Organized by

CCI SRI LANKA

Chamber of Construction Industry Sri Lanka

Sponsored by

JANASHAKTHI INSURANCE

Seminar on Flood Control & Disaster Responsiveness in Proposed Western Megapolis

on 15th March 2017

@ Renuka City Hotel, Colombo

PREAMBLE

To address the concerns of flood control and disaster responsiveness, Chamber of Construction Industry convened a Seminar on 21 March 2017, at Renuka City Hotel. The Seminar was sponsored by Janashakthi General Insurance Ltd and the Asia Pacific Alliance for Disaster Management Sri Lanka (A-PAD SL), to make the event a success. The event was attended by over 100 participants and Hon. Anura Priyadarshana Yapa, Minister of Disaster Management graced the event as the Chief Guest.

The seminar was addressed by Deshabandu Ar/Plnr Dr. Surath Wickramasinghe, Eng. Dr. Kitsiri Weligepolage, Eng. S. P. C. Sugeeshwara, Mr. Timothy Hannan, Mr. Firzan Hashim, Eng. Upali Delpachitre, Mr. Hiroki Hashimoto, Ms. Dayalanie Abeygunawardane, Eng. Maj. Ranjith Gunatillake and Eng. Nissanka Wijeratne.

The experts and members of CCI exchanged views on designs for Kelani Ganga and Kalu Ganga, maintenance of micro and macro drainage systems, flood retention areas near river banks and provided solutions to mitigate effects and create proactive responses to flash floods.

CONTENTS

Welcome Address by Ar/Plnr Deshabandu Dr. Surath Wickramasinghe, President, Chamber of Construction Industry (CCI) Sri Lanka

In his welcome address, Dr. Surath Wickramasinghe thanked Hon. Anura Priyadarshana Yapa, Minister of Disaster Management, distinguished invitees and speakers, for attending the Seminar and Mr. Firzan Hashim, Country Director, Asia Pacific Alliance for Disaster Management Sri Lanka for supporting the CCI in facilitating arrangements to convene the event.

Dr. Surath Wickramasinghe informed that Sri Lanka is a country that faces several disasters which create severe losses and the devastation that was caused by the floods in May 2016, caused critical damage to the country. Due to such reasons, the CCI decided that it was their social national responsibility to highlight the issues arisen and in this connection, invited an expert panel of distinguished speakers, locally and internationally to address the audience. Dr. Surath Wickramasinghe also brought to the attention that following the devastation of the floods last year, Sri Lanka faced the drought and presently the capacity of water in hydro reservoirs has also decreased. However, during the floods, 60% to 70% of the water was dispersed to the sea as mechanisms to capture water have not been initiated. With these two important aspects in mind, CCI decided to convene the Seminar on Flood Control and Disaster Responsiveness in Proposed Western Megapolis.

In the recent floods, Colombo experienced 256mm of rain and then within few months it led to a drought situation. With the developments of the Megapolis already in track, the western region will be advanced, and it has been indicated that the respective population of 5.8 million will increase to 8.0 million by 2030. Therefore, the shortage of water will be inevitable and measures must be taken to address this concern. Dr. Surath Wickramasinghe mentioned that in Malaysia, the Stormwater Management has been partially solved with a 9.7km road tunnel known as a smart tunnel, where the tunnel constructed beneath will capacitate the flash floods that occur and will be linked to other lakes to conserve the water. Such solutions need to be created. Further, in Tokyo Japan, flood control has been addressed for 200 years. The three rivers, Tone, Edo and Ara are interconnected to a 6.3km tunnel built 50m below the ground. Many innovations and solutions are devised by every country, and Sri Lanka must initiate and implement their own to address these disasters. Dr. Surath Wickramasinghe informed that frequent flooding occurs in Philippines and Vietnam, and due to the shortage of low lying areas towns, cities and housing projects are been built above the flood level linking the area with walkways and roads. He stated that Sri Lanka should consider this solution as there are several low-lying areas and prime land that could be utilized in this manner.

