International Journal of Landscape Architecture Research
Uluslararası Peyzaj Mimarlığı Araştırmaları Dergisi
E-ISSN: 2602-4322, 3(2): 168-174, 2019

An Evaluation of Floods in Urban Areas under Green Corridor and Resilience Perspective - Istanbul

Aliye Ceren ONUR[1]*

[1]Maltepe University, Faculty of Architecture and Design, Istanbul, TURKEY

*Corresponding Author: aliyeonur@maltepe.edu.tr
[i] This paper was presented at ICLAR 2019 Congress, İstanbul, Turkey, 23-24 August 2019.

ABSTRACT

High frequency of floods in streams as a result of climate change induced increased precipitation rates, threatens especially urban built-up areas. The areas which are highly under risk of this threat are areas that suffers from urban poverty, un-planned urbanization and urban squatters. Ayamama stream is such an example that locates in urban built-up areas and urban life around these streams have frequently impacted from the flash floods. Even tough recently these areas that should be planned as green corridors, experience some rehabilitation efforts, their concepts in accordance with resilient urbanization and green corridor approaches are not known well. It is obvious that Istanbul is very far from being a resilient city as a result of urban regeneration projects that causes socio-economic segregation, loss of public areas and green areas and partial implementations. Resiliency perspective can be summarized not only reducing the risks and/or adapting for having less damages from disasters but also socio economical and spatially having ability to recover itself and continue the urban life as it was before. In this study, the situation of one of the important streams that is highly under risk of floods that locates in urban areas such as Ayamama is tried to be evaluated under green corridor and resiliency perspective.

Keywords: Resilience, flood, green corridors, unplanned urbanization, Istanbul

INTRODUCTION

Fast and unplanned urbanization due to fast increase in population and migration to mega cities, environmental problems like pollution, lack of resources, climate change and earthquakes creates challenges on urban areas and decreases quality of life. Unequal regional investments cause lack of job activities and this results with fast and unplanned urbanization due to migration to cities. At the same time globalization and neo-liberal policies force cities to transform their built-environment according to the demands of the globalizing world[1]. Urban regeneration projects and mega projects have already started changing the image of the cities. These new pressures on cities results with increase of built-up areas and decrease of open green spaces at urban areas. Beside physical challenges, social and economic challenges like economic loss, decrease in quality of life and social challenges are experienced. Nowadays climate change has become one of the most important issues of cities and their agendas. The impacts of climate change are described as rise in temperature, extreme weather events, melt of glaciers and rise in sea level, drought and floods which may not only threaten economy but also quality of life. In case of climate change; increase in urbanization, poor and insufficient infrastructure causes urban heat island effect which increases the urban temperature free from climate change. Together with increase of temperatures caused by climate change, urban heat island effect may increase temperature to extreme levels[2].

Floods can be destructive in urban areas where the built-up area locates close to streams, especially the ones that has lack of infrastructure and quality of construction. Especially increasing rates of precipitations due to climate change caused by unexpected extreme weather events like storms etc. increases the risks on urban areas[8]. For a resilient climate adaptive urban stream system, the watershed area should be planned in a holistic approach together with the city. If these streams are located in densely built urban areas the rehabilitation of the streams have crucial importance. These areas should be integrated with green and open areas containing a continuous habitat without fragmentations. In these continuous green corridors pedestrian and bike roads, public areas where people can be gathered and socialized should be integrated. Around stream areas built-up areas should be limited and/or decreased considering flood risk areas. For adaptation to climate change induced flash floods,

permeable surfaces together with riparian planting to create carbon sink and flood tampon areas should be developed. These flood prevention areas should be integrated with coastal areas in order to decrease the level of hazards that may be caused by sea level rise and waves[3].

Considering all these challenges especially at mega cities and developing cities like Istanbul, creating urban resilience seems difficult. Urban resilience is described as coping with existing vulnerabilities and risks also managing future disturbances through effective urban resilience tools[4].In this study the question "can Istanbul be a resilient city?" which tries to face with unplanned urbanization, increase in built up areas and decrease in open green areas together with impacts of climate change like floods are tried to be discussed. In Istanbul floods have become one of the most destructive hazards of climate change. In Istanbul extreme rains causes floods of streams in urban areas due to lack of impermeable surfaces like open green areas that causes economic loss and creates risk on citizen's life. Regarding to these facts Istanbul case is tried to be analyzed focusing Ayamama River's flood risk. The focus question "Are the precautions taken for these floods are efficient enough for being a resilient city?" is tried to be discussed.

