Participatory disaster information gathering approach for urban flood resilience

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Abstract: **Flooding is an indivisible component of nature facing by the human across the world. It is proven that 'flood' is highly required to the cyclical process of river based ecosystems. During the last few centuries, the global urbanization has been severely affected by the phenomena of flood among all types of natural disasters which occur worldwide, as the most frequent disaster occurrence. The artificial alterations plus over exploitation of the natural functioning of water cycle have been causing devastating flood events increasingly. Sustainable Development of the human settlements is being threatened by frequent flood occurrences and their consequences where flooding has become a negative event in the context of rapid urbanization. On this background, this study aims to achieve the objective of examining the applicability of community based information to increase the flood resilience in the urban regions affected by storm water and flood occurrences, taking Kalu Oya Basin of Northern Colombo, Sri Lanka as the case study region. In the context of mixed urban to rural continuum of Kalu Oya basin, the utilized tools of community based information gathering techniques were proven greatly successful enabling a fruitful interaction to gather the different scenarios on living with flood.**

Key words**: Community, Disaster Resilience, Flood Risk Management, Urban Floods**

I. INTRODUCTION

The earliest human civilizations are depicted to be evolved along the river valleys according to the historical evidences where the river based agriculture and transport were sacred to the citizens. Thus being in the riverine areas, "Flood" was an indivisible component faced by the human civilization evolved across the world. Extending back into prehistoric ages even before the Bronze Age and Neolithic period, flood has affected the history of human kind where most of the times flooding was essential for them in order to nourish their agriculture fields. The well-known historical tales from the farthest corners of the world including the Epic of Gilgamesh in ancient Mesapothemia (being the first ever written epic of the world), Manu-Mathsya tale from India, the Great Flood in Holy Bible etc. commonly denote how the anthropogenic forces have broken the 'sacred bond' between water and human beings. Even most of these historical examples explain that, 'flood' is highly required to the cyclical process of river based ecosystems while artificial alterations plus over exploitation of the natural functioning of water cycle have been causing devastating flood events throughout history.

However even being technologically advanced in multi-spectrums during the last few centuries, the global urbanization has been severely affected by the phenomena of flood as one of the main causes of immeasurable damages among all types of natural disasters which occur worldwide, as the most frequent disaster occurrence. Rather than riparian flood events, urban flash floods have become a nuisance in the recent past due to the higher frequency and devastating magnitudes of the inundation. Identification of the threatened areas of these flood events is critical where the predicted climate change induced major flood disaster events are occurring at large. In handling the disasters it is essential to firstly identify the nature of the particular disaster occurrences. Flooding can be identified as a disaster with a nature tending to cause repetitive events, where handling it would definitely require cyclical phases necessarily including 'mitigation, preparedness, response and recovery' (Alexander, 2002). Various global examples indicate that preparedness armed with Flood forecasting and early warning is the most effective strategy which enables the capacity to minimize the possible negative impacts of flooding. Therefore it is in critical need to study how to enhance the community resilience to face flood disasters as one of the most pressing challenges in accomplishing sustainable development. On this background, this study aims to achieve the objective of examining the applicability of community based information to increase the flood resilience in the urban regions affected by storm water and flood occurrences, taking Kalu Oya Basin of Northern Colombo, Sri Lanka as the case study region.

II. BACKGROUND

In the context of present urban development expansion pattern, it is anticipated the Northern Colombo region of Sri Lanka to be severely urbanized within the coming years irrespective to its long-lasted role of acting as the main water retention region next to the Colombo Metro Region. Aiming to transform the Western Province as "the most vibrant and livable cosmopolitan smart city (Technologically Advanced IT, Transport, Communication, Power and energy) in South Asia" the Western Region Megapolis Plan (WRMP) was initiated during 2015 which eagerly anticipate the development of Northern Colombo suburbs. This Physical Planning endeavor claims the anticipated development should be grounded upon environmental sustainability and also dynamic economic growth, yet to be achieved via number of larger scale development project activities (Mallawatantri

et.al; 2016). Here it can expect population expansion in these regions in order to bring forward the results expected by the WRMP which in turn means increment of human settlements where the flood disaster vulnerability is experienced, since the WRMP area is located embracing 47% of the Kelani River Basin. Hence whatever the steps taken forward in-line with the settlement development may in severe need of attention with sophisticated research on the effects of flood occurrences and possible remedies at large (Mallawatantri et.al; 2016).