In concluding his statement, Dr. Surath Wickramasinghe stated that the while Sri Lanka has Kelani river passing through Kithulgala and Awisawella and flowing down to Colombo, experts on irrigation and Eng. Upali Delpachithre, Consultant, Western Region Megapolis Planning Project (WRMPP) is of the view that there is a possibility of constructing dams upstream thus creating storage reservoirs to divert water to required areas during the drought. Dr. Surath Wickramasinghe wished the deliberation today would address flood mitigation, management and conservation, and thanked the audience and Hon. Minister Priyadarshana Yapa, for attending the seminar.

Address by Chief Guest, Hon. Anura Priyadarshana Yapa, Minister of Disaster Management, Ministry of Disaster Management Sri Lanka

Hon. Minister Anura Priyadarshana Yapa extended his great pleasure in attending the Seminar organised by the CCI Sri Lanka, and also his appreciation for inviting to grace the event as the chief guest. Hon. Minister noted that during the last few decades, the number of natural disasters experienced in Sri Lanka has increased at an alarming rate, mainly due to climate change. Sri Lanka is a country with diminutive greenhouse gas emissions been approximately 0.01% of the global GHG emissions or a mere 41Mt annually. However, the country is very vulnerable to the effects of climate change because Sri Lanka is a tropical island. Climate change due to increased greenhouse gas concentrations in the atmosphere will boost temperatures over most land surfaces, though the definite change differs regionally. Possible outcomes of the increase in global temperatures include increased risk of drought and increased intensity of rainfall with higher wind speeds, a wetter Asian monsoon, and possibly more intense cyclonic storms. Hon. Minister also informed that Sri Lanka has been frequently affected by prolonged droughts and severe floods, and the situation can become even worse in the future.

Globally, since 2009, an estimate of one person every second has been affected by a disaster, with an average of 22.5 million people affected by climate or weather-related events. In Sri Lanka, the most frequent disasters are floods, droughts, and landslides accounting to 95% of the natural disasters experienced in Sri Lanka. Hon. Minister stated that the floods experienced in the Southwestern region of Sri Lanka has become severe not only due to heavier rains but also because of urbanisation. During the floods in May 2016, the entire Kelani Ganga catchment received a rainfall of over 500mm within two days resulting in a rise of the river level which in turn obstructed the free flow of the canals in the city and suburbs in Colombo resulting in the inundation of vast areas in the city.

Hon. Minister specified that when discussing floods, the intensity of rainfall must be considered. During the last few decades, the intensity of rainfall in Sri Lanka has increased very significantly. Rainfall intensities of the order of 120 – 130 mm per hour is not uncommon. When enormous volumes of water fall on the ground at these high intensities, existing drainage systems fail to cope with resulting in flash floods. Therefore, the capacity of the drainage systems need to be enhanced to match the present-day intensity of rainfall, which involves a large investment. Hon. Minister further mentioned that the region in and around Colombo previously functioning as water retention areas have now been filled up and therefore, developing a few areas around Colombo to serve as water retention areas during floods is vital. Following the floods in May 2016, a team of experts from Japan was invited to study the system and to recommend remedial action. The recommendations were to build a reservoir upstream as well a diversion.

Further, to control the floods in the Colombo region, it is necessary to increase the drainage capacity of the gravity system and to improve the primary canal system. Under the Metro Colombo Urban Development project funded by the World Bank, work is now in progress. However, increasing intensities of rainfall may require enhancing the capacity of the gravity system further. Moreover, people residing in close proximity to canals and waterways must be relocated, which is a requisite to mitigate flood hazard in the Colombo

metropolitan area. Finding suitable alternate lands for re-location is also a major concern.

Hon. Minister advised that for measures to be taken for flood control, it is important to improve the technical capacity to forecast heavy rainfall events. The capacity of the mandated agency for weather forecasting, the Department of Meteorology needs to be enhanced and at present, the World Bank has undertaken to upgrade accordingly. The project would involve strengthening of the meteorological observation network, improving the forecasting capacity at all time scales including quantitative precipitation estimation. In addition, the Japanese government has agreed to establish two Doppler weather radar network for real time precipitation observations, which would be operational within the next two years.