ISTANBUL CASE FOCUSED ON AYAMAMA RIVER

Istanbul as a mega city with a population over 15 million[6], is one of the most rapidly developing cities in the world. It covers 5344km2 and locates between two continents (Asia and Europe). It has both Black Sea and Mediterranean Sea climates and a unique ecosystem that contains both characteristics of these climates. The population started to increase in 1950's as a result of migration from rural areas toward Istanbul. Reflection of globalization and neo-liberal policies in cities are showed themselves as urban regeneration projects, decentralization of industry from the center of the city, mega- projects etc. After 1999 earthquake this transformation found a legal reason (Urban regeneration Law:6306) for the investments at city. After 2000's the city center and the desantralizated old industrial areas have become the most rentable places for both national and international investments. The new image of Istanbul has changed to high residences, malls, trade centers with high way connections and mega projects like airports, bridges, canals etc.

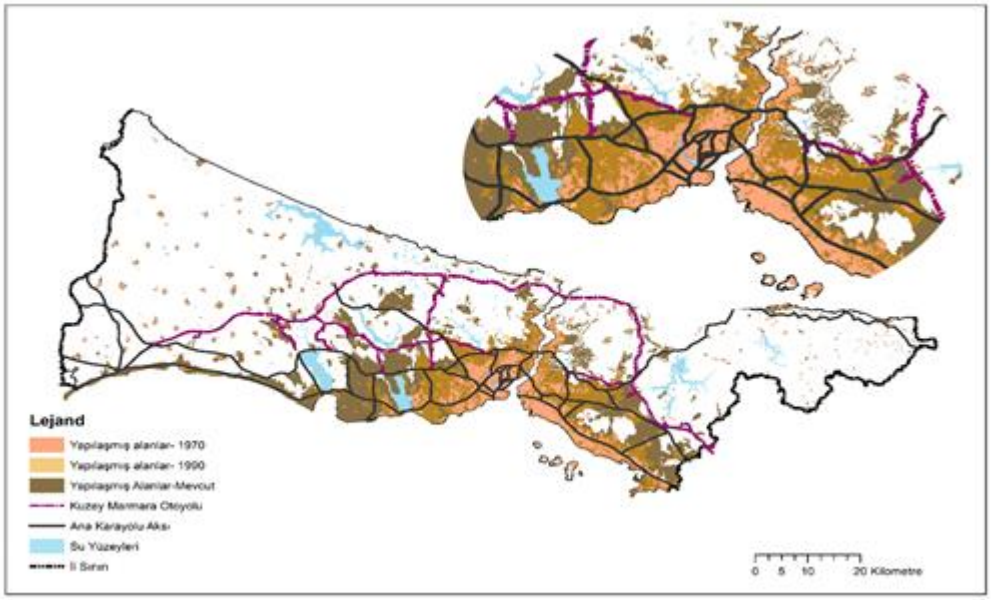


Figure 1: Urbanization in Istanbul[8]