Kalu oya basin which is sited within Northern Colombo region, is frequently affected by flash floods in its rapidly urbanizing context rather than the temporal flood occurrence which a riverine ecosystem face with the rainfall pattern (MCWMS, 2015). The urban and suburban areas of this region have been facing higher alterations and modifications to the hydrological processes within a very short period in recent past. Not only larger river basins, but also the micro scale catchment areas are becoming more vulnerable to frequent flood occurrences (Dissanayake & Sangasumana, 2017). The urban floods typically triggered due to the increasing structures of impermeable spaces including huge constructions, concreted/paved roads, paved home gardens etc. This increase in the impervious spaces cause to the reduced infiltration rates thus the rapid volumes of surface runoff where the flash urban floods are frequented (Hung & Kobayashi, 2010). Similarly, in the Northern Colombo region Kelani River overflowing due to heavy rainfalls in rainy season is only one factor of Flooding. Urban Flooding in the region is very critical due to cumulative concentration of commercial, industrial, residential land uses and the greater infrastructure development schemes given the added pressure of high density population. Hence community involvement in disaster risk reduction is crucially important to address the forthcoming calamities in terms of Floods and Storm Water stagnation.

III. DEFINING DISASTER VULNERABILITY & RESILIENCE CAPACITY OF COMMUNITIES

Cutter (1996) defines that 'vulnerability' is a degree of probability to expose for an adverse effect due to a hazardous event. Any risk presence in social, economic, environmental and human aspects in the context of hazardous event and any ability to cope with the results of that particular event are used to measure the level of 'vulnerability' in the disaster management approach (Proag, 2014). In the context of the coping ability, the level of vulnerability to a disaster event may increase to the people below poverty line while the people who are above poverty line will have better capacity to face the results of a disaster occurrence making them lesser vulnerable (Manyena, 2016). Further according to Manyena (2016), the level of vulnerability differ upon the people as well as the living environs between one community/individual to others within locality, across regions and among countries where some are more vulnerable than others due to multiple factors. Thus, vulnerability to a disaster occurrence depends thoroughly on the coping capacity of a particular community and their degree of exposure to the particular disaster (Proag, 2014). People who are the most vulnerable to the flood hazard may be incapable to escape from the risk due to inadequate resources, especially the knowledge of preparedness.

According to the UNESCO Institute for Water Education, Vulnerability equals to the exposure level plus susceptibility minus the level of resilience capacity. Vulnerability to any disaster depends on the degree of exposure and susceptibility whiles these two phenomena having a positive relationship (Adger, 2006) which is valid to the occurrence of urban floods as well. Increasing degrees of exposure levels and level of susceptibility in a flood hazard may trigger the probability of increasing vulnerability (Witharana & Rathnayaka, 2018). Further according to Adger (2006), the level of susceptibility to be destroyed due to the higher exposure levels to the Social and Environmental changes with lack of adaptation capacity due to the disaster events is higher in densely urbanized areas. Therefore the coping capacity or the adaptation capacity to any disaster occurrence is immensely crucial in any system or community and this factor is described as the 'resilience' (Gunawardhana, 2013; Jose et al., 2017). According to the American Psychological Association (2014), resilience is the process of adjusting well in the face of adversity, trauma, tragedy, threats or even substantial sources of stress. It incorporates psychological, biological, socio -cultural aspects that interrelate with one another to control how individuals answer to stressful experiences. In the context of flood management in reality, resilience is more probable to exist on a continuum that may exist to contradictory degrees transversely multiple domains of life (Pietrzak & Southwick, 2011). Accordingly newer definitions expose that Vulnerability among the individual and community vary conferring to the degree of exposure, sensitivity and adaptive capacity of them (Chetia et al., 2015). The factors affecting the level of sensitivity and adaptive capacity often includes gender, age , income of the people, disabilities, pregnancy and they clearly affect to the differences in human vulnerability to disaster events (Ruin et al., 2009).

