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Urban sprawl processes characterize the landscape of the areas surrounding cities. These landscapes show different features according to the geographical area that cities belong to, though some common factors can be identified: land consumption, indifference to the peculiarities of the context, homogeneity of activities and building typologies, mobility needs exasperatedly delegated to private cars.

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URBAN RESILIENCE AND ECOSYSTEM SERVICES: HOW CAN BE INTEGRATED IN THE CASE OF ISTANBUL - SULTANBEYLI DISTRICT?

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ABSTRACT

As estimated by UN, in 2030, 95 % of population growth will result from urban areas while a few metropolitan areas of rapidly growing developing countries will absorb much of this growth. Due to the accelerated urban growth and uncontrolled urban dispersion through naturally significant areas, sustainable urban growth management becomes a critical urban development policy for the global agenda.
Istanbul has been attracting much of the internal migration with a dramatic urban growth process since 1950s and Istanbul Province, with over 12 million people in 2010, is the most populated city of Turkey. Sultanbeyli, as a unique case for informal housing development in Istanbul, expanded like mushrooming after 1980's and located itself on the largest drinking water source of Istanbul: the Omerli Watershed. The population of the Sultanbeyli District grew from 82,298 (1990 census) to 272,758 people (2007 census) (TUIK, 1990;2007): more than threefold increase in less than two decades with consequent environmental degradation, uncontrolled ground water pumping, lack of drinking and waste water infrastructures. These factors endanger the well-being of the environment and of the society. On the other hand, the serious poverty problem is the main concern in Sultanbeyli for urban resilience (UR) which can be defined as the degree to which cities are able to tolerate alteration before reorganizing around a new set of structures and processes and which can be measured by how well a city can simultaneously balance ecosystem services (ES) and human functions (Resilience Alliance, 2007).
This paper aims to discuss how to integrate ecosystem services and resilience theory which will be essential to resolve the problems reflected by social, economic and administrative characteristics of the Sultanbeyli District to enhance its urban resilience capacity in Istanbul.

KEYWORDS:

Ecosystem services (ES), urban resilience (UR), informal housing, Istanbul, Sultanbeyli.

1 AN INTRODUCTION TO RESILIENCE THEORY

Seeking a reform or a radical rethinking of the development concept, it is obvious that changes are compulsory in both goals and methods. The simple view of development suggests an upward climb, which is common to all countries but with different stages. Once the traditional development thinking has been challenged, a new concept – such as sustainable development, started to find wider interest. In 1987, the World Commission on Environment and Development attempted to formulate the concept of sustainable development as the study of the conflicts between environment and development ends. As this concept had been introduced in a larger discussion, there were generally three aspects (social, economic, environmental) that had been recognized; sustainability vs. un-sustainability: this lasts in itself is easier to recognize and compelling to action through the necessary policies (Haris, 2000). Klein, Nicholls and Thomalla (2003) state that over the past thirty years, there is an increasing recognition across the disciplines as human and ecological systems are interlinked and their resilience (therefore sustainability) relates to the functioning and interaction of the systems rather than to the stability of their components or the ability to preserve or return to some equilibrium circumstances.

Urbanization causes changes on land uses and habitats which are often subject to complex interactions among patterns, processes and natural systems in urban areas, and influenced intensely by all of ecological, social and economic drivers. On the other hand, rapid changes in urban activities and land uses affect the capacity of urban ecosystems to continue their functions and ecosystem services (ES) sustaining the quality of life. Therefore building resilience might be important particularly in the areas experiencing rapid population and urbanization change (Berkes et al. 2008; CSIRO, 2007).

According to spatial, administrative/institutional and temporal perspectives, cities may change more or less suddenly. The occurrence of vulnerability reduces resilience and increases the exposure of urban systems to the risks of oddities of uncertainty and unexpectedness. This perspective shows a multi-level look of the resilience of an urban system conceived as the role of *metabolic flows* in sustaining urban functions, wellness and quality of life; *governance networks* and the ability of society to learn, adapt and reorganize itself to face urban challenges; the *social dynamics* of community and citizens, as users of services, consumers of products, etc., and their relationship with and within the *built environment*, defining the physical patterns of urban space interactions (CSIRO, 2007). The *Metabolic flows* concerns the production, supply and consumption chains in an ecosystem, transcending the boundaries of the city. This is directly linked with the capacity of producing energy, goods, and services to be sufficient for the wellness and the life-quality of the whole community. On the other hand, production systems' interconnection, interdependency, diversity and efficiency are meaningful to test their own resilience. *Governance networks* are composed of institutions and organizations leading and managing urban settlements. The relations among them affect the regional, national and international levels. Governance relates to the management of finance, services (sewer, water, education, etc.) and emergency services (police and fire departments). *Social dynamics* include such as the features of demography, human capital and inequity characteristics of the population. Finally, *built environment* category represents ecologic and urban landscapes, and habitats. Ideologies, policies, building laws and transportation, affect the way the built environment may develop (Normandin et al. 2009). Urban resilience (UR) derives from the intersection of these areas.

Urbanization is both a social phenomenon and a physical transformation of landscapes through intense use of ecological processes around the globe and it totally dominates complex systems made up of resource flows such as food, energy, water, waste, as well as flows of people and goods. However, many rapidly growing cities of developing countries have not reached the same growth in socio-economic opportunity as developed countries. In other words, the socio-economic roles of ecosystem services in the wider development context should be factored into urban resilience strategies (Schäffler, 2010h), especially in developing countries. Turkey, like other developing countries, suffers from extensive pressures on natural resources due to rapid population increase and urbanization dynamics around metropolitan attraction nodes. The case of Istanbul sets a unique example with a population growth around 600% and a growth in built up areas 700% approximately since the 1950s. Today, Istanbul, with more than 12 million people, is still one of the most attractive internal migration nodes in Turkey. Diverse service facilities of governmental and private institutions, employment opportunities, cultural and historical background have been stimulating thousands of people from different rural parts of the country. As a result of rapid growth in population and urban dispersion, there has been significant pressure on ecological life support systems of the region. Since the 1980s especially, Istanbul experienced a considerable urban development in or neighbouring areas to drinking water sources. Therefore, there has been rapid environmental degradation in watershed areas by the impact of urbanization, especially by informally developed areas (Tezer, 2005).

