Camp.

Further, I would like to express the view that it would be perhaps useful, if the other Calibration Base for chaining in CATENARY shown in drawing No. 6 is also constructed, particularly for training purposes. This construction should be very much simpler, less costly and involving much less time and labour than the construction done already.

Every detail in the construction done is not included herein. However the six (6) drawings would be quite useful in assessing the magnitude of the construction and the rigors gone through. It is most gratifying to have been able to put down on record, even in this abstract form, some of the salient features and events that marked the various stages of the construction of the above Metric Calibration Base in very pleasant surroundings at the Survey Camp, Diyatalawa.

Applications of Surveying in Land Management

Mrs. J.K.A.D. Iranganie, Senior Superintendent of Surveys (Research & Development)

The origin of Surveying has a close connection with the designation of the land boundary, and cadastral surveying is the basis for a country's land management, serving as an important tool to gather, assess, and update geographical spatial data. In the contemporary era, Surveying is more widely used in different branches of land management. Moreover, the number of techniques and data acquisition methods has dramatically increased in the last 30 years. On the one hand, traditional optical instruments have developed thanks to the integration to computers and electronic devices. On the other, new sensor techniques became available to be used from ground-based stations, mobile terrestrial vehicles, and low-altitude aerial platforms (e.g., helicopters and Unmanned Aerial Vehicles – UAV).

The diffusion of Global Navigation Satellite Systems (GNSS) for precise positioning and navigation has not only completely changed the approach to land surveying, but also had an impressive impact on day-by-day life and the entire society. Mobile mapping technology allowed an increase in the productivity of high-resolution mapping of communication roads and urban environments, thanks to the integration of different sensing and positioning systems.

Digital photogrammetry and laser scanning sensors can be used for fast acquisition of dense point clouds useful to model terrain, buildings, civil constructions and infrastructures, as well as any other natural or man-made objects. While some main surveying instruments were used for the full data collection process in the past, data and sensor integration play a fundamental role today. In particular, the availability of digital data has changed the operational workflows for data acquisition, production, distribution, and management of surveying outputs.

On the other hand, the concept of land management also developed its content, going in several other directions rather than traditional cadastral and topographic applications. Detailed 3D digital mapping is now more important because more aspects of buildings and the urban environment have to be considered, for example the ones related to energy efficiency. Also changes of buildings and land over time have attracted great interest in the mapping process, not only to have up-to-date three-dimensional spatial databases, but also to keep record of the evolution process in 4D digital maps. In some cases and when available, historical maps are integrated in the archives. Geographic data need to be accessible to a wider number of users through the Internet, where web services have been developed to allow people to interact with maps and geocoded data. In addition, the availability of several online map services allowed to create added value by supporting commercial applications and location based services (LBS).

Crowdsourcing information can be continuously uploaded by the users in order to validate, integrate and update existing geographic data. The development of large facility management networks requires the precise survey for their geo-referencing and overlap to other digital map archives adopted for land management. In such applications, geographic information systems (GIS), real-time GNSS and ground penetrating radar systems are used in an integrated way to survey objects in the underground. Modern surveying techniques are also adopted for security issues in land management, including assessment of land safety, emergency management. This Special Issue entitled 'Applications of Surveying in Land Management' presents different applications based on some of the technologies illustrated above.

Thanks to the recent development of digital photogrammetry it has fully demonstrated to be a powerful and cheap tool for 3D data acquisition and modeling of complex objects. The availability of low-cost digital techniques extended its use to a large community of people, although the knowledge of the basic theoretical principles is still necessary for a correct use.



Printing of Paysheets and Payslips (GPS) using printers other than Dot matrix printers

Mr. E.M.D.M.Ekanayake, Senior Deputy Surveyor General (Mapping)

The problem of printing above mentioned documents using non DOT matrix local or network printer can be overcome by adopting following method.