Flood vulnerability is undoubtedly more related with the location of physical elements in an urban setting. For example, low lying areas are notably connected to higher risks of flooding given the impervious features. Evidences prove that people below poverty line who lives in an urban setting are more vulnerable to flooding than the non-poor. Most notably these higher vulnerable people tend to live in low lying areas which are affordable for them than low risk areas. Hence resilience level of communities is crucial to be identified with the Physical characteristics of the urban settings including the geomorphology, landscape features, patterns of land uses and specially the hydrological system as well (Gunawardhana et al., 2013).

IV. DISTRESSES OF CONTEMPORARY URBAN FLOODING

"Sustainable Development" of the human settlements all over the world are being threatened by frequent flood occurrences and their consequences during the recent years where flooding has become a negative event in the context of rapid urbanization (Magami et al., 2014). Periodical flooding which was considered as massively positive to the ecosystems (Hickey (2014) are now being distorted with the unpredictable rainfall patterns induced by the climate change aspects. It is globally considered that flood is the most destructive natural hazard worldwide which causes the highest rates of damages to the environment, economy and livelihoods (Doocy et.al; 2013). The consequences of the urban flooding events which are put in to the category of 'destructive disasters' include loss of lives, damage to physical properties including critical infrastructure and pollution of the urban environment at large (Mehtab;2017).

Contemporary urban flooding causes massive environmental problems by extinguishing plant and animal species and habitats by frequent high magnitude floods. It also causes severe environmental pollution by releasing hazardous and toxic substances to ecosystems causing eventual contamination of water bodies (Hickey & Jose; 1995). 2017 is considered as one of the years which occurred highly destructive natural hazard events all over the world during the recent decade. The World Relief Web (2018) denotes that only in the year 2017 there were 96 million people who were hit by natural destructive disasters while more than 55 million from them were affected by flood occurrences where 3331 people lost their lives. According to Magami et,al; (2014), flooding has become more frequent plus more intense with larger magnitudes striking locations which were not being vulnerable to flood event ever in past. The periodical flooding cycle has been visibly changing rapidly worldwide. 100 year flood occurrence magnitude which had 1% chance of occurrence per year is predicted to be intensively increase al lease twice as in was per year in more than 40% around the globe by 2050 which will be a result of changing socio-economic landscapes plus continuing emissions of greenhouse gases (Hallegatte et al., 2013). Global flood risk would upsurge by nearly 187 % over the risk by 2050 in the presence of climate change while South and East Asia would be the highest vulnerable region (Arnell & Gosling, 2016) where as an island nation Sri Lanka will never be an exception.

V.THE APPROACHES TO URBAN FLOOD MANAGEMENT

The links between Urban Growth and Flood impacts are frequently discussed in the context of disaster management especially in recent years due to the increasing levels of high magnitude flood occurrences (Parker, 1995). The increasing exposure and the potential of impact rising has been discussed by various aspects where the approaches of Urban Flood management are based upon. Further according to Parker (1995), the problems and possibilities of reducing the urban flood hazards put upon an increasingly huge burden on the urban governance and citizens as well. Comparative analysis on the contemporary attempts of flood management in the urban contexts reveal that if developing world vs developed world dissimilarities on urban flood management are to be minimized, it require innovative approaches to urban flood management in the context developing world (Stalenberg & Vrijling, 1978). In their study "The Battle of Tokyo and Dhaka against Floods", Stalenberg & Vrijling, (1978), further explain that enhancing the urban flood management may lower the disaster driven losses to the rather larger population holding third world cities such as Dhaka. Constructed Urban drainages have become one of the crucial factors in managing urban floods rather than natural remedial measures increasingly (Verworn, 2002). More studies explains that problems to urban flood management always conjoined with land use and physical development regulatory issues, uncountable gaps in basic hydrological data in riparian regions, structural designing and implementation problems, socio-cultural factors and upon all these the governance and policy issues (Odemerho, 1993). Therefore at these increasing rates of climate changes, the integrated approaches in urban flood management are crucial in urban contexts more than ever. In this context 'Disaster Risk Management' and 'preparedness' have gained higher attention worldwide.