Drinking water is provided by seven watersheds in Istanbul and the Omerli Watershed is the most important since it supplies more than 1/3 of drinking water demand of the province. However, the watershed has been experiencing dramatic population growth and informal settlement dispersion. Informal settlements, such as Sultanbeyli District, spreaded around after 1980's with lack of building and infrastructure quality in the peripheral areas of Istanbul with additional degrading effects on the environment and natural resources (Firat, 2004; IMP, 2007). In this study, social vulnerabilities are seen as the major triggers of change in ecosystem services and also as main threats for resilience in Sultanbeyli's ecosystems. In this case, the integration of ecosystem services with resilience theory becomes essential to enlighten the conflicts reflected by social, economic and political characteristics of the Sultanbeyli District.

Since the Sultanbeyli District is located on the long-range protection zone of the Omerli Watershed (Tezer et al. 2011(a)) and accommodates densely constructed informal residential buildings, the provision of the socio-economic resilience and the integration of the ES into the urban resilience theory are essential. In general terms, the benefits of the integration of ES which are rationally in line with the resilience theory, can be classified as follows:

- Multi-dimensional land use
- Better integration of socio-ecological systems
- Better identification of land-management thresholds
- Better coordination, cooperation and governance
- Provision of information production and sharing
- Encouraging sustainable activities
- Improving adaptive governance systems
- Provision of financial resources

These perspectives will be evaluated in the case of Sultanbeyli District which has significant importance as representing unique example for the resilience of the Omerli Watershed and Istanbul.

2 INTEGRATING ECOSYSTEM SERVICES AND RESILIENCE THEORY

"Resilience", as a concept, emerged from ecology between the 1960s and early 1970s. Ecologist C.S. Holling introduced resilience as the capacity to endure within a condition despite the changes and assumed that "resilience determines the persistence of the relationships within a system and measures the ability of these systems to absorb changes of state variables, driving variables, and parameters, and persist still" (Folke, 2006 quoted Holling, 1973). While Folke et.al. (2002) defines resilience as the capacity of a system to absorb shocks and to maintain its functionality at the same time. So resilience provides the mechanisms to renew and reorganize its functioning, when there is a change. Moreover, Brand and Jax (2007) propose resilience as a boundary object in the sense that it incorporates the capacity of social-ecological systems to cope with, adapt to, and shape change and learn to live with uncertainty and surprise. Basically, urban resilience is a multi-dimensional concept which basically focuses on the achievement of the changes where urban settlements exposed to.

The attention this term receives is the response to a widespread sense of uncertainty and insecurity and a strain to find formulas for adaptation and survival (Müler, 2011). Resilience as a concept firstly appeared in the work of the ecologist C.S. Holling. According to Holling (1973), resilience is "a measure of the persistence of systems and of their ability to absorb change and disturbance and still maintain the same relationships between populations or state variables." In 1986, Holling (1986) refines this definition as "the ability of a system to maintain its structure and patterns of behavior in the face of disturbance." In the late 1980s, the ecological vision of resilience involved the interactions between people and the environment in order to measure the complexity of community-environment interactions, and the changes they bring (Maguire and Cartwright, 2008), then in the 1990s several scholars adopted this approach as an important tool to measure sustainability.

A key conclusion is that the definition may vary according to the use that is done of it. Plodinec (2009) classifies resilience into four categories;

Being vs. Becoming: Many definitions of resilience begin with "the ability to . . . ," as an inner quality of the subject. Others view resilience as a process.
Adaptation vs. Resistance: Most of the definitions focus on the adaptability to adverse events.

Trajectory: A more ecological approach studies if an adverse event brings an actual change in the socio-ecosystem without evaluating whether the change is an improvement or not.
Predictability: This approach is used to predict how positively the subject will react and regain functionality compared to others.

Finally, these definitions can be taken in comparison according to of what is similar to resilience. As an example, resilience and resistance are often considered as similar, but they are not. Resistance should be the provision of protective structures in order to make systems not significantly harmed by natural hazards; while, resilience has more in common with the term 'adaptation. The process of adaptation may help to achieve resilience, but it can't be substituted with resilience (Surjan, Sharma and Shaw, 2011).

Vulnerability can be understood as the features of resilience to tackle with for being resilient. The social and ecological systems lose their resilience and become vulnerable to change, when the change couldn't be absorbed, adapted or transformed. Therefore, in vulnerable systems, even small changes may be devastating in results; while, in a resilient system change has the option to produce opportunity for development and sustaining of the system. When considerable transformation is unavoidable, resilient systems already contain the components needed for renewal and reorganization. Briefly, they can cope, adapt, or reorganize without sacrificing the provision of ecosystem's services. Given its origins in ecology, it is not surprising that most resilience scholars have historically been interested in empirical analyses of non-urban areas (e.g., shallow lakes, production forests, and small-scale agriculture), and have devoted less attention to the specifically human and social elements of human-dominated systems, such as cities. In fact, several elements of resilience theory are highly relevant to cities (Ernston et al. 2009). A resilience perspective recognizes that communities are diverse and have ecological, social and psychological dimensions (CSIRO, 2007). Resilience is associated with diversity of species, of human opportunity, and of economic options maintaining and encouraging both adaptation and learning (Folke et al. 2002).

