

# **Urban Transformation as a tool for Disaster Mitigation**

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## **Abstract**

Urban transformation projects are prepared with the purpose to sanitize decayed areas, to make cities beautiful and to create economic vitality. Since natural hazards threaten large metropolitan areas, urban transformation is pronounced together to mitigate disasters. This approach of urban transformation includes land use decisions related to hazard, risk and vulnerability analysis and to enhance the implementation of building codes respecting the current standards with application of urban transformation methodologies. Ideally urban transformation methodologies include not only physical and economic improvement but also provide social improvement concerning people who live in the area.

Urban transformation seems to be the government's primary tool for disaster mitigation by guiding urban development and improving the quality of housing stock in Turkey. Municipal Law gives municipalities the power to initiate Urban Transformation projects to rehabilitate urban areas or to mitigate disaster risk. Istanbul (Turkey) which is the biggest metropolitan area and waiting a big earthquake in next 30 years will be subjected to several urban transformation projects in the near future. In the paper, the urban transformation related to disaster mitigation approach will be discussed in the case of Istanbul in terms of descriptive analysis and proposals for future development.

## **Introduction and Background**

Urban transformation used to be accepted as economical vitalization of inner city. Recently social, aspect gained importance as well as economic and physical issues for the projects. The cases subject to urban transformation generally are old industrial sites and ports, historic deteriorated areas in city centers, old residential areas in developed countries. In 1999 Marmara earthquake show us about %60 of building stock in Turkey is vulnerable for the earthquake. Therefore after 1999 earthquake urban transformation cases in Turkey focused on unplanned areas where is vulnerable for earthquake.

In June 2010, Law No. 5998, an amendment to the Municipal Law No5393 of 2005, expanded item 73 on urban transformation projects to give municipalities the power to initiate Urban Transformation Projects to rehabilitate urban areas or to mitigate disaster risk (Yönder and Türkoğlu, 2011). Urban transformation seems to be the government's primary tool for disaster mitigation in Turkey (Yönder, 2006).

Housing Development Administration of Turkey (TOKI) is a key partner to municipalities in the implementation of urban transformation projects. From its establishment in 1984 to 2003, TOKI had developed 43,000 housing units on public lands. From 2003 to 2010, TOKI intensified its production, developing 430,000 units and aiming to reach 500,000 units by the end of 2013. Thus TOKI has become a key engine in development and transformation of urban areas. Despite its claims to provide affordable housing, however, TOKI's focus has not been on low income housing, and it does not produce rental units. "Low income housing" makes up only 31 percent of the units it produced from 2003-2010; 14 percent is related to urban transformation, 1 percent is rural units, and only 3 percent was disaster housing, with the remaining 51 percent being market rate. Its strategy is to reduce housing prices by increasing the overall housing supply, and to finance affordable units through development of market rate housing (Yönder and Türkoğlu, 2011). The municipalities' partnership with TOKI is initiated through a request by the municipality. Priority is given to the transformation of high-risk areas, and suitability of the development site (Yönder and Türkoğlu, 2011).

## Urban Transformation Projects and Mitigation Efforts in Istanbul

Today, within its 12 million inhabitants, Istanbul is the most populated city in Turkey. Moreover, Istanbul undertakes several leading roles in cultural, financial, commercial, tourism and service functions. This feature of the city certainly reflects on nation's economy. Istanbul's contribution to tax revenues reaches 42%, its contribution to the budget is 34% and its share in GDP exceeds 20%. Expansion of urban land in Istanbul showed linear development in the southern part of the city, from the eastern side to western side, parallel to the North Anatolian Fault. Both population and building density increased in the fringes of the city. Newly developed sub-centers and industrial areas enabled to change mono-centric structure of Istanbul to poly-centric structure. Despite, this development process tends to arrange inner-city flows and protects forest land in the northern part of the city, earthquake vulnerability increased in Istanbul. When 1999 Kocaeli earthquake hit the Marmara Region, in Istanbul, Avcilar (in south-west) and Tuzla (in south-east) were the most affected districts with collapsed buildings. In Istanbul 1-2% of the buildings were damaged, 454 people were killed and 3600 people were injured (Erdik et al, 2000).