The Irrigation Department, the mandated agency for flood forecasting is also undergoing capacity enhancement through the Climate Resilience Improvement Project. This enhancement includes the strengthening of the real time hydrological observation system, introduction of flood modelling and capacity development. Further, the Ministry of Megapolis and Western Development recently submitted a cabinet memorandum to establish a flood control and water management centre for the western megapolis region. On this we were of the view that it is preferable to upgrade the technical capacities of the Departments of Irrigation and Meteorology than establishing a new centre solely for flood control in the said region. Hon. Minister also noted that he has indicated that real time and data can be shared with the Ministry of Western Megapolis. Hon. Minister also stated that the programme to upgrade both departments are presently in progress, and informed that it is very important that the mandated functions are not overlooked.

Hon. Minister noted that the operation is a vast task that involves acquiring financial assistance and believes that the private sector participation is greatly required at this stage to assist the government. The local authorities providing permits for building houses and entities must bear in mind that building in flood prone areas must not be allowed. It was due to such reasons, the severe floods last year were encountered. Also it was further informed that the availability of finding flatbed boats from Negombo and other areas, was a great challenge. However, all affected individuals were brought to safety and provided food and non-food items. Hon. Anura Priyadarshana Yapa took the opportunity to thank and appreciate the good work done by the Armed Forces in Sri Lanka, to assist all citizens. He also raised the issue that many people didn't want to be rescued as they were afraid that their belongings would be stolen. The Government of Sri Lanka has now taken the decision to insure every household for natural disasters and the process has recently been completed, irrespective of household incomes. Many districts have been already been remunerated for and in other districts collection of information is still ongoing as the process was only recently initiated. Hon. Minister asked all engineers in the Platform to consider and design new concepts for flood mitigation and extended his sincere appreciation for being a part of the Seminar.

SESSION ONE

SESSION ONE

"Water Demand for Drinking and Irrigation Purposes in Sri Lanka by 2030: Supply Constraints and Possible Solutions"

Eng. Dr. Kitsiri Weligepolage, Director (Water Resources Planning) Department of Irrigation Sri Lanka

Eng. Dr. Kitsiri Weligepolage thanked the Board of Directors, and CCI for the invitation to present on the topic at the Seminar. During the past one and a half centuries, the development of water resources has been ongoing and largely sectorial. In the early 1900s and before, until the late 1980s, the irrigation sector played a dominant role to achieve self-sufficiency. This mainly included the development of water resources for agriculture and food production. Formally after the 1950s during the Gal Oya dam development, "Senanayake Samudra", the industry was gradually deepening the constructed reservoirs, except the ones constructed during the ancient times. However, during the Mahaweli development a significant portion of the country's water resource was harnessed aimed at irrigation purposes. After the introduction of the open economy in the late 1970s the development strategies gradually shifted from the primary irrigation sectors to the other sectors such as sport oriented industries, tourism and financial services and given more priority in the developing stages of the country. Resulting from these activities, urbanization increased and there was a considerable demand for the drinking water supply. However, all these sectors had to compete with the available water resource so there was a sectoral demand. Eng. Dr. Kitsiri Weligepolage informed that this is the current condition faced and solutions within the context are been provided.

103 distinct river basins cover 90% of the island and 17% of these river basins exceed 1000km2 and only 05 basins over 2500km2. The total internal renewable surface water resource is estimated at 50km3 per year and the internal renewable groundwater resources are estimated at 7km3 per year. Even though vast amounts of water are spoken of, water does not exist in every part of the country and is seasonal. There is a considerable variation spatially and temporarily. In his presentation, Eng. Dr. Kitsiri Weligepolage displayed, the variation in rainfall where there is a high concentration in the Western region, and the dry areas in the Eastern dry zone and the North-west province. In the district of Batticaloa, rainfall occurs only for a few months of the year, with minute water received during the rest of the year. This is also followed by the run off or the availability of surface water in the river basins, similar to the pattern of the rainfall and then the water use. At present, only 20% of the water is been utilized while 80% is been lost to the sea.

"Water Resource Management & Flood Control in Western Megapolis with examples from other Asian Countries"

Eng. S. P. C. Sugeeshwara, Chief Engineer (Drainage & Flood Systems), Department of Irrigation

Eng. S. P. C. Sugeeshwara informed of the situation that occurred in Kelani river basin during the floods in May 2016 that caused damages of approximately Rs. 800bn. 800MCM of water was dispersed into the sea during the flood occurrence. However, to mitigate floods in the Kelani a reservoir of capacity of 400MCM is required and it must be emptied to store water.