1. Printing of Pay sheets

- a) Install following freely available softwares
 - a. Jaspersoft iReport Designer (iReport) (i.e. ***iReport-5.6.0-windows-installer.exe***). Latest version of this software can be downloaded from <http://sourceforge.net/projects/ireport> website.
 - b. Java runtime environment (i.e. ***jdk-8u45-windows-i586.exe*** for 32 bit or ***jdk-8u45-windows-x64.exe*** 64 bit operating systems respectively). Latest version of this software can be downloaded from <http://www.java.com/en/download/index.jsp> website.
- b) After running GPS programme for a particular site, relevant copy of the Paysheet is located in C:\\GPS\\ directory as ***PSHEET.RPT***
- c) Start ***iReport 5.6.0*** software and open the file named ***PSHEET.RPT*** located in the directory mentioned in 2.b above. Then select ***OK*** in the following message

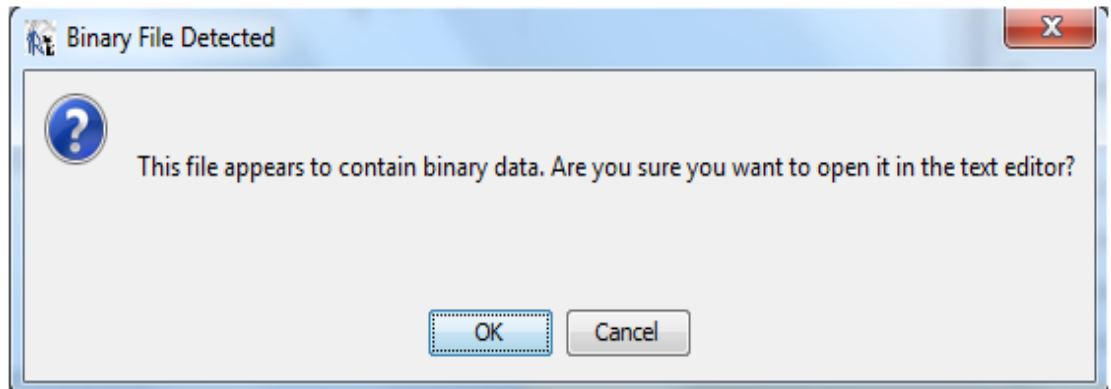


Fig 01

d) Then select **File>Print** to get the following screen

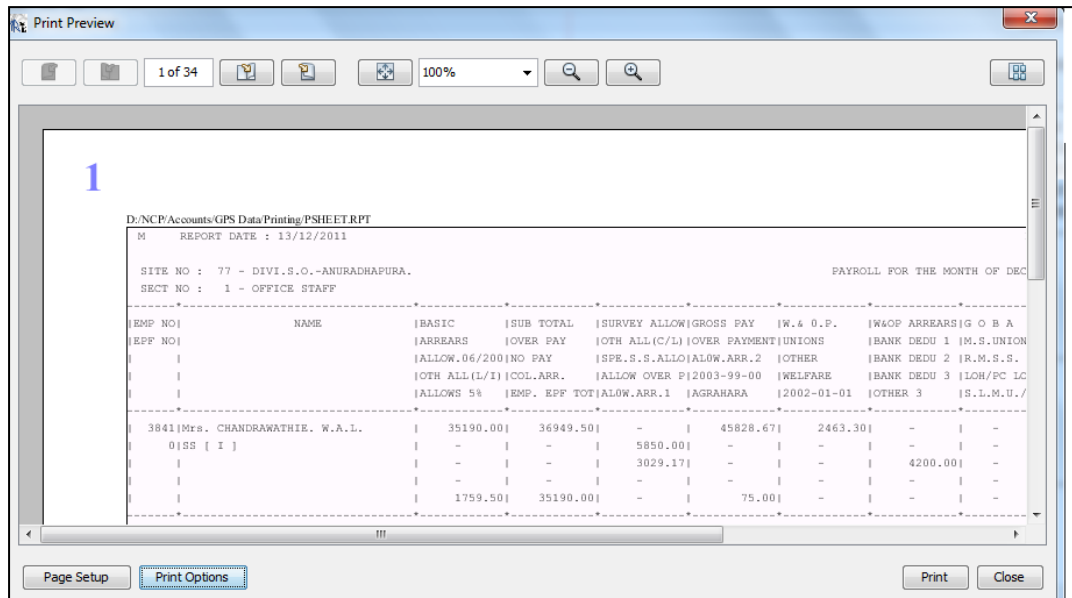


Fig 02

e) Then select **File>Print Option** to get the following screen

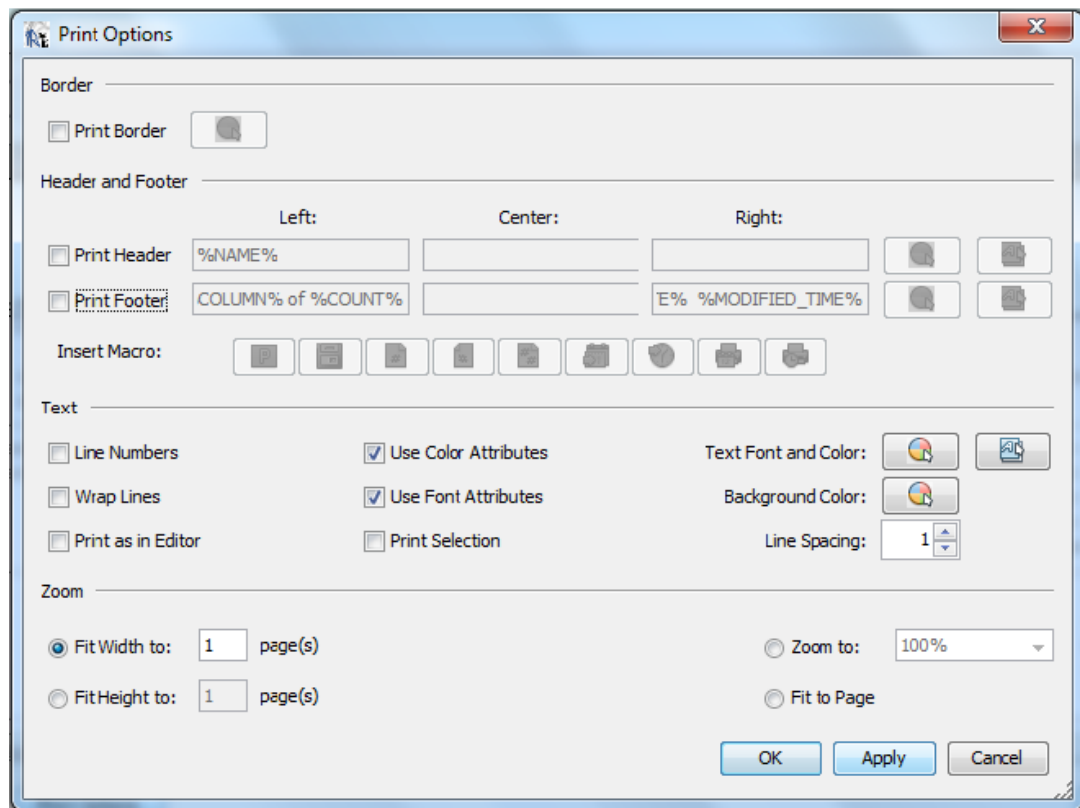


Fig 03

- f) Where Tick off default selection of **Print Border, Print Header, Print Footer** and select option **Fit Width to 1 page**. Then press **Apply** and **OK** and select **Page Setup** in Fig.02 to get the following screen.

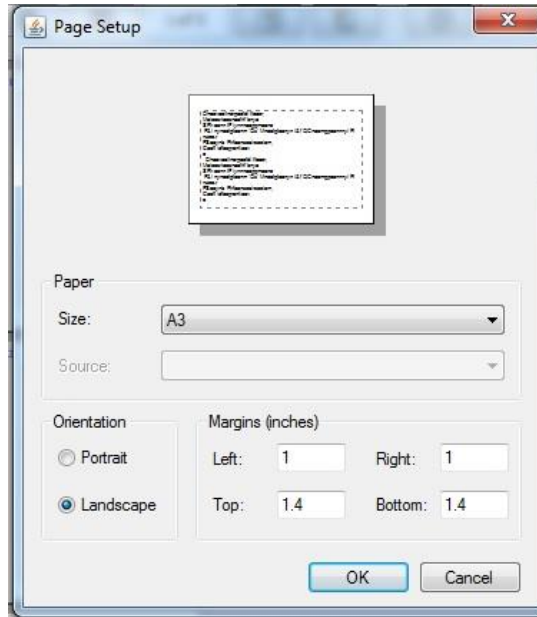


Fig 04

- g) Select paper size as **A3** and orientation as **Landscape**. Set both **Top** and **Bottom** margins as **1.4"** and leave **Left** and **Right** margins as default selection (**1"**) and perss **OK**. Now select **Print** in Fig.02 to obtain relevant print out.