Vulnerability and exposure indicators for Istanbul have been evaluated in different ways. For instance Davidson (1997) had used a set of indicator to compare the risks at megacities including Istanbul as a case. In her approach, vulnerability is described as "how easily and severely a city's physical infrastructure, population, economy and social-political system can be affected". Respectively to this definition, Istanbul is one of the vulnerable mega-cities of the world after Manila, Jakarta, Lima and Santiago. This macroscopic perspective gives a general idea in evaluation of vulnerability of different cities taking into account the basic and common indicators. For instance, Gencer (2007) defines vulnerability with a combination of (a) urban poverty; (b) uncontrolled and unsustainable urbanization and development; and (c) substandard urban administration focusing on the case study of Istanbul. In another study by Kundak (2006), decisions and their reflections on land use pattern of Istanbul are major components increasing vulnerability and consequently earthquake risk. Once considering vulnerability, it is worthy to note that vulnerability is a product of a long term process which means cities cannot become vulnerable over night and consequently it is better to figure out resilience as a long term target to achieve. For instance, in Turkey, building amnesty laws in the last period of the 20th century targeting un-planned developed zones in major cities such as Istanbul. In this period, both central and local government were able to fulfill residential need of large number of immigrants from the rural parts of the country to big cities. Therefore, at the fringe of settlements, a new type of development gave a start without respecting to any regulation, without taking building codes into account, without receiving engineering support and expanded mostly near to natural resources and on hazardous areas. Unplanned areas within illegal houses are mostly situated on risky zones such as water basins, alluvial soil and filled land. These areas were used to be remained empty before this development. Because of their location near to city center, they had been favorable for new comers who suffered to find shelter in the city (Figure 1). Consequently, especially in Istanbul, urban transformation projects have been initiated in order to make city more resilient.

The rapid urban expansion of the city has caused a great pressure on natural sources as well. The northern part of the city is covered by forest areas (47.7 % of the total area). The main underground water reservoirs are wider in the European part. Sensitive and critical areas hereby, are crucial natural zones which can be either easily affected from disruption and/or under the threat of urban development. Once natural features of the city overlays with the built up area, we can easily notice that some parts of underground water reservoirs are covered by urban land. These areas are at the same time most problematic areas in heavy precipitation as well. Regarding to earthquakes, these areas are more susceptible to collateral hazards considering leakage of hazardous materials to the soil and then to underground water.

Socio-economic aspect of Istanbul unfolds vulnerability and resilience at the same time. Regarding urban exposure of the city, the elements at risks reveal as major element inherently having vulnerable. But on the other hand, social and economic capital that city has is the main element to make the city resilient. Istanbul is the primate city in Turkey with its population more than 10 million and its great

contribution to the national budget. Furthermore, as Istanbul is specialized at the tertiary sector, it is the economic heartland of the country as well. Within this perspective, Istanbul seems to have a better mitigation capacity, however, once considering the economic losses due to the Kocaeli Earthquake on the national economy, we may assume that even Istanbul is able to recover itself in the case of any crises; there can be some negative impacts on national economy such as less contribution to the budget. Theoretically, if we consider “the stronger is resilient”, we ignore probable losses which may affect not only Istanbul but also the entire country. If we just focus on probable losses and their indirect impacts, so this time we underestimate the recovering capacity of the metropolitan city. This dilemma makes difficult to assess macro level vulnerability and resilience of large cities.