Eng. S. P. C. Sugeeshwara presented on results of the flood study for Kalu ganga (2012-2013) and the proposed mitigation strategies. The study was done by the TAHAL Group, a leading global provider of sustainable infrastructure development projects in developing countries. The findings using SOBEK software model noted that to mitigate floods in Ratnapura, a 250MCM reservoir in Malwala, and 75MCM reservoir at Dala was required for storage.

The Deduru oya reservoir of 75MCM was constructed in 2014, to act as a reserve to mitigate floods and drought in the basin. In December 2014, the tank discharged water three times the capacity of the reservoir (180MCM), to safeguard the reservoir. Further in May 2016, the tank dispersed water four times the reservoir capacity (250MCM) to mitigate effects of the floods. Eng. S. P. C. Sugeeshwara further noted that the Western MegaPolis region covers parts of it and Kelani river basin, Kalu river basin, Attanagalu oya basin, Bentara ganga basin and Maha oya basin. He added that it has been proposed to divert Kelani river water to Deduru Oya basin by constructing reservoirs at Ruecastle, Nawatha and Holombuwa in Kelani basin. This would store water in Deduru Oya reservoir during drought season.

Eng. S. P. C. Sugeeshwara stated that the proposals for Malwala and Dela, would be rarely utilized to divert water due to topographical reason. The reservoirs can be used for hydropower development and domestic water. However, the major reservoir at Kukule, could be effectively used to divert Kalu river basin water to Hambantota and Monaragala district. He reiterated that none of the mentioned proposals had considered flood control benefits.

The Ministry of Irrigation and Water Resources Management have also initiated a study for identifying better water resource management and flood control options in 10 critical river basins in Sri Lanka; Gin river, Nilvala river, Kelani river, Attanagalu oya, Maha oya, Deduru oya, Kala oya, Malwathu oya, Mahaweli basin downstream and Gal oya. Other than the Kelani river basin, structural flood control systems in other river basins have not been considered.

Eng. S. P. C. Sugeeshwara provided descriptive information on the Kelani river basin and noted that Colombo and the suburbs of Sri Lanka face two types of floods generally. Floods by overflowing Kelani river (Riverrine floods) caused by the topographical condition and high rainfall events experienced in the basin, and floods by local drainage (Urban floods), due to insufficient drainage facilities, high rainfall events and encroachments. He further noted the main characteristics of the Kelani river flood protection and system and emphasized on the need to improve local drainage systems in Colombo and outer areas as a solution.

Floods are critical and damages are considerable as flood prone areas are highly populated or used as agriculture land. The Irrigation Department has also proposed a medium sized reservoir system in Attanagalu oya basin and Kalu ganga basin. Eng. S. P. C. Sugeeshwara also stated that river mouth improvements have been found effective in downstream, Kalutara, flood mitigation. While river banks are faced with major issues, further approaches are also required. Eng. S. P. C. Sugeeshwara noted that the concerns will be addressed and the Treasury has provided provision to the Department for resolving this issue immediately.

"Impact of climate change on flooding and drought, with examples on mitigation from other countries"

Mr. Timothy Hannan, Team Leader, Climate Resilience Project, World Bank

Mr. Timothy Hannan thanked the Chamber of Construction and Industry for inviting to speak at the Seminar. He noted that CRIP-DBIP programme is an investment plan that identifies specific projects for the Government of Sri Lanka (GoSL) and for the potential financial institutions, that will be providing funds for flooding and drought projects. Mr. Timothy Hannan stated the immediate need to improve climate change resilience to mitigate the effect of damages caused by floods and drought on the economy, retards growth of the economy and society.

The programme is currently looking at ten river basins, covering almost half of the country. Priority has been given to the Western Region, incorporating Kelani ganga, Attanagalu oya and Maha oya. Even though this was not considered initially, the key areas were identified following the floods in May 2016. He further elaborated on climate change and informed that it is caused by the rising concentration of CO2 in the atmosphere, resulting in global warming. Global warming is resulting in more frequent and extreme weather events; hurricanes, tornadoes, typhoons, thunderstorms, high winds, heat waves and

droughts. It has caused more intense and longer duration of severe rainfall events, developing in bigger and frequent floods. Mr. Timothy Hannan further elaborated that floods are a natural phenomenon and the topography of the basin, land use of basin, changes in channel characteristics, such as sand mining and encroachment of building, greatly influence the magnitude of floods. Through better management, better responses to emergency situations, structural flood mitigation systems, non-structural flood mitigation systems and emergency preparedness, the effect of climate change can be mitigated.