With each repeated flood circumstance, community capacity has been decreased and development investments–such as buildings, real assets, food or security–have been adversely affected in a short span of time (Ainullotfi, Ibrahim & Masron, 2014). But communities were not actively engaged in activities to manage flood risk, they were merely seen as the beneficiaries. Yet, with the introduction of the Sustainable Development Goals which highlighted the significance of disaster-proof and resilient cities and human settlements , the holistic disaster risk management was described as crucially important at all levels (UNISDR, 2015). Hence rather than being too technical in Flood Mitigation, involving the flood prone communities in flood disaster preparedness has been drawn attention with the introduction of Sendai Framework 2015-2030 in Disaster Risk Management. Even though scientific research in this approach are minimum available, gathering the spatially referenced knowledge perceived by the communities living with flood can be converted in to an effective tool which is extremely important for pre-disaster management and especially for enhancing community resilience.

VI.RESEARCH DESIGN

6.1. The Case Study area

Kalu Oya Basin area is a precious wetland portion which is sited in the Northern corner of Colombo Metro Region which has been exposed to the claws of rapid urbanization during the recent decades. The Kalu Oya basin has a small catchment located between the Ja-Ela basin to the North and Kelani river basin to the South and extending to an approximate extent of

78.86 km2. The stream originates in the northeastern part of the basin about 15 km away from the sea and ends at the coast. The Kalu Oya is the major drainage path of the entire basin, which flows into Kelani River through Old Negombo canal. The highly inhabited suburban areas of Ragama, Wattala, Welisara, Mahara, Horape, Gonawela, Kiribathgoda, Kelaniya and Kadawatha are sited within this region which is currently fast expanding with the attraction gained via the ongoing development projects of the area. With the growing population the demand for basic needs also grow, while the main issue in this region lies with Storm Water stagnation and frequent flood occurrence.