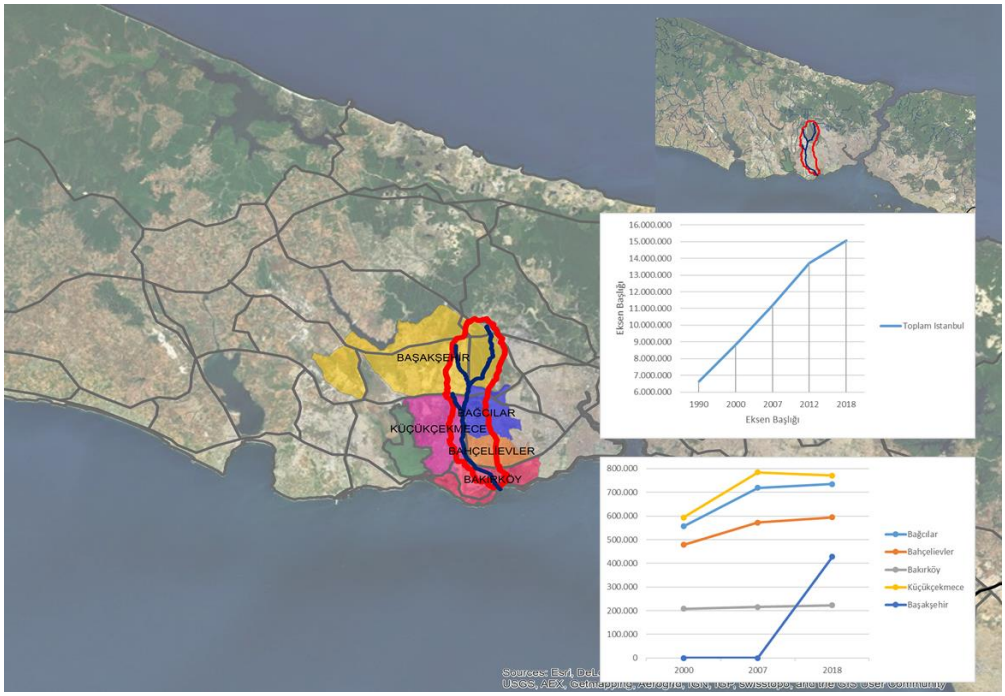
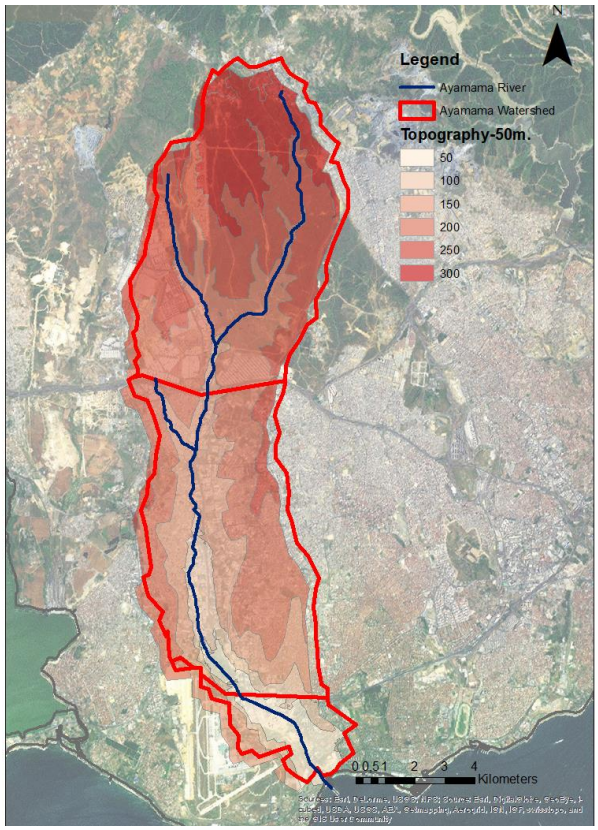


Figure 2: The location of Ayamama and population rates

Ayamama Stream locates at European Part of Istanbul where close to city's important CBD's and main roads. Its watershed covers about 6676 ha with 21 km. length (with attributes 42km). Around Ayamama River and its watershed, built-up area is dense and the functions are various. The Land use of the area varies from housing to trade and industry containing other service and education facilities as well[5]. It covers about 6 districts which boundaries are changed after 2010's and the population seems to increase dramatically after 2007 (Figure 2). The highest place of the watershed locates at the north of the watershed where the stream born and slightly flows into Marmara Sea Figure 3)