Mr. Timothy Hannan provided short and medium term recommendations on reducing greenhouse gas emissions and improving resilience to reduce the magnitude of floods. Flood mitigation can be approached through structural measures; upstream storage, flood relief channels and embankments. It can also be mitigated through improving land use, flood forecasting and warning systems, and flood preparedness. Through examples of North Thames river, and Canada, structural approaches to flood mitigation were addressed. He further provided information on the embankments been constructed in New Orleans and denoted that $135billion worth of damages were caused by Hurricane Katrina. Landscaping embankments into urban planning can be implemented by developing parklands and recreational spaces.

He further highlighted the potential to mitigate flood in Kelani ganga informing that temporary structures are not feasible. High level embankments may displace many communities and this cannot be allowed, therefore, requiring a more comprehensive, basin level strategy. Mr. Timothy Hannan stressed that the objectives under CRIP-DBIP are to protect lower Kelani to a high level and minimize displacement of people. For the Kelani river, the three main options for flood management; reservoirs, diversions and embankments are been investigated to maximize the level of flood protection. Mr. Timothy Hannan concluded his presentation and informed that by end of June 2017, a flood mitigation strategy will be presented for consideration by the GoSL and financiers.

"Flood mitigation and conservation options for Kelani ganga and Kalu ganga"

Eng. Upali Delpachithre, Consultant, Western Region Megapolis Planning Project

Eng. Upali Delpachithre expressed his thanks to Deshabandu Ar/Plnr Dr. Surath Wickramasinghe, Mr. Nissanka Wijeratne nd the member of CCI, for the invitation to speak on the subject. He initiated his address to members of the audience by speaking on the basic characteristics of Kelani ganga basin, the catchment area, agro ecology land use, and water use consumption of the basin. He further mentioned that the main component of the major flood protection system are flood embankments at both sides of the river. The South bund can protect flood of 12Ft and North bund can accommodate protection up to approximately 9Ft at Nagalam Street gate.

He further informed of the minor flood protection schemes building during 1930 and 1935 for the protection of Agriculture, with 3 to 5 years of protection that was abled mainly for the purpose of food security. Eng. Upali Delpachithre described the availability of hydrometric data; met data, hydro data, and land use; and presented on hydrological features from 1913 to 1989. Previous studies were highlighted, providing further information on flood control and trans basin diversion in Nawata and Holombuwa: Levees and flood channel, JICA-Nippon Koei study in 2003 and on further assistance that was provided by JICA in 2009.

Eng. Upali Delpachithre emphasized on the need to provide effective defense for people and property against flooding from the river by relocation identified affecting houses. Further design considerations were explained and focused on the issue of the greater Colombo flooding. Further economic recommendations have also been presented to relevant authorities, addressing hydro power generation, inland water transport, sand mining degradation of bed and bank erosions. He also noted that there has been an increase of water usage to meet the present day demands of individuals and business entities.

Further information was provided through Eng. Upali Delpachithre's speech highlighting the characteristics of the Kalu ganga. Previous studies were explained, with key findings from TAHAL Study and JICA noted. He further presented on the design considerations and parameters that have been implemented and provided short term and long term recommendations for future proposals. Eng. Upali Delpachithre concluded his presentation by thanking President and CEO/SG of CCI for him giving him an opportunity to speak on previous studies been conducted and the formulated proposals in place for Kelani and Kalu ganga basins.