2. Printing of Pay slips

- a) Install following freely available software
- a. **Jarte**™ (i. e **jarte_53_setup.exe**). Latest version of this software can be downloaded from <http://www.jarte.com/> website.
- b) Then open the software so you will get the following screen which is the **Compact Layout** (Default Layout) of the interface.

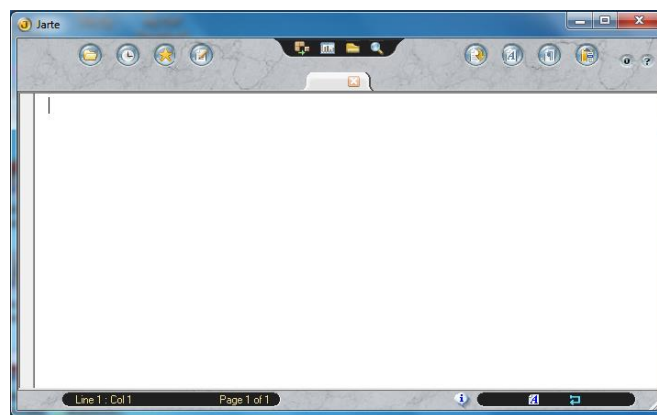


Fig 05

- c) Now click on the most left hand side icon of the four icons located at the middle of the interface under black back ground and select option of **Minimal Layout**. Then open the file named **PYASLIP.RPT** located in the directory mentioned in 2.b above and get the following screen.

Employee Name	Emp No.	Site/Sec	Basic Pay	Sub Total	Gross Pay
AJAKARUNA. K.M.P.	3077	77/ 1	23,580.00	24,759.00	33,859.00
Mr. GUNATHILAKA. M.A.P.	3078	MS(GU/M/1093) 77/ 1	15,400.00	16,170.00	22,020.00
Mrs. CHANDRAWATHIE. W.A.L.	3841	SS Site/Sec: 77/ 1	35,190.00	36,949.50	45,828.67
Mr. KARUNASINGHA. R.P.	7146	DRIVER Site/Se	15,000.00	26,000.00	25,000.00

Fig 06

- d) Go to **File>Page Setup**, click on **General** tab to get the following screen and select relevant printer. Then click on **Printer Settings**, select paper size as **A3**, orientation as **Landscape** and click **OK**.

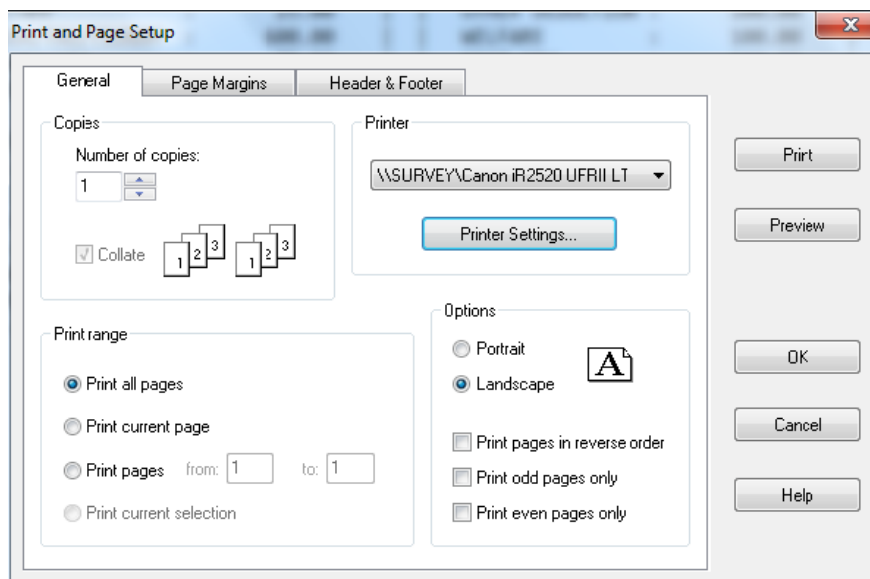


Fig 07

- e) Click on **Page Margin** tab and check settings. Leave default settings (1”) for all the margins. Similarly leave default settings for **Header & Footer** information also and click **OK** to go back to the **Fig. 06**.
- f) Now arrange page breaks using enter key to set only one set of data to remain in between two page breaks. If required, page breaks can be manually inserted by using **Insert>Insert Page Breaks** command in **Fig. 06**. Then go to **File> Print** to obtain print outs.