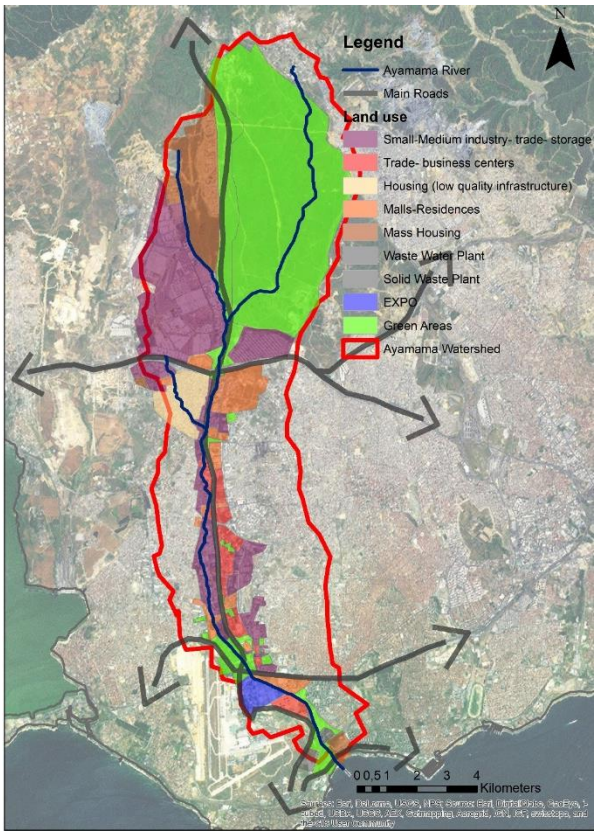


Figure 3: Altitude and Land Use Analyses (2019) of the stream (Produced from ARC-GIS Satellite views by Onur, A.C.)

At the upper part of the streams the area is covered with natural vegetation like grass, then stream passes along the new housing and industrial areas where the quality of construction is high. Then TEM road which connects European side to Asian side by the 2nd Bridge crosses the stream. The connection road between TEM and other important road E-5 that locates at the south part close to Marmara Sea follows and sometimes intersects with Ayamama stream. This connection road (Basın Express Road) between two main dense roads and its surrounding's land use are housing, residences, malls, trade centers, industrial areas etc. The most damaged part by flood consists of housing with low quality with 2-4 floors, small industries with same quality, some storage areas together with medium industry, services and trades with better conditions. At downstream the waste water collectors and expo centers close to the Atatürk Airport (closed at 2019) and also new housing and trade center projects exists. At the area green areas are generally passive and severe.

At 2009 after a very heavy rainfall, a flash flood occurred at Ayamama river and caused serious damages to housing areas, industrial and trade areas. Transportation and infrastructure totally collapsed. Beside economic and physical damages, some people are died at this flood[5]. After this hazard, the authorities tried to rehabilitate the river by plans which are far away from a resilient urban stream system. This plan considers enhancement and increasing the capacity of Ayamama, constructing waste water collectors rather than considering urban green corridors and creating flood tampon and sink areas with open green public areas which can be a sustainable and resilient solution for these areas under risk of flood. The watershed area is under highly dense and urbanization and no rehabilitation efforts are observed at the area. The area especially starting from Basın Express Connection road a transformation from industry to trade and service sectors together with high residences and malls are observed. With severe and passive open green areas, the risk of flood may continue threatening the quality of life in the area.

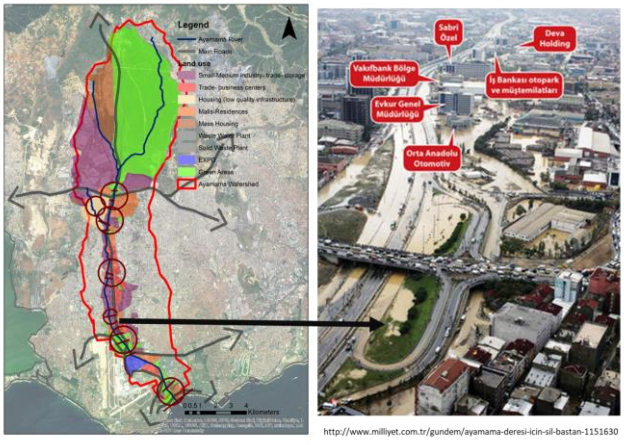


Figure 4: Areas under risk of flood

According to the Istanbul Metropolitan Municipality AKOM flood risk study the area under risk of flood are determined and mapped. Regarding to that study, the areas that are under risk of flood are tried to be adapted and evaluated together with land use analyses of Ayamama. At this focus area also there are some areas that are more under risk of flood (Figure 4). At this risk area the land use is about 13% industry, storage and trade, 5% business centers, 8% residences and malls, 4% green areas (passive) and %70 housing and others. But the housing area in this focus area has low quality of construction and infrastructure.