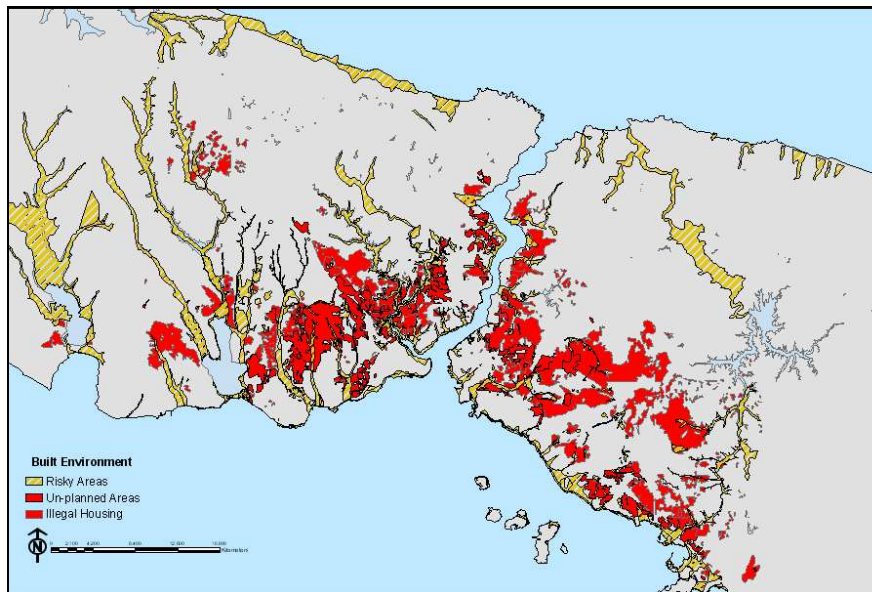


Figure 1: Unplanned areas located in risky land in Istanbul (Kundak, 2006)

In 2002, following a “Study on Disaster Mitigation/prevention in Istanbul Including Seismic Microzonation” prepared by the Japanese International Agency (JICA), a comprehensive Earthquake Master Plan for Istanbul (EMPI) was prepared for the Istanbul Metropolitan Municipality (EMPI, 2003). The overall purpose of EMPI was to provide guidelines for disaster risk reduction in order to enhance safety and quality of life in the city and it is a comprehensive risk-based approach for sustainable urban resilience. The plan provided a comprehensive assessment of the current situation and seismic vulnerability of the building stock in the city, and considered the implications of these risks in relation to urban planning, legal, financial, educational, social, and risk and disaster management issues. Recommendations included: “reducing infrastructural deficiencies; gradually eliminating the unauthorized stock and hazardous use; protection of the natural and historical assets; density reduction; reclaiming urban quality and identity; participation of the local communities in the management of the city; rehabilitation of high risk areas; ; integration of city management processes, and land-use decisions; retrofitting or removal of buildings according to the local revision plans; prepare special data-base systems for local planning for the management of risks; organize participatory planning procedures, devise new tools for enforcement and finances.

1/5000 scale geological studies were prepared for Istanbul at the level of micro-zones that provide the basis for master plans by Istanbul Metropolitan Municipality. Istanbul Metropolitan Planning (IMP) Office was created in 2005 coordinating with the Planning Department of the Metropolitan Municipality and is in charge of developing 1/100,000 scale environmental plans. The 1/100,000 scale Istanbul Plan was prepared by IMP-IBB in 2007, and after some controversy, was adopted in 2009, and then again, cleared by the High Court in 2010. The plan incorporates all the urban

transformation projects in the city as well as the plans from an international urban design competition for two sub-centers in Kartal (Figure 2) to the east and Kucukcekmece on the western side of the city.

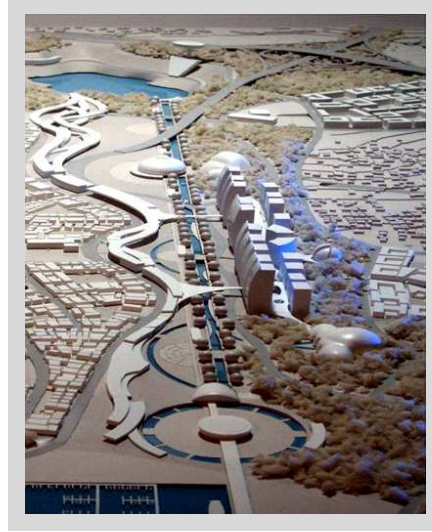


Figure 2: Kartal Urban Transformation Project (Istanbul Metropolitan Municipality)

In 2006, Istanbul Provincial Administration started the Istanbul Seismic Mitigation and Emergency Preparedness Project (ISMEP) with financing from the World Bank to strengthen local disaster response and emergency management capacity with strengthening of overpasses, underpasses and viaducts and school buildings.