Geoid Modeling around the World

Mrs. K.A. Pushpakanthi, Government Surveyor (Research & Development)

The geoid which is defined as an equipotential surface of the Earth gravity field (Heiskanen and Moritz, 1967). High accuracy Geoid Modelling leftovers as one of the major issue in physical geodesy.

The closed equi-geopotential surface nearest to the mean sea level which is defined as Geoid serves as height datum system and plays a significant role in different significant application fields such as compute Mean Sea level heights from ellipsoidal heights observed by GNSS.

The geoid can be determined using various methods such as the gravimetric, geometric, astro-geodetic, astro-gravimetric, transformation and hybrid methods.

The gravimetric method can be carried out by the well-known Stokes-integral using gravity data. In the geometric method, the geoid undulations of points are obtained from GNSS observations and geodetic levelling. The levelling of these points is carried out with respect to the Mean Sea Level.

The Stokes' method and Molodensky's method are two classical Geoid modelling methods used to determine a geoid or quasi-geoid by solving the boundary value problems called the Stokes boundary value problem and the Molodensky boundary value problem. Stokes' method determines a geoid and Molodensky's method determines a quasi-geoid. Both these methods have its own advantages and disadvantages too.

To overcome these disadvantages a new method was proposed and introduced based on definition of geoid, and used the external gravity field models (e.g. EGM2008), digital topographic models (e.g. DTM2006), Shuttle Radar Topography Missions and crust density models etc.

Nowadays, satellite gravity missions, i.e. CHAMP, GRACE and GOCE, were launched, significantly improving the knowledge of the gravity field, but global models from satellite missions are limited in terms of spatial resolution due to the dampening of the gravity signal with the orbital height. The spatial resolution of Global models can be increased by using ground gravity data. But it is also related to the way in which those heights and gravity data were observed.

Two type of applications are used in high resolution accurate global gravitational modeling. First, in land areas, GNSS positioning and gravimetrically determined geoid heights leads to determine the orthometric heights and undulations without levelling observations. Second, in sea areas, altimeter derived Sea Surface Heights are used to determined absolute Dynamic Ocean Topography and its slops. Combination of these two types of observations offer unique and accurate global high degree gravitational model and it is used to provide the reference surface for the realization of a global vertical datum, the Geoid model.

Earth Gravitational Model EGM96 and EGM2008 are spherical harmonic models of the Earth's gravitational potential, developed by

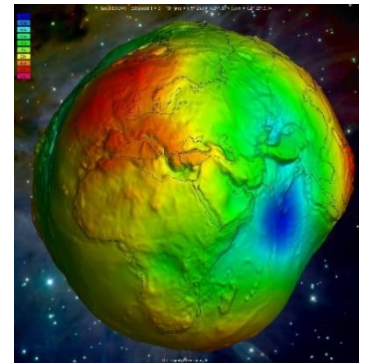


Figure 01: Geoid undulations of the model EMG2008

a least squares combination of the ITG-GRACE03S gravitational model. Over areas covered with high quality gravity data, the discrepancies between EGM2008 geoid undulations and independent GPS/Leveling values are on the order of ± 5 to ± 10 cm.

SGG-UGM-2 is the latest earth gravity model provided in 2020 from satellite gravimetry, satellite altimetry, and Earth Gravitational Model 2008 (EGM2008) derived gravity data based on the theory of the ellipsoidal harmonic analysis and coefficient transformation.

Online conversions of the heights from ellipsoidal to orthometric heights or vice versa, of a single point or a set of points from a csv file by using one of these geoid models are also available.

Hence the accuracy of such global geoid models are few decimeters and it is not sufficient for many scientific and engineering applications, high resolution regional geoid models are still necessary for the most practical purposes. Therefore most of the countries attempt to have their own Geoid Models and also regional geoid models as the availability of their own mean sea level heights and gravity data observed by various methods. Most of them are gravimetric or hybrid geoid Models such as Argentina (GEOID16), Australia (AUSGEOID2020), Canada (CGG2013/CGG2013a), Europe (EGG2015), Germany (GCG2016), Japan (GSIGEO2011), New Zealand (NZGEOID2017), USA (xGEOID19B/GEOID18), France (QGF98), Corsica (QGC02), Italy (ITALGEO05), Iberian Peninsula (IBERGEO2006), Belgium (BG03), Switzerland (CHGEO2004Q), Greece (GreekGeoid2010).