Now the general approach of resilience for urban development related sectors is quickly expanding and including the following: mitigation and adaptation to climate change (Satterthwaite et al. 2007; Dodman, Ayers and Huq, 2009; Deppisch and Hasibovic, 2011), disaster planning, management and recovery (Goldstein, 2009; Vale and Campanella, 2005; Godschalk, 2003; Berke and Smith, 2009; Normandin, Therrien and Tanguay, 2009), energy and environmental security (Coaffee, 2008), urban design (Colding, 2007; Pickett et al. 2004), resilience as socio-ecological systems (Berkes, Folke and Colding, 1998; Adger, 2000; Folke, Colding and Berkes, 2003; Adger et al. 2005; Walker, Holling, Carpenter and Kinzing, 2004; Folke, 2006; Walker and Salt, 2006; Ernstson, 2008), urban resilience (Folke et. al. 2002; Alberti et al. 2003; Pickett, Cadenasso and Grove, 2004; Campanella, 2006; Gleeson, 2008; Maguire and Cartwright, 2008; Ernstson et al. 2009; Newman, Beatley, and Boyer, 2009; Deppisch and Schaerffer, 2010; Lin, 2006) and urban planning (Fleischhauer, 2008; Wilkinson, Porter and Colding, 2010; Scotti-Petrillo and Prosperi, 2011; Schrenk, Neuschmid and Patti, 2011; Wilkinson, 2011). The extended use of resilience allows the treatment of the issues raised by Holling (1986) about renewal, innovation and reorganization in system development and how they interact across scales (Gunderson and Holling, 2002; Folke et al. 2010).

The resilience of an area provides the idea about the management of social-ecological systems. Thus, in order to build resilience for social and ecological sustainability, firstly it is essential to explain the relation between the humans and the nature. People are the most significant part of the urban system. They, respond and react, get involved and interact with urban ecosystems (Pickett et al. 2004). Human activities modify the states, landscapes and the functions of the ecosystems, consume terrestrial environments for providing life-support systems and affect the sustainability of human society. Therefore, the "land use system" can be considered as the "coupled human-environment systems" or the "social-ecological systems" (SESs) (Lin, 2006). In the coupled human-environment systems, or SESs, natural and social systems play a dynamic role. The social-ecological systems act as strongly coupled, complex and evolving integrated systems (Folke et al. 2002). Human communities may show a great capability to face changes and adapt themselves if analysed only through the social dimension, but such adaptability may weight on the capacity of ecosystems to sustain the fitting, and generate gaps and discrepancies in the resilience of a social–ecological system. On the other hand, considering the ecological approach as a sole basis for decision-making for sustainability, may lead to too narrow and wrong perspectives. That is why it is necessary to work on resilience which stresses linked social–ecological systems (Folke, 2006).

Management of resilience-building is versatile and open to learning. It attends to slowly-changing, fundamental variables that create memory, heritage, diversity, and innovative capacity in both social and ecological features of the system. It also keeps and fosters the diverse necessary elements to reshape and adapt to new, unexpected, and ever-changing circumstances. Therefore, it increases the range of surprises with which a socio-economic system may cope (Folke et al. 2002).

3 SULTANBEYLI DISTRICT: AN INFORMALLY DEVELOPED QUARTER OF ISTANBUL

Sultanbeyli was established as a small village in 1950s for the immigrants coming from Bulgaria; however, today it extends over 3000 hectares area with a population over 282.000 people (Figure 1 and Figure 2). In 1954, a 750 ha area was acquired for residential development and Sultanbeyli received formal "village" status by the Government in 1957. Old village pattern of the settlement represents the planned character as different from the recent informal developments. According to different researches, the most important driving forces for the change in Sultanbeyli were the availability of cheap land, existence of the most important highway (TEM) passing through the district and intensive internal migration originated from different rural regions in Turkey (Hurfikir, 1994; Isik and Pinarcioglu, 2001). The District sustained its village status until the beginning of 1980's and became "municipality" with the impact of population increase and settlement expansion in 1987. In the meantime, 1350 ha of State Property forest area was taken out of "forest land status" (as 2B-degraded forest status) by the Directorate of Istanbul Environment and Forestry Department in the same year, as a result of illegal urban development expansion. 2B- degraded forest lands that lost forest characters are assessed by cadastral applications regarding to 2/B of 6831 No. Forest Law that was realized according to 1744, 2896, and 3302 numbered additional laws (Tezer et al. 2001(b)). In Sultanbeyli District 440 of total 695 hectares land disqualified from forest were transformed to built-up areas. This process encouraged to degrade forest areas in the form of shrinking and transforming to built-up areas continuously. Today, although land expansion is not continuing as fast as previously but population is still increasing in considerable ratios (Figure 2) (Tezer et al. 2001(b)).