SESSION TWO

SESSION TWO

"Impact of floods on Urban Communities"

Mr. Firzan Hashim, Country Director, Asia Pacific Alliance for Disaster Management Sri Lanka"

Mr. Firzan Hashim brought a different perspective, distinct to the technical expertise provided to the platform and spoke on the impact that is created on urban communities by floods. Floods are the most frequently occurring disasters internationally, and from 1950 research has indicated that the intensity of the disaster has increased. Therefore, it is very pertinent at this time for Western Megapolis and development to go towards sustainable development ensuring all mitigation processes are taken into account. Further data was presented on the impact of urban flooding internationally, that caused severe economic loss in 2013, with losses exceeding billions. He further informed of the disasters that have occurred in Sri Lanka from 2010 to 2017, affected districts and respective populations. The Disaster Risk Index 2017, on a scale from 1-10, denoted that tsunami stands at 8.2, followed by floods at 6.2.

Mr. Firzan Hashim addressed issues concerning the impact created on communities by floods in different ways and informed of the Post Disaster Needs Assessment formulated by the Ministry of Disaster Management, Disaster Management Centre, Ministry of National Policies and Economic Affairs, UN, UNDP, EU and other UN and government departments. The total effect caused amounted to USD 688Million, with 90% of the private sector affected and 10% of losses suffered by the government. The social, productive and impact on infrastructure of in damages and losses were further presented.

The speaker also mentioned that during disasters while the earlier noted impact is noted and addressed, the emotional impact on the affected communities must be considered. Many individuals' lose property, life savings, and important documentation, creating severe distress. These areas must also be incorporated in the development process. When responding to people in disasters, individuals must adhere to the humanitarian charter and minimum standards in disaster response to minimize harm.

Mr. Firzan Hashim spoke of the differences in responding to urban flooding and responses to Aranayake landslides. It was stated that during urban responses when preparing camp management, land space is a huge concern. There are major issues in the security of women and children, water and sanitation. Due to the severe impact of the floods, many children were unable to attend school due to financial constraints.

He further mentioned that A-PAD SL has worked closely with the Ministry of Disaster Management, DMC, corporates and UN agencies to respond immediately in disasters, and in the early recovery stages. Mr. Firzan Hashim closed his presentation by informing of the Rain Water Harvesting Systems that have been constructed by A-PAD SL in the North and South for storage of water, and stressed on the importance of bringing in mitigation strategies to, legislations and ensure that such systems are mandatory in all households to be prepared for the impact of disasters.

"An insurer's perspective on flood damage"

Mrs. Dayalanie Abeygunawardane, Chief Operating Officer, Janashakthi General Insurance Limited

Mrs. Dayalanie Abeygunawardane expressed her gratitude to CCI and the opportunity for Janashakthi to be a part of this important discussion. As an insurer, Mrs. Mrs. Dayalanie Abeygunawardane welcomed the informative presentations provided by the previous panel of experts. She agreed with Hon. Minister Anura Priyadarshana's statement to the importance that must be placed on relocating communities from the flood prone areas. In May 2016, many industries were harmed and as insurer's we experienced the severity that was faced by them. These proposals are important to take forward and minimize the impact of these disasters. Mrs. Dayalanie Abeygunawardane further agreed with the comments made by Mr. Timothy Hannan on climate change resilience and appreciated the structural approaches denoted by Eng. Upali Delpachitre. She further mentioned the necessity of accounting the emotional impact as presented by Mr. Firzan Hashim.

As described by Mrs. Dayalanie Abeygunawardane, insurance is a form of risk management in which the insured transfers the cost of potential loss to another entity in exchange of monetary compensation known as premium. She stated that a situation involving exposure to danger, harm or loss is considered a risk. During floods May 2016, the entire insurance industry insured losses of Rs. 15 Billion. Insurance companies were able to pay for these losses through pooling. The insurance cover for floods is an extension under certain policies. Fire and motor policies are extensions that require additional premium. Mrs. Dayalanie Abeygunawardane informed that the wording of flood entails that water has escaped or been released from the normal confines of any natural or artificial water course lake, river dam, canal or reservoir. For an incident to be considered as a flood, water has to enter the watercourse then escape or be released from the watercourse to be considered a flood incident. The definition of flood has been under discussion, however, the current definition is internationally accepted.