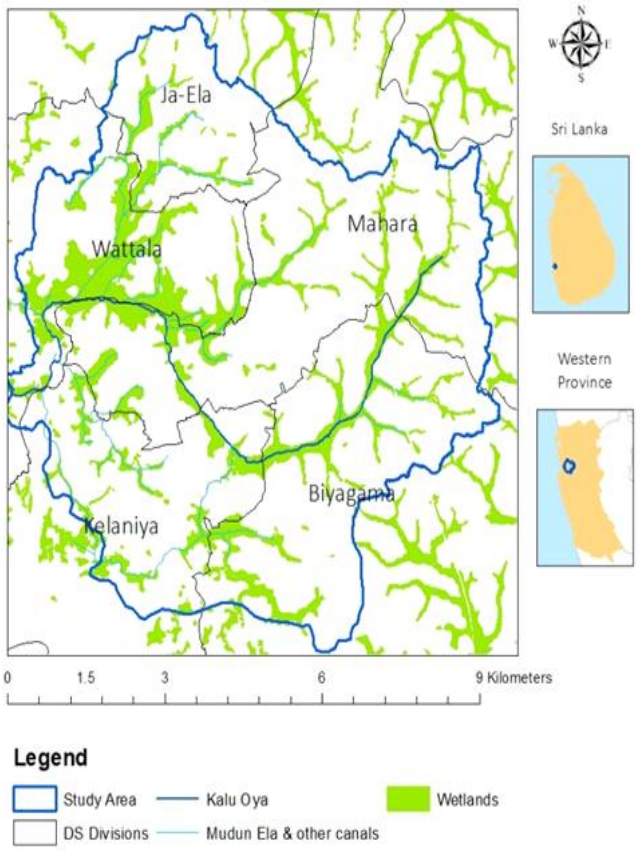

Fig. 1 The location of Kalu Oya Basin

Source: Developed by Authors, 2020

VII. METHODOLOGY

The Storm Water and Flood vulnerable community pockets of the Kalu Oya Basin were identified by consulting the Disaster Management Officers of the 5 Divisional Secretariate Divisions sited within Kalu Oya Basin namely, Wattala, Ja Ela, Mahara, Kelaniya and Biyagama. The gathered results were sorted according to the level of Flood Vulnerability based on the affected communities and property damages during 2016 flood event. A series of Ground level Pocket Discussions were conducted covering the inundation regions identified addressing the sorted 'highest vulnerable community pockets' (80 pockets). Accordingly, a structured questionnaire was developed and fed in to the Open Data Kit (ODK) data collection platform utilizing the 'ODK Build' web application. Then the questionnaire was enabled to use as a mobile-phone data collection app utilizing 'ODK Collect v1.25.1' platform. The filling of questionnaire in field using the app automatically feeds the data in to a Google sheet which is downloadable as an Ms Excel file, reducing all the time which would have been spent to enter the data manually. The collected quantitative data analyzed in MS Excel and the qualitative data utilized to interpret the results. Parallel to the Mobile questionnaire survey, A Cognitive Mapping exercise was carried out with the participants to identify the maximum inundation region in each community pocket. The participants were provided with blank A4 sheets and pens, and then requested to draw cognitive maps of the inundation region of the area they can remember referring to the most important elements in the area. The collected 80 maps were analyzed as a Composite Cognitive Map following 'the city image theory' and 'cognitive Analysis' technique of highlighted elements in Lynch, 1960. By following these techniques, the study anticipated to achieve the objective of examining the applicability of community based information gathering techniques for disaster risk reduction in the urban regions affected by storm water and flood occurrences.

VIII. RESULTS AND DISCUSSION

When discussing the Disaster Risk Reduction for the Flood and SW issues in Kalu Oya Basin, one of the major issues raised was the rapidly occurring urban sprawl. Out of the responses of Pocket Meetings, 67.5% answers indicate the usual inundation area of the region includes mixed use settlement area while 86.25% elaborated the usual inundation regions are comparatively densely built up areas. These percentages of the results justify that, densely built up areas are sited within the flood plain regions. The 80 community pockets covered are all sited within the inundation regions of the Kalu Oya Basin and 182 community participants responded including 74% of males and 26% female respondents. (Accordingly the responses counted as 182 households for the analysis.) Collectively 91% of the housing of the respondents from flood and SW disaster vulnerable communities of the Kalu Oya basin were permanent houses made of brick, cement and concrete while 59% of these households are single story buildings. And also the 8% of shanty dwellers who have permanent or temporary timber and other material buildings as houses are highly vulnerable in terms of flood and SW damage. Accordingly the resilience capacity of these people in terms of inundation damage is relatively very low.