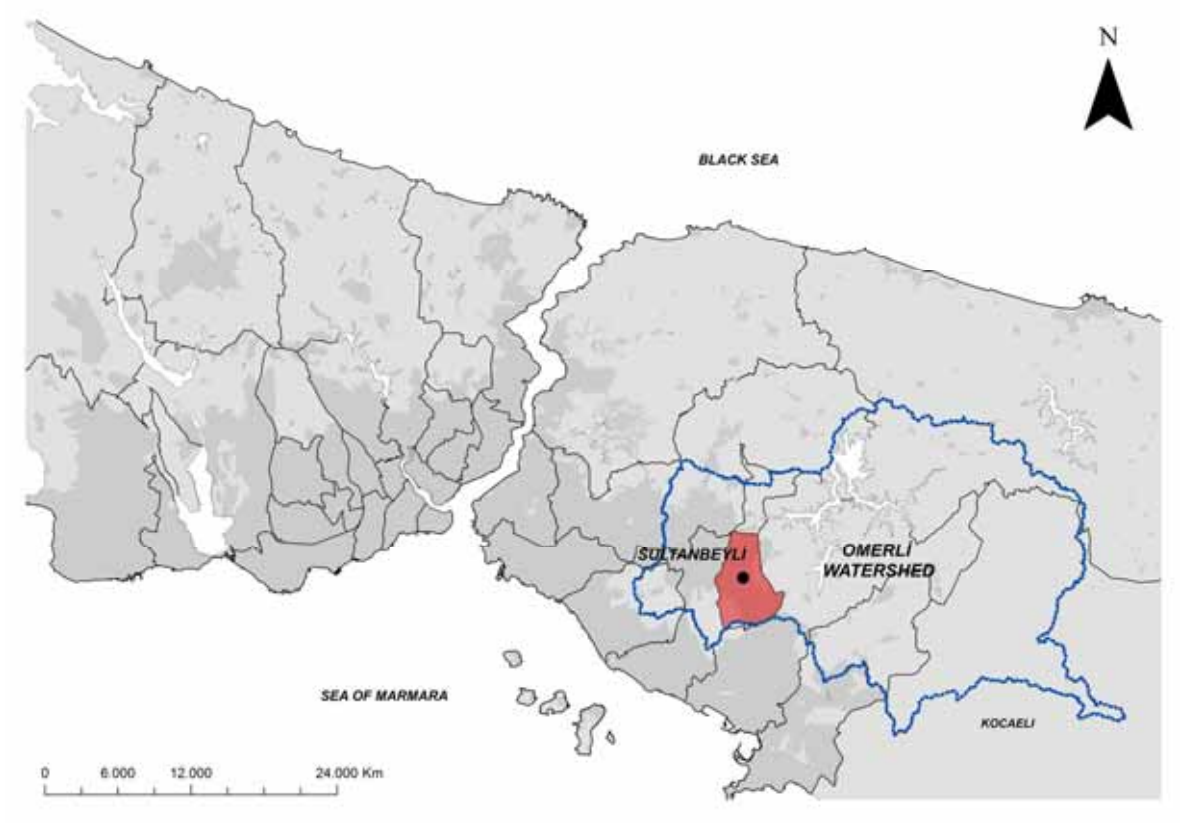

Fig. 1 Location of Sultanbeyli and Omerli Watershed in Istanbul (Tezer et al. 2001(b))

The irrigation pool, which is located on the southern central part of the District, with its 4.7 hectares area is an essential domestic and drinking water supply for Sultanbeyli and Pendik (IPDEF, 2007). Additionally, the north-eastern and south-western parts of the District are covered by forests and heath-lands and the Aydos Forest located near Sultanbeyli represents one of the most important forest ecosystems in the region. The flora of Aydos Mountain is enormously rich with Mediterranean, European-Siberian and Southeast Balkans species and it contains many rare and endemic plant species [Ozhatay and Keskin, 2007; Tezer et al. 2008; Ozhatay et al. 2005).

Between 1987 and 2005, transformation of almost 2000 hectares of land into built-up areas caused dramatic changes in the distribution of cultivated areas, bare-lands and other key ecological units in the Sultanbeyli District. Figure 2 and Table 1 show land cover changes of ecological units and built-up areas between 1987-2005. It is clearly visible that built-up areas represent a sharp increase while forests, woodlands, cultivated areas and bare-lands are simultaneously decreasing (Tezer et al. 2011(b)).

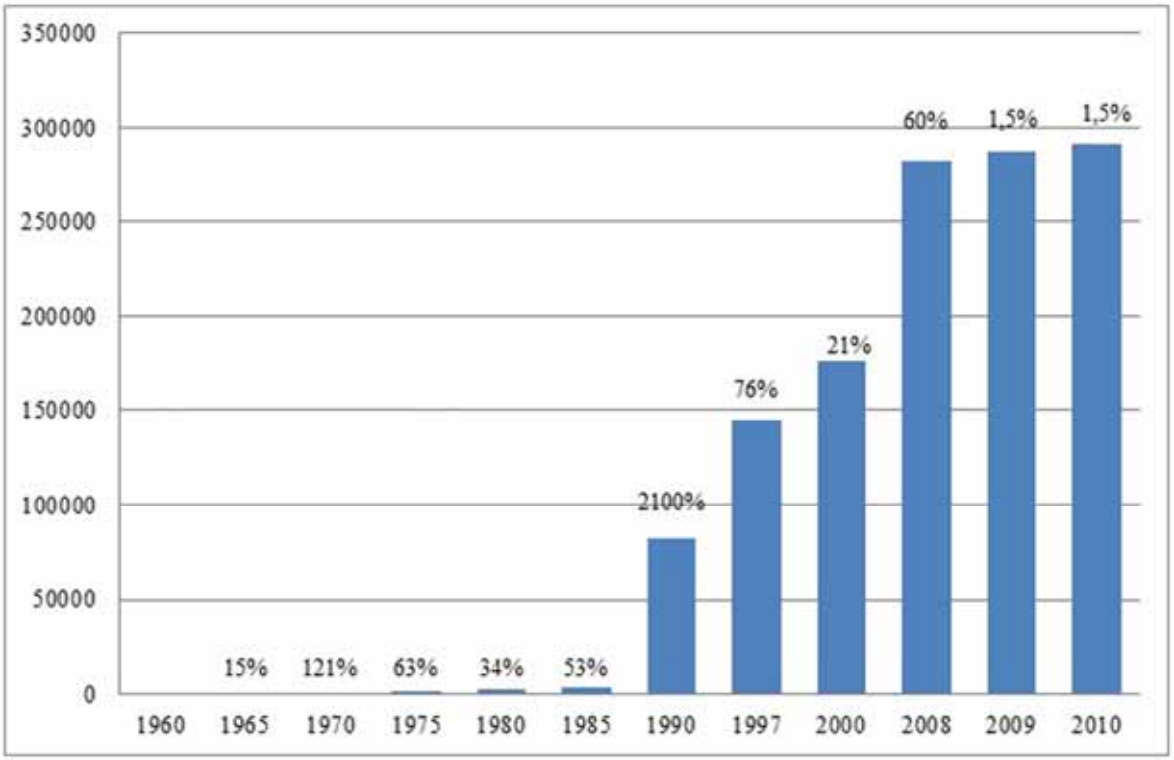

Fig. 2 Distribution of ecological units and built-up areas in 1987, 1995, 2005 (Tezer et al. 2011(b))