The warehouses and industries down the Kelani river were severely affected in May 2016. Many warehouses entailed stocks from different customers causing each insurer to pay very high claims. Commodities such as tea, liquor, spirits were most affected. Insurers further impose warranties such as stacking and pallet warranties. However, during the disaster last May, water was stored for nearly 5-6 days, and the warranties were not able to withstand the catastrophe. Mrs. Dayalanie Abeygunawardane further denoted that the loss suffered by Janashakthi was approximately Rs. 4 Billion, with Rs. 3.75 Billion worth of losses in property and Rs. 250 million losses in vehicles. Many clients were informed of risk mitigation initiatives to safeguard their vehicles.

Mrs. Dayalanie Abeygunawardane informed that Janashakthi has implemented a mechanism to forecast the impact in partnership with local authorities through google maps, within the model "Catastrophic Tool Kit". She stressed that these are international practices that have been incorporated and limit the exposure. Mrs. Dayalanie Abeygunawardane concluded by requesting to the engineers in the audience to provide best solution to the GoSL that can mitigate the impact of future disasters.

"Strategy for Disaster Risk Reduction in Sri Lanka"

Mr. Hiroki Hashimoto, Representative, Japan International Cooperation Agency (JICA) Sri Lanka

Mr. Hiroki Hashimoto opened his address by thanking CCI and provided an elaborative description on the background of JICA. Japanese Official Development Assistance (ODA) was initiated in 1954, when the Government of Japan joined the Colombo Plan. Since then, JICA has provided technical cooperation, loan assistance, grant assistance and volunteers to Sri Lanka. JICA has developed the Colombo Port, and constructed, improved and expanded air terminals of the Bandaranaike International Airport, since 1980s. Further, construction of 150MW run-of-the-river type hydropower plant at Kotmale river was also commissioned in July 2012. JICA has moreover advanced Baseline road, and areas of expressways.

He further informed of JICA's priority areas for cooperation and the operation schemes that are provided. Mr. Hiroki Hashimoto briefed the audience on the main projects implemented for Disaster Risk Reduction (DRR) in Sri Lanka, involving government organizations; RDA, NBRO, Department of Meteorology, Department of Survey and Ministry of Disaster Management. The loss of lives and people affected by disasters are

increasing significantly due to climate change and expand of exposure; requiring substantial investments and DRR efforts for the country.

Mr. Hiroki Hashimoto emphasized on the Sendai Framework for DRR set by the UN World Conference on DRR in March 2015, Japan. JICA contributed to the substantial discussion in formulating the framework, and will align the work implemented in Sri Lanka accordingly. He further spoke of the global targets in Sendai Framework and highlighted the priority actions required to achieve targets. A key concept of the Sendai Framework is prevention of disaster risk, which is frequently increasing due to urbanization. Further information on the importance of DRR activities were explained through examples of concepts implemented in Japan. To adhere in 'Build Back Better', Japan reviews land use plan, legal framework and institutional structure constantly.

Government of Sri Lanka proposed a project to develop a master plan for urban flood mitigation in Western region that will be implemented by the Government Japan. Mr. Hiroki Hashimoto concluded his speech and denoted that further details of project will be formulated by 2017, based on concepts applied in Japan.

Summing up by Eng. Maj. Ranjith Gunatilleke, President Elect of Chamber of Construction Industry (CCI) Sri Lanka

Eng. Maj. Ranjith Gunatilleke stated that the data presented by speakers and each expert is of high value and contributed to the success of the Seminar. As Deshabandu Ar/Plnr Dr. Surath Wickramasinghe noted, the main concern is the management of water resource that requires immediate attention and will allow us to reuse water during the period of drought with a tunnelling system or by pumping to areas lacking water. That consideration was addressed by all speakers and what has already been done in these spheres. Hon. Minister also mentioned that all these data are widely available for the last 100 years or more, and several studies have been done in the last 50-60 years by various parties. However, it is still uncertain if a disaster will strike this evening or not. He also expressed his content in the statement made by Mr. Hashimoto informing that by mid 2017 a concrete and constructive proposal will be produced to finally mitigate and provide solutions to Sri Lanka.

Elaborative information was provided to the members of the audience at this Seminar. Eng. Maj. Ranjith Gunatilleke provided a Sinhalese quote to the members of audience, translating into "The monkeys have several discussions to build their houses during the rains and the following day when there is no rain, it is all forgotten. And they keep on jumping". For the floods and drought in this country, a permanent solution has still not been availed. Eng. Maj. Ranjith Gunatilleke stated that this Seminar is an eye opener to educate and inform professionals in this field to involve themselves further in providing mitigation strategies and solutions. Eng. Maj. Ranjith Gunatilleke concluded by thanking members of the audience and noted that presentations provided at the Seminar will be sent to all attendees for further information.