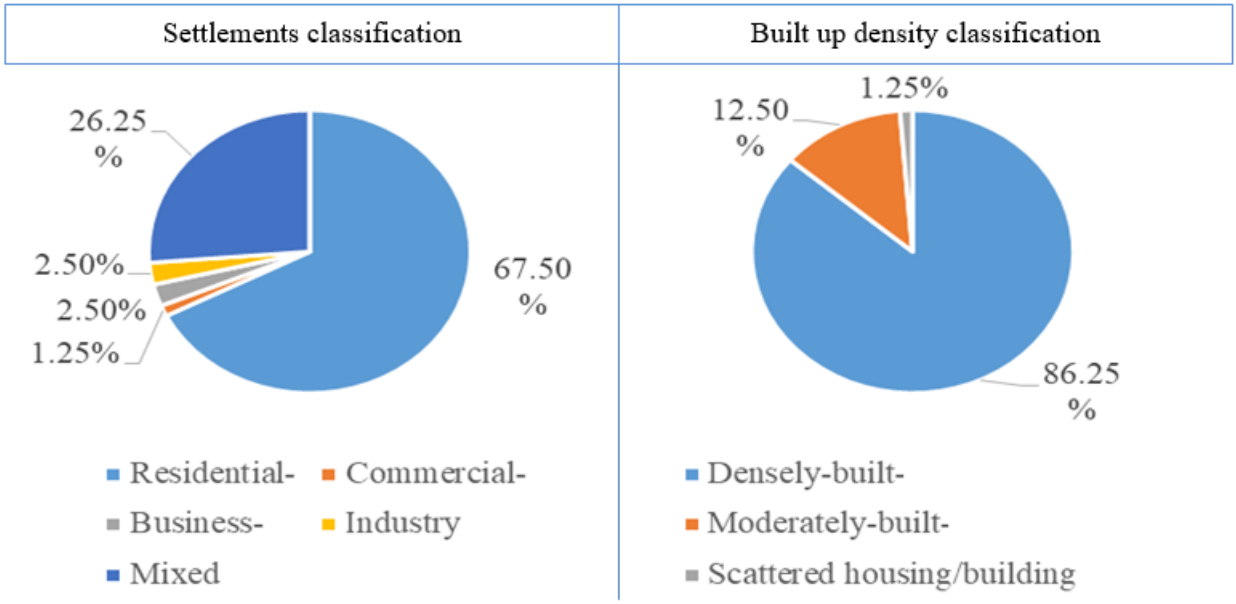

Fig. 2 Inundation area classification

Source: Developed upon Ground Level Pocket meeting results, 2019-2020

The participants' satisfaction regarding the condition of the road network, waste water disposal and garbage collection in the region is in a comparatively lower level where the satisfaction on road conditions is 'poor' for 85%, Waste water disposal condition 'poor' for 79% and garbage collection facilities 'poor' for 58%. The explanation of the participants this regards was, when the residents do not have other option, most of them dump the garbage in to the 'waste lands' sited nearby. The 'waste lands' they refer to are the wetlands, mostly the abandoned paddy lands which are now being converted in to marshes providing habitats to many flora and fauna species. The concept of 'wetlands are wastelands' within these local communities requires a radical change in order to divert the current flood and SW disaster scenario in to positive means. Because, the disaster damage control at least for this much is being retained by the flood control actions of these wetlands. A flood event scenario without the wetlands in the region is 100% inundation of all the settlements and also will follow with deaths, property damages and a broken economy after the event.When considering flood and SW control of the region, the most critical infrastructure is the canal network and drainage network. The participants in the pocket group discussion pinpointed that the condition of these infrastructure in the region is relatively very low and especially the canal maintenance is never in state of art. According to them, especially in terms of canal maintenance there are several institutional bodies responsible (Department of Irrigation, Department of Agrarian Development, Sri Lanka Land Development Cooperation and the relevant Local Authorities) and most of the time none take the responsibility. The same issue was raised during the conducted CAP workshops as well confirming the ground level situation revealed by the CAP participants was true. However there are activities of cleaning and dredging the canal network which was observed during the field work and it requires to highlight that the community behavior also effects on the canal and drainage deterioration.

It is critically alarming more than ever when comparatively analyzing the important land use types related to storm water management and flood mitigation in the contemporary context. Figure 3 illustrates the urban settlement area vs other land use types of Kalu oya basin forecasted for 2030. The figure clearly describe the critical condition of low land areas, nature areas and water bodies in both basins where the immediate actions must be taken as soon as possible.

