IMPACT OF WETLAND FILLING IN URBAN AREA ON FLOOD DETENTION CAPACITY; CASE STUDY FROM MUTHURAJAWELA MARSH

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ABSTRACT

The study was carried out to determine the change of land use pattern in Muthurajawela marshy area due to wetland filling, and its impacts on flood detention capacity of the area. Two methods were used to analyze the data and the objective of the method one was to detect the changes of land uses in the study area during the past 10 year period of 1994 to 2005 while the objective of method two was to measure the reduction of retention volume during the that period. Results of both methods were finally used to find out the impact of wetland filling on the reduction of the retention volume of the study area.

The maximum storage in the marsh area was about 11 million m^3, with a water level of 0.52 m at MSL and the maximum discharge rate 12.5 m^3/s. The retention time was slightly more than 10 days in 1990.The land use changing patterns from 1994 to 2005 in the area was revealed that a significant reduction of 8.586 km^2 as a percentage 35% mainly due to encroachments, unauthorized construction, dumping of solid wastes and deposition of sediments. The filled area for industry was 2.11 km^2 while 0.58 km^2 was filled for Colombo Katunayake expressway project. The category of Garden area was expanded from 19.16 km^2 in year 1994 to 19.28 km^2.

The scrub area in 1994 was 6.66 km^2 and it was increased up to 11.64 km^2 by 2005 due to the effort of maintenance of their home garden area. Scrub area and the coconut cultivation area have been increased by 5.0 km (75%) and 0.68 km^2 (20%) respectively during this 10 years . The surface area was calculated within the 0 and 0.5m contours by overlying with the satellite image in 2005 was 5.585 km^2 and as result of encroachments and unauthorized

wetland fillings, the volume reduced in marsh area within the contour 0 and 0.5m was determined as $5.585x10^3x10^3x(0.5-0)/2 = 1396.25x10^3$ m^3.

Surface area of within the 0.5 and 1m contours by overlying with the satellite image in 2005 was 0.8 km^2 in 2005. Subsequently, the reduction of the volume within the contours 0.5 and 1m was determined as, $0.8x10^3x10^3x(1.0-0.5)/2 = 200x\ 10^3$ m^3. The total, volume reduction within 0 and 1m contours by 2005, was $1596.25x10^3$ m^3due to the results of encroachments, wetland fillings and deposition of sediments. Therefore, a 15% of volume reduction in the storage capacity was observed by the year 2005 from 11 million m^3 storage volume available in 1990. However it is clear that an additional wetland fillings which is amounting 2.2 km^2 have been taken placed beyond the 0 and 1 meter contour lines during this period (1994-2005). Most of flood occurrences were at the range of 0.6-1.2 m MSL in Ja Ela and Wattala area occurred 14 times and 21 times, respectively and recorded 2 flood occurrences at the range of 1.2-1.8 m MSL in Ja-Ela DS division. The Ja Ela and Wattala area recorded a higher level of flood high and occurrences as these areas are located close to Muthurajawela marsh and as a result the people live in Ja Ela and Wattala area were affected very frequently . Number of flood affected houses recorded in Ja Ela DS division were 1147 houses (25%) and 725 houses (7%) were affected in Wattala DS division as in year 2002. As a result of reduction of the volume in the marsh, and the back water impact and the storm water in upper catchments area is not properly drain out from the area. Thus, even in a low rainfall in the upper catchments area could be affected due to urban flash floods. Fragmentation of the wetland area due to encroachments and wetland fillings have trigger out the sedimentation and influence further fillings. Finally the whole area concern will be filled without any plan, resulting frequent flooding. Urban wetlands therefore needs to integrate in to the urban development process without further filling or be permitted minimum filling for urban amenities providing the required flood detention capacity in the area. Compatible land use pattern to be carefully practiced in low lying areas in sustainable manner to provide recreation facilities, such as children parks, dry weather play grounds, on stick structures, and open spaces in to bring an aesthetic appearance to congested urban environment.