Presentation of Souvenirs

Eng. Maj. Ranjith Gunatilleke invited Deshabandu Ar/Plnr Dr. Surath Wickramasinghe, President, CCI to present tokens of appreciation for the speakers at the Seminar: Eng. Dr. Kitsiri Weligepolage, Eng. S. P. C. Sugeeshwara, Mr. Timothy Hannan, Eng. Upali Delpachithre, Mr. Firzan Hashim, Mrs. Dayalanie Abeygunawardane, and Mr. Hiroki Hashimoto.

Vote of Thanks by Mr. Nissanka Wijeratne, CEO/Secretary General

Mr. Nissanka Wijeratne, thanked all partners, speakers, guests, President of CCI, Board of Directors of CCI, Council members of CCI, sponsors and media personnel for the success of the Seminar. He made a special mention to Hon. Anura Priyadarshana Yapa, Minister of Disaster Management, for gracing the event through his busy schedule on parliament day. He further thanked all experts for the presentations, and their valuable contribution. Mr. Nissanka Wijeratne also expressed his thanks to Janashakthi Insurance that sponsored this event. He also stated that many insurance companies were approached, but only Janashakthi Inusrance came forward to support the objectives of this Seminar. Special thanks was also given to Sri Ramco Lanka Pvt Ltd and 'other organisations' for the display of banners and support.

Mr. Nissanka Wijeratne also conveyed his gratitude to Asia Pacific Alliance for Disaster Management Sri Lanka (A-PAD SL) for all the assistance given in organizing the seminar, coordinating with the Hon. Minister, and also for functioning as the rapporteur. He concluded his address by thanking the media personnel for the coverage of this Seminar, and CCI staff and Renuka Hotel for the support given.

SUMMING UP

By the presentation of the learned papers in this successful seminar to address 'Flood control and disaster responsiveness in proposed Western Megapolis ', the following inferences can be drawn .

As Sri Lanka is an island located within a Tropical Monsoon belt, she has become increasingly vulnerable to Global climate change (ie.) Drought in one corner and floods in another and that too simultaneously.
Where as previously the Urban: Rural ratio was more static, over the past 30 years or so creeping urbanization with natural population growth has increased pressure especially on the Western Parts of the country which is exposed to the Monsoons from the South – Westerly direction of the Indian Ocean.

There are many critical River Basins in this Region (viz. Gin , Nilvala, Kalu , Kelani , Attanugalu and Maha oya) and floods are caused due to overflow of these rivers (Riverine Floods) and floods caused by local drainage (Urban Floods) during a deluge .

As Mitigatory measures, Structural Flood Control (Levees etc) and construction of Holding Resevoirs at locations prior to the rivers flowing into the Urban Metropolis have been proposed with subsequent Trans – Basin Canals to connect drought prone areas are some of the proposals in these papers .

In particular it is noted that the Kalu ganga with the highest annual runoff is hardly used productively except the small Kukule resevoir to generate electricity . It is the same with Kelani ganga which has the third highest run-off . Both these rivers have not been tapped to irrigate the dry zone inspite of several feasibility studies undertaken in the past . There have been studies even to divert the water from the Kukule , Gin and Nilwala to the Southern dry zone upto Inginiyagala . Unless these schemes are undertaken to regulate and control the flows in the rivers it will be difficult to prevent floods in the Western and Southern Provinces and the droughts in the dry zone.

The papers have also noted that land degradation, erosion, sand mining, unsuitable human settlements as contributory factors to Flooding.

With the intended Western Megapolis development caution has been raised about the severe economic and social consequences that can be encountered if adequate drainage management is not addressed at the Design Stage of Planning.

In japan in particular Disaster Risk due to increased Urbanisation is factored into designing Urban Metropolis spread and it was noted that a Japanese Govt Study of the Kelani basin is forthcoming in July 2017.
The deliberations were very thought provoking and scientific and lauded for its timeliness.