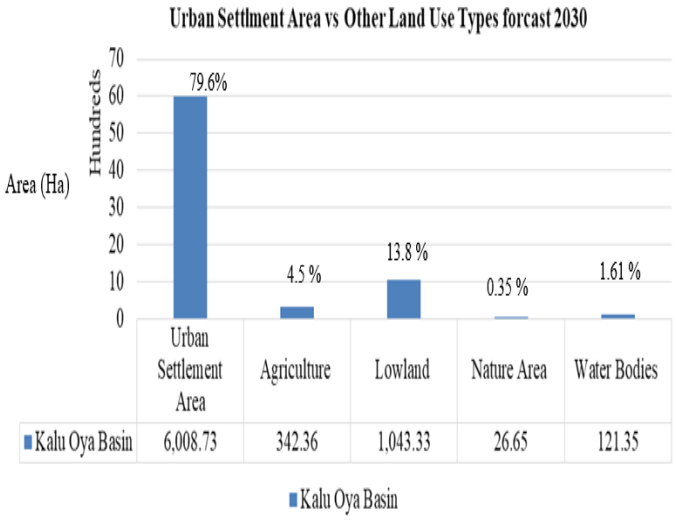

Fig. 3 Forecasted land use pattern in 2030 – Kalu Oya Basin

Source: Compiled by Author using the data from JICA, 2020

The cause of inundation of the majority of the respondents is SW stagnation and the percentage of the response in 85%.Only 15% described the riparian floods as the cause of inundation. Accordingly, the disturbances to the natural water flow of the Kalu Oya basin can be assumed as the reason for most of the inundation issues in the region. Frequency of Inundation during a year was questioned and the response percentage of settlement inundation more than one time per year was 85% where the inundation more than three times per year is 15%. Once the settlement areas are being inundated from flood or storm water, 46% of the households are under inundation for maximum two days while 26% responded the inundation hold on at least one week in an average flood event. The blockage of drainage and canal network and destroying and reclaiming the wetlands have already taken the troll on the inhabitant communities making their resilient capacity even lower towards forthcoming extreme weather events. When discussing about the extreme events, the maximum inundation experience of the respondents was the flood in 2016. All respondents had experienced more than one day inundation duration in this event. According to the report for the World Bank of Rogers, Love & Stewart (2016) the recurrence probability of the 2016 flood is between 15 to 20 year return period while the analysis of Mahanama (2015) and the present study indicate 2 to 5 year probability of recurrence frequency. There had been higher magnitude flood events occurred before 2016 but the damage occurred was not higher than the reports in 2016. The ground level focus group discussion results of the inundation duration indicates that, flood and SW disaster prone communities of Kalu Oya Basin are dramatically deviating away from the basic norms of disaster resilience and the attention towards disaster risk reduction is far yet to reach them.

100% of the respondents have explained the effects of the 2016 flood was devastating than the previous events they faced and also 78% of the respondents deliberated the water of the flood and SW events occurred in the recent decade are full of mud and other debris such as garbage hence the damage to property is being increasing by every event. As the impacts due to an average flood and SW disaster event, 24% of the respondents are in need of relocation to temporary relief centers during a major flood event and the others responded that they can stay at home with difficulties. 93% of the respondents explained the transportation modes will all go under water blocking their daily transportation needs and they would become stuck until the inundation seized away. The access to health services of 57% become denied during a flood situation while 94% responded that the probability of getting sick during flood events is higher than rest of the time for their family members. 60% of the respondents explained the schooling of their children is heavily affected in an average flood event and the reasons explained by the majority of the respondents (89%) is the road network to schools getting blocked due to inundation. The other reasons were school temporary closes down (10%) and school gets inundated (1%).