GROUP OF ECOLOGICAL UNITS	YEAR 1987 (Ha)	YEAR 1997 (Ha)	YEAR 2005 (Ha)	RATE OF INCREASE OR DECREASE IN LAND AREAS OF ECOLOGICAL UNITS AND BUILT-UP AREAS BETWEEN 1987-2005
Wetlands and surface waters	8	5	14	75% increased
Forests, Woodlands, Heath lands and Rocks	713	642	583	18% decreased
Cultivated Areas and Bare lands	2712	1836	852	68% decreased
Built-up Areas	67	1017	2051	2961% increased
TOTAL		3500 Ha		

Tab. 1 Changes in land area of ecological units and built-up areas in 1987, 1995, 2005 (Tezer et al. 2011(b))

Property right is another important issue leading to land degradations in Sultanbeyli. According to the land ownership distribution map given in Figure 3, 633 hectare of land belongs to the Treasury, 583 hectare of forest area is managed by the Ministry of Environment and Forestry and the rest of the area consists of private and shared properties. In 2005, in the Sultanbeyli District, 361 hectares of land belonging to the Treasury was occupied by illegal developments (Tezer et al. 2011(b)).

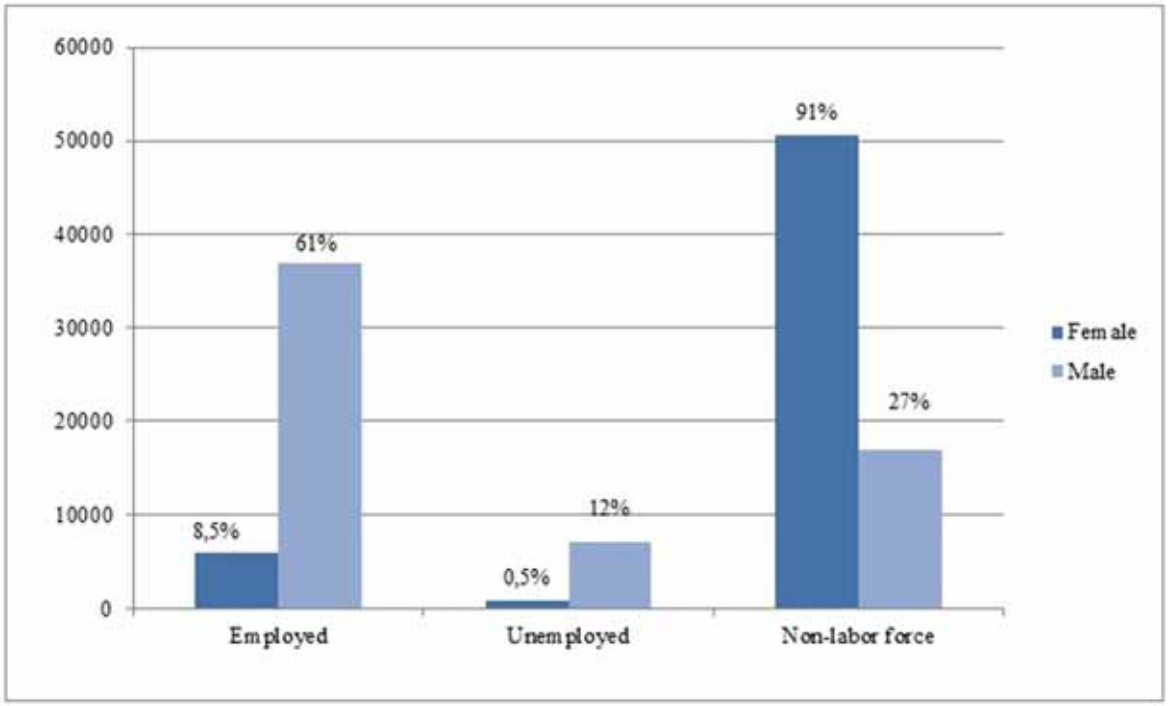

Fig. 3 Land use and ownership pattern in Sultanbeyli 2005 (Tezer et al. 2011(b))

The physical structure of Sultanbeyli developed as a result of the lack of control on land-management together with the ever starting and unfinished construction sites. In some periods, informal constructions were even encouraged with some legal tools such as building amnesties and Local Rehabilitation Plans. Consequently, the informal districts such as Sultanbeyli were legalized in every general election periods to persuade people who live in those areas for their political support. However, the quality of living standards, social services and infrastructures were way below the standards and out of control. Although the former examples of informal constructions and squatters (*gecekondus* in Turkish) in Istanbul were built for sheltering purposes only, the latter ones however, were much beyond than this as the ones in Sultanbeyli District. Latter *gecekondus* were different from the earlier ones with their multi-storey, concrete and not being "built over-night" characteristics. On the other hand, dense built-up pattern, lack of infrastructure systems and public facilities and more importantly the way of land occupation processes were the common features of these two types of informal building examples. These factors accelerated risks on ecological units and socio-cultural environment (Tezer et al. 2011(b)).

During the late 1980's, when the construction process of *gecekondus* accelerated, the majority of the buildings were unfinished: left without facade-plasters and unfinished-roofs recalling extra stores to be built in the future. In recent years, although they were looking like more 'complete', unfortunately the majority of these buildings had no engineering service and control during their construction processes. This building stock has another concern regarding to the earthquake risk with lack of required vertical and horizontal facilities for the strength of buildings (Tezer et al. 2011(b)).

Fig. 4 Population growth in Sultanbeyli (TUIK, 2010)

On the other hand, if we quest these changes we can find the overlap of extraordinary population growth and irregularity as a cause. As Figure 4 indicates sharply, the second half of the 1980's was the turning point for population increase in Sultanbeyli. Sultanbeyli's social profile formed with mostly immigrants from Black Sea and Eastern Anatolian Regions of Turkey. As Isik and Pinarcioglu (2001) state, there were three generations of immigration waves which are classified as;

-First generation: 1970's-1983 from outside of Istanbul-Black Sea Region,
-Second generation: 1984-1993 from Istanbul-outside of Turkey (foreigners) and central Anatolia region,
-Third generation: after 1994 from southeast Anatolia and eastern Anatolia region.