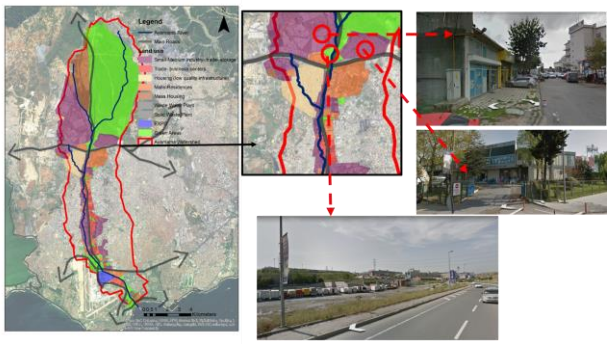


Figure 5: Land use details of flood risk areas at Ayamama Stream (1)

The risk area close to where Ayamama borns and close to TEM High way, the land uses are storage areas and small industries which the construction quality seems low and. The area is important as TEM passes across this risk area (Figure 5)

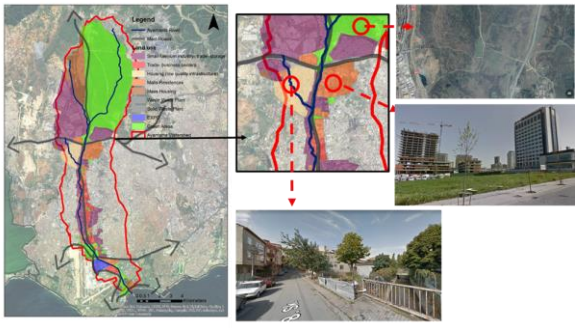


Figure 6: Land use details of flood risk areas at Ayamama Stream (2)

The land use where the Ayamama Stream borns is military area and open green area. No significant flood risk is observed in this area. Below TEM Highway, areas that are under risk of flood have various and important land uses such as housing, small industry, business centers and residences (Figure 6)

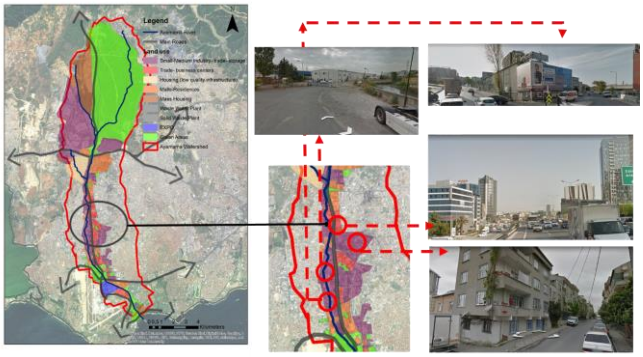


Figure 7: Land use details of flood risk areas at Ayamama Stream (3)

Among these areas which are under risk of flood, the risk area shown in Figure 7 is one of the most vulnerable area. The flood happened at this area in 2009, collapsed all Basın Express Road which connects TEM and E-5 Main Highways and exists important land uses. These areas land uses are generally business centers, small medium trade and industrial areas, storage areas and residences which are newly built.

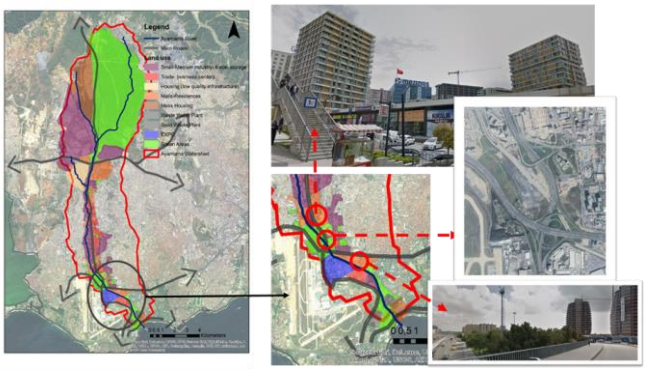


Figure 8: Land use details of flood risk areas at Ayamama Stream (4)

The Land use around the Ayamama Stream at south where meets Marmara Sea, consists of facilities that are in connection with Atatürk Airport which was the main Airport in Istanbul but closed at 2019. There are new residences and housing areas beside open but passive areas. There are also waste water collectors and E-5 main road with connection roads. There is a railway and coastal road which is also important for Istanbul's coastal areas and connection with CBD's.