92% of the reasons for the frequent flooding provided by the respondents are directly related to anthropogenic activities while only 8% of responses pinpointed the overflow from principal canal network. According to the explanations raised during the discussions, many of the encroachments particularly along canal banks and wetlands are illegal. Around 90% of the shanties are built on reclaimed lands. These have exemplified many environmental issues including flooding. These issues have reduced the capacity of wetland to provide valuable services and to support biodiversity. Some measures that would be required to improve hydrological flow in the area and thereby reduce flooding were suggested by the community members while mapping out the local conditions in the cognitive analysis. The suggested measures include clearing of blocked canals, culverts and drains (Gangabada East, Natha ela, Mudun ela, Depaala ela, Kalu ela, Nawammahara area, Muturajawela), removal of silt and mud (e.g. Wedamulla, Kumbal Oya, Peralanda, Peralanda, Ihalagama, Kapuwaawa tanks), removal of aquatic weeds (E.g. Baraneskanda), widening of canals (Baraneskanda, Ranga hardware, Old Dutch Canal, Natha ela, Naramminiya ela, Expressway entrance Kadawatha, Heen ela - reported to have been much wider (8-10ft) than it is now (1.5ft), prohibiting release of waste water or discharge of refuse (e.g. Gills sausage factory, Micro Company Mudun Ela), remove encroachments, have additional drainage canals and culverts, rehabilitate banks and practice sanitary methods of garbage disposal, restrict/prevent landfilling (e.g. Muthurajawela area), evacuate those on the Kelani reservation and those in reclaimed lands and re-settle them elsewhere, remove Illegal constructions on reservations (e.g. Rohana Vihara MW, removal of unauthorized small boutiques (e.g. near Tire Corporation, King coconut venders) and dredging (Ritigaha ela). They also raised concerns as to the necessity of selecting suitable resettlement sites, approving housing plans and having a communal meeting to seek for amicable solutions. Another point raised was that there should be more strict enforcement of the law particularly for retaining canal reservations for settlements and for construction. Future projects they believe must be well coordinated. (e.g. referring particularly to those implemented by the Urban development authority). They claim that the river / canal reservations must be clearly demarcated. Apart from these issues, interestingly, the local residents report that they experienced increased sightings of the Estuarine crocodile (Crocodylus porosus, S. Geta Kimbula) and attributes this to the disposal of food waste from the boutiques and butcheries near the canals and streams. The suggested remedies by the respondents are basically focused on structural measures and maintenance activities of basic infrastructure especially drainage and canal network of the Kalu Oya Basin. 1% of the responses discuss regarding early warning and evacuation while none of the responses are focused to disaster preparedness or disaster risk reduction. Neither the responses of potential remedies are talking about protecting the wetlands nor regarding the protection of natural water flow pattern. The results reveal that the responsibilities

of the community are not established within the community's mindset.

IX.CONCLUSION AND RECOMMENDATIONS

It is evident that these wetland ecosystems are fast diminishing and in the danger of vanishing from existence very despondently due to the extremely ignorant external forces. Over the past decades, the wetlands of Kalu oya basin have been influenced by a number of anthropogenic impacts and unauthorized activities. Upon analytical study on the results of community-based event- evaluation, the frequently utilized abundant toolkits essentially incorporate community-based mapping approaches throughout the world and proven highly successful during the present study. Such activities give a precise environment for individuals to discuss, memorize and express while the perception gain verification and acceptance or rejection in a collective forum. And also, most importantly, letting the community to discuss over the level of socio-economic and environmental resilient capacity in their locality with the future trends is a newer aspect that the present professional level community-based evaluation approaches should practice in abundance for better results. In the context of mixed urban to rural continuum of Kalu Oya basin, these tools have enabled a fruitful interaction to gather the different scenarios on living with flood. Consulting the communities who has the real ground experience covering all the disaster prone households and go for a sustainable solution is highly recommended when evaluating the relatively low resilience capacity of the vulnerable populations of the region. Gathering the spatially referenced knowledge perceived by the communities living with flood is important for the pre-disaster management and enhancing community resilience. A crisis communication plan should be devised and introduced to further mitigate the vulnerabilities. Urban floods in the Kalu Oya basin suburbs of Colombo which has been neglected for a long period require attention more than ever with the accelerated processes of urbanization.

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