Internal migration waves have an important effect on the dynamics of social-economic structure in the peripheral settlements of Istanbul. First effect is the selection of Sultanbeyli as a settlement with the connections of people from the same part of the country as country-fellow (*hemseri*) and establishment of communion (*cemaat*) relationships. Secondly, development of income groups of districts with the effects of immigration waves (Isik and Pinarcioglu, 2001). Isik and Pinarcioglu argue that these migration waves have divided in sharp contrast the social structure of Sultanbeyli District as high income groups and low income groups. High income groups have their own homes and rental homes and they have solidarity networks like country-fellow and communion relationships. They have regular income, live in unqualified structures and environment but they have a chance for making their life conditions better. Low income groups who do not have regular income, they have to rent unqualified residential buildings and don't have the opportunity of solidarity networks as the others. Accordingly, low income groups who have difficulties for reaching qualified living conditions as education, working, security etc., are the most vulnerable groups of social structure.

Rapid population growth reflects a population structure with young profile constituting roughly the half of the total population. 44% of the population needs education and other basic public services which are insufficient amount and the quality in the District. Age structure of the population indicates that the rate of population below 15 years old (age limit for employment) constitutes more than 1/3 of the population in Sultanbeyli. In addition to young population characteristic, the majority of the population have not got qualified education background for employment and unfortunately only 1 % of the population have university degree. The majority of the population is constituted by children and young-adults (TUIK).

On the other side, unqualified education status and employment characteristics of population elucidate the developments on informal construction sector and the rents on urban-land becomes the first source of

income in Sultanbeyli (Isik and Pinarcioglu, 2001). In general, the participation of labour force especially for females is very low (Figure 5).

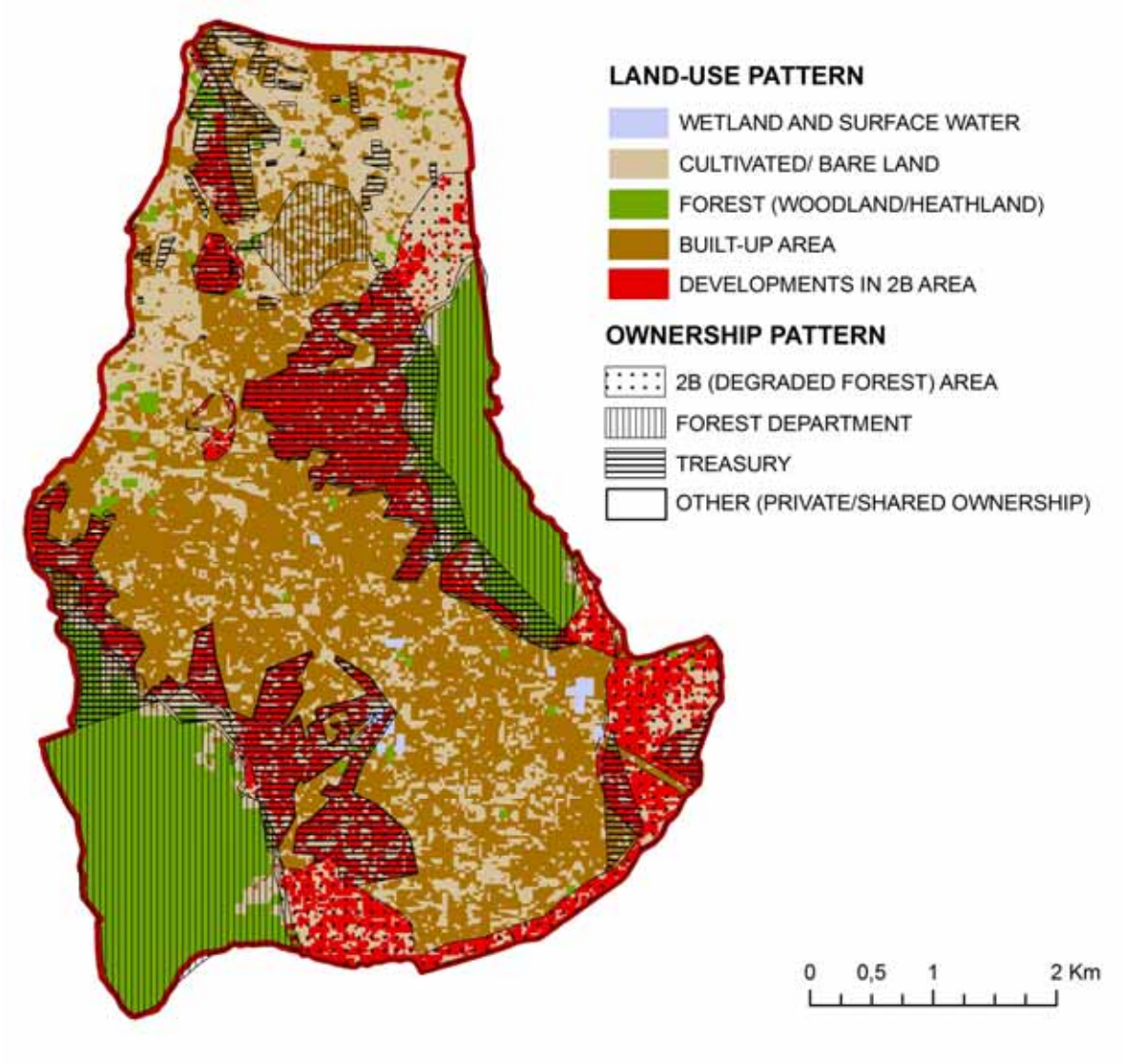

Fig. 5 Employment characteristics of Sultanbeyli (TUIK, 2000)

Therefore, irregular housing sector becomes the main driver of social, spatial and economic structuring of Sultanbeyli District. Cheap, unknown or governmentally owned lands accelerate informal housing developments with the contribution of socio-economic and socio-cultural characteristics of population. Unfortunately, these developments adversely effects ecosystems in Sultanbeyli and all together is not improving social capacity and impeding to strengthen the socio-ecological resilience capacity in the District.