CONCLUSION

In this study the how a resilient climate adaptive urban stream system can be developed is tried to be discussed over Ayamama Stream. According to this approach the urban stream systems should consider these following strategies[7];

- Integration with green and open areas containing a continuous habitat without fragmentations
- Including pedestrian and bike roads, public areas where people can be gathered and socialized[5]
- Limiting built-up areas around stream areas considering flood risk areas. For adaptation to climate change induced flash floods, permeable surfaces together with riparian planting to create carbon sink and flood tampon areas should be developed. These flood prevention areas should be integrated with coastal areas in order to decrease the level of hazards that may be caused by sea level rise and waves[8].

The vulnerable area around Ayamama Stream has the following character;

- It is a transition area from industry, storage areas and low quality of housing lack of efficient infrastructure to business centers and high quality of residences.
- It contains important highways like TEM, E-5 and Basın Express Road which has highly importance for city and connects CBD's and continents,
- Around Ayamama Stream there is lack of open green areas which can have functions like flood and carbon sink and tampon areas,

- The lack of infrastructure capacity especially at existing housing areas and industrial areas increases the vulnerability.
- No public areas, no human scale is considered in this area lack of pedestrian and bike roads.
- The area is highly dense with buildings
- The daily population is even much more higher than the existing populations, so the population which is under risk of flood are higher than the population of the area.
- The urban transformation does not consider open green areas, public areas, green corridors perspective etc.

Considering these results Ayamama stream seems far away from being a climate resilient and adaptive Urban Stream. The strategies determined on the plans unfortunately may not be implemented because of the pressure of investments in these transition areas especially from industry-storage areas to business centers, malls and residences. In the future in case of increasing the climate change impacts, in Istanbul the precipitations will increase and Ayamama may have to face with even worse flood risks. In this case the recovery phase of the city may be even harder and expensive.

REFERENCES

[1] H. Yaylı, Küreselleşmenin Kentler Üzerine Etkisi: İstanbul Örneği, S.Ü İİBF Sosyal ve Ekonomik Araştırmalar Dergisi, vol 12, (2012), pp. 331-356

[2] A.C. Onur, A. Tezer Ecosystem services based spatial planning making for adaptation to climate changes. Habitat International, 47, (2015), pp. 267-278.

[3] Nathaniel E. Seavy, Thomas Gardali, Gregory H. Golet, F. Thomas Griggs, Christine A. Howell, Rodd Kelsey, Stacy L. Small, Joshua H. Viers and James F. Weigand, Why Climate Change Makes Riparian Restoration More Important than Ever: Recommendations for Practice and Research, Ecological Rest. September 1, (2009), vol. 27 no. 3 pp. 330-338

[4] Z. D. Yaman, Urban Resilience As A Policy Paradigm For Sustainable Urban Planning And Urban Development: The Case of Istanbul, Phd Thesis. ITU, (2018).

[5] T. Kervan, Avrupa Ülkelerinde Entegre Nehir Restorasyonu Yaklaşimlarinin İncelenmesi Ve İstanbul Ayamama Deresi Vaka Analizi, Yüksek Lisans Tezi, Fen Bilimleri Enstitüsü, İTÜ, (2016).

[6] TURKSTAT, (2018), http://www.turkstat.gov.tr

[7] M. Delibaş, Critical Assessment Of 'Stream Daylighting' As An Approach For Renaturalization Of Riverine Systems In Urban Areas, Case Study On: Ayamama Stream, Msc. Thesis, ITU, (2012).

[8] A.C Onur. İstanbul'da kentleşmenin iklim değişikliğine uyum çerçevesinde değerlendirilmesi, Doktora Tezi. İTÜ, Fen Bilimleri Enstitüsü , İstanbul, (2014)