Forty percent of TOKİ projects related to urban transformation are concentrated in Istanbul. Urban transformation projects are developed either on site, if there is space available within the municipality, or in a new development area whenever possible, with some facilities, such as cultural centers and schools. These include the developments in İkitelli-Başakşehir (114 units), Başbüyük in Maltepe (300 units), Esenler-Oruç Reis, Kayabaşı Küçükçekmece. Ayazma (308 units) and Bezirgan Bahçe (2640 units) developments in Kucukcekmece have been designed as a satellite town where people have been living now for two years. The 114 units in İkitelli-Başakşehir are built as disaster housing (Yönder and Türkoğlu, 2011)

Three district municipalities – Zeytinburnu, Kucukcekmece and Fatih have completed disaster related urban transformation projects. Zeytinburnu was selected as an Urban Transformation pilot project in 2003 after the EMPI study. This was due to both the poor quality of its housing stock and its location along the southern coast on the European side of Istanbul, the most seismically sensitive area of the city, and its prime location for real estate development. After EMPI study approximately 150.000 building were searched, and roughly 1/3 of them was determined as risky in ten districts such as Zeytinburnu, Fatih, Kucukcekmece, Bayrampaşa, Bağcılar, Güngören, Bahçelievler (Figure 3).



Figure 3: The Areas Under High Risk in Istanbul (Istanbul Metropolitan Municipality)

All of these projects led to different degrees of community reaction. In Basaksehir (formerly Kucukcekmece), homeowners opposed to being moved to smaller units, and the reactions to having to move an isolated and drastically different living environment, led the municipality to offer some social programs, such as psychological support, career development courses, activities for women. In Fatih, destruction of the 2000 year old Roma community (Sulukule) create reaction for removal of its residents to high rise buildings outside the center city. Zeytinburnu, was in a relatively more advantageous situation, despite the low and moderate income levels its residents, since it was selected as a pilot district by the Metropolitan municipality for mitigation activities and urban transformation. A participatory planning process was undertaken in Zeytinburnu municipality in Sumer and Merkez Efendi neighborhoods (Figure 4). The Matra Regina Project, initiated by a proposal by the Dutch Ministry of International Affairs, was carried out in partnership between the district municipality and the Istanbul Technical University. Merkez Efendi project involved working with residents of a single urban block, and was more successful since it involved residents from the beginning of the process, and turned out to be a learning process for both the residents and district officials (Yönder and Türkoğlu, 2011).

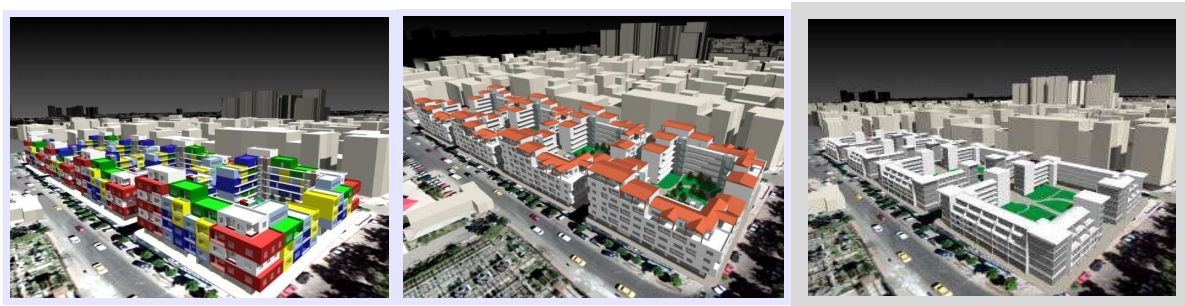


Figure 4. Design Alternatives for Sumer Neighborhood (Istanbul Metropolitan Municipality)

## CONCLUSION:

Significant steps have been taken in Turkey, and especially in Istanbul, since 1999 for the disaster mitigation. But for the building stock there are a lot to do. Therefore urban transformation could be accepted as a important tool to mitigate the urban environment at the neighborhood level.

It is not so much the lack of appropriate legislation and information systems but rather the lack of coordination among the numerous government agencies both at the central and local level. Municipalities the locally elected government units responsible for implementation of mitigation

measures through preparation of master plans and building controls, as well as their closer interaction with communities. Land use and building legislation also started addressing issues related to disaster mitigation. Increasing the role of municipal administrations in disaster mitigation through better land use and building controls is important (Yönder and Türkoğlu, 2011). TOKI has been successful in increasing the safe housing supply but social planning and equity issues do not seem to be their concern in the applications. TOKI applications will be concentrated at the city centers in the near future. Urban transformation in city centers requires a participatory planning and design approach. Using this valuable tool could protect the vulnerable groups who live in the inner city and economically valuable land.

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