As it was stated, in this research, social vulnerabilities are considered as the major drivers of change on ecosystem services and also main threats to the resilience of ecosystems in Sultanbeyli. Avoiding social vulnerabilities and providing social resilience is a way of understanding the dynamic systems of interaction between people and the environment.

Besides the obstacles of population profile, the inadequacy of social services and facilities, decelerates social integration of fragmented social structure and slows down communication and information flow within the community. It is remarkable that irregular housing settlements are the basic causes of social vulnerabilities, and the social vulnerabilities of the irregular/informal housing areas in Sultanbeyli can be grouped as follows;

-High rates of unemployment and marginal sector,
-High birth rates,

-High dependency ratio,
-Low rates of literacy,
-Low rates of participation to compulsory education,
-Low income rates,
-Socio-economic and cultural differences of the society in the Omerli Watershed area,
-High rates of young but non-qualified population,
-Continuous migration.

Table 2 summarizes the ecological, structural, social, economic and urban planning characteristics of the vulnerabilities in Sultanbeyli. In order to achieve socio-ecological resilience in the district, those vulnerabilities should be obviated.

ECOLOGICAL	- Risks on the sustainability of the ecosystem services by;
	  - *Degradation of natural habitats (especially forests and heath-lands),*
	  - *Illegal developments in riparian corridors,*
	  - *Contamination of water sources,*
	  - *Inefficient use of water sources,*
	  - *Uncontrolled use of surface and underground water sources.*
	- Risk of losing and/or transferring socio-ecological knowledge as a consequence of lack of relevant space to practice

STRUCTURAL	- Irregular/informal housing areas constructed by the immigrants. - Lack of engineering support/demand on the construction of houses, - Low cost and low quality housing which are vulnerable to natural hazards, - Lack of infrastructure and facilities, - Uncontrolled and unplanned developments, - Unhealthy and unsafe living conditions
SOCIAL	- Uncontrolled population growth, - Low rates of schooling, - Lack of cultural activities and social services, - Lack of access to socio-cultural and sport facilities, - Lack of health and social security, - Lack of social insurance as a consequence of the marginal sector or unemployment, - Lack of employment opportunities especially for females, - Irregular income distribution, - Non-qualified labour force, - Risk of cultural and ecological memory loss with migration.
ECONOMIC	- Lack of economic activities, - Increasing marginal sector , - Low income rates of illegal housing residents, - The relative low value of illegal buildings.
ADMINISTRATIVE	- Uncertain ownerships, - Unfair distribution of socio-cultural services, - Administrative failures, - Disregard to legal frameworks, - Uncontrolled urban growth, - Uncontrolled urban population increase, - Political pressures on urban planning practices.

Tab. 2 Characteristics of the Vulnerabilities in Sultanbeyli.

Although this table may not include the complete list of the vulnerabilities of Sultanbeyli, however some of the vulnerabilities were shown under the context of this study. The further step may be the definition of "key vulnerabilities" and the determination of policies to address these vulnerabilities.

4 HOW ES AND UR CAN BE INTEGRATED IN THE SULTANBEYLI DISTRICT

A research on ecosystem services will make a contribution to understand capabilities of social and ecological systems in the district as well. An important issue for this perspective is the definition of social and ecological vulnerabilities to maintain resilience in the area. Resilience is clearly related to the capacity of response to components of vulnerability, but resilience seems also to be a subset of capacity of response for social systems (Gallopin, 2007). Managing resilience is thus not only a matter of sustaining capacity and opportunities for development for now and in the future, but also a matter of environmental, social and economic security (Folke et al. 2002).

As it was emphasized, the resilience approach assumes nature and society being an integrated system. Moreover, based on the fact that the community development depends on the generation of ecosystem goods such as food, timber, genetic resources, and medicines, and services such as water purification, flood control, carbon sequestration, pollination, seed dispersal, soil formation, disease regulation, nutrient assimilation and the provision of aesthetic and cultural benefits on which humans are depended (Sessa, 2009; Folke et al. 2002; Tezer et al. 2011 (b)).

Ecosystem services provide outputs or outcomes that directly and indirectly affect human well-being and these services should be linked to the socio-economic dynamics as well as to the ecological processes (MEA, 2005). At this point, *resilience* concept, which aims to define dynamics, interactions and interdependencies between human and ecological systems, can be a relevant tool for poverty reduction and maintenance of ES which will support all aspects of human life (Adger, 2000; Carpenter and Folke, 2006).

Social resilience is related to adaptive governance, income stability, social diversity – stability (Adger, 2000), and these indicators can be examined by reference to economic, demographic and institutional variables in Sultanbeyli. On the other hand, ecological resilience is related to ecosystem stability and diversity of ecosystem functions. Therefore, the determination of ecological units, ecosystem services and ecosystem quality are necessary to display stability and functional diversity of ecosystems in Sultanbeyli. Since Sultanbeyli is located on the long-range protection zone of the Omerli Watershed, the resilience of Sultanbeyli depends on the resilience of the Omerli Watershed for ecological reasons. In fact, Sultanbeyli is an area developed as an illegal settlement near the watershed; it is not possible to generate a resilience theory without the reduction of the negative impacts of the irregular settlements in the watershed area and the vulnerabilities arising as a result of the socio-economic and ecological changes.

Therefore, the integration of ES and UR in Sultanbeyli together with the reduction of negative effects of irregular settlements based on these targets are listed below:

-Controlling and holding up urban sprawl is determined by laws
-Enhancing awareness for the importance of surrounding ecosystems among local people and stakeholders
-Improving construction and living environment qualities
-Enhancing buffer zones between settled area and ecologic units with ecological harmony.