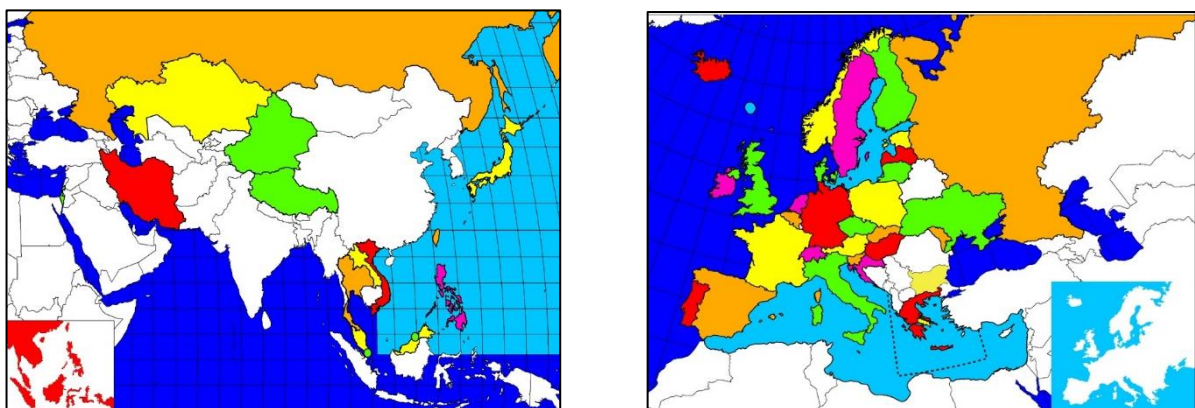


Figure 02: Countries having Regional Models by Map (Asia and Europe)

In the South India area, a gravimetric quasi-geoid has been estimated in cooperation with the National Geophysical Research Institute of Hyderabad that supplied 16013 gravity data. Data over the surrounding seas were derived from High Resolution Altimetric Gravity Field Mapping (KMS2002 Global Marine Gravity Field). The final global gravity data base consists of 63968 values. The standard “remove-compute-restore” procedure was adopted to estimate this quasi-geoid. The residual component was computed via Fast-collocation. The estimated quasi-geoid plotted is shown on figure 03.

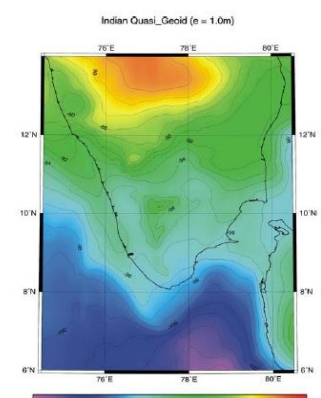


Figure 03: The South India quasi-geoid

In Japan hybrid geoid model, GSIGEO2011 was established by fitting Gravity geoid model JGEOID2008 to geoid heights determined from GNSS/ Levelling at 796 GEONET stations, 29 tidal stations and 197 benchmarks. JGEOID2008 was a combination of global geopotential models GGM02C and EMG96, surface gravity measurements, altimetry derived marine gravity model KMS2002 and 250m mesh digital elevation model of Japan.

For determining accurate local geoid model for Sri Lanka both gravimetric and geometric methods should be combined as a hybrid model. Enhancement of the coverage of the existing vertical control network with high accuracy and highly maintenance of the system is necessary for the quality of the model. The gravity observations in the areas where the geometric data is not existing is also a necessity for increasing the well distribution of the data for the geoid model.

References

WenBin Shen, Jiancheng Han (2013): Global Geoid Modelling and Evaluation.

Nikolaos K. Pavlis, Simon A. Holmes, Steve C. Kenyon, John K. Factor (2012): The development and evaluation of the Earth Gravitational Model 2008 (EGM2008.)

International center for Global Earth Models (ICGEM) (2021): <http://icgem.gfz-potsdam.de>

Wei Liang, Jiancheng Li, Xinyu Xu, Shengjun Zhang, Yongqi Zhao (2020): A High-Resolution Earth's Gravity Field Model SGG-UGM-2 from GOCE, GRACE, Satellite Altimetry, and EGM2008.

Basara Miyahara (2015): Case Study of Japan, Current situation and challenges in Vertical Reference Frame of Japan.