The targets for strengthening the key vulnerabilities of social structure are;
-Extending education
-Enhancing different employment opportunities in harmony with qualified living environment and surrounding ecosystems
-Enhancing social networks for improving learning and adaptation capacity

Better integration of social-ecological systems
-Defining the relation types between local people and surrounding ecosystems apart from irregular constructing. How they benefit from ecosystems and what actions of them effect the surrounding ecosystems
-Identifying the inventory of surrounding ecosystems that local people have communication. Also enhancing these knowledge between other local people, authorities and associations
-Preventing adverse effects by law and social-networks

Achieving these targets will be directly related with the benefits of integration ES and UR for sustainable urban development (Figure 6).

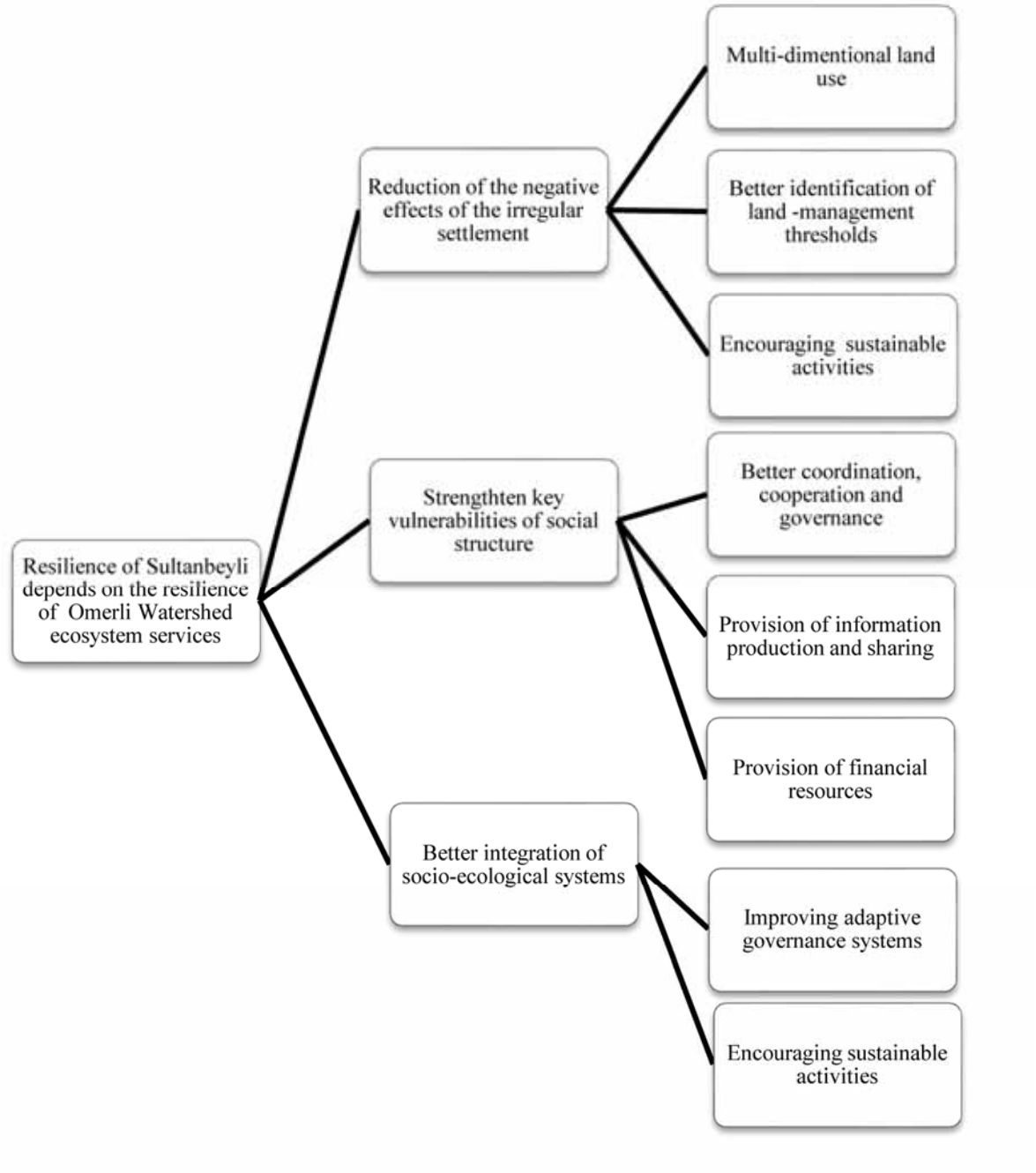

Fig. 6 The figure of integration of ES and UR in Sultanbeyli.

5 CONCLUSION AND RECOMMENDATIONS

A resilient city is a sustainable network of constructed physical systems, social structure and natural environmental components of settlements, like roads, buildings, infrastructures, communications, and energy facilities, as well as waterways, soils, topography, geology, further natural systems, and human communities who can regard to social, economic, cultural and political aspects of that settlement (Godschalk, 2003; Morrow, 2008). An urban system can be regarded as an ecological system with natural environment (ecological) and economic (social) subsystems, or coupled ecological-economic systems (Tezer

et al. 2011 (b); Isik and Pinarcioglu, 2001) where humans and ecological processes united as a mutually collaborating networks (Hurfikir, 1994). The principle of resilience indicates that cities are not passive victims, but they have to show flexibility by adjusting their sustainability policies to challenges and opportunities by more pro-active development policies. Since cities experience a world-wide rapid change process, the question is how to guarantee continuity in change; simply, how to use the precious elements from the past such as culture, science, and entrepreneurial spirit as the basis for a promising future. This resilience behaviour does not happen automatically, but definitely, it requires a successful sustainable urban development policy (Nijkamp et al. 1999). The following policies explain how the possible sustainable urban development policies in Sultanbeyli should integrate ES into resilience indicators:

- Social & Economic

Provisionary: The percentage of the society to benefit from the ES should be improved.
Regulatory: It is crucial to use recyclable, healthy, durable building materials also compatible with natural environment and to improve basic infrastructure systems. Appropriate building densities should be provided according to the position of ecologically sensitive units. Besides, it is essential to improve employment, education, access to socio-cultural activity opportunities especially for unemployed female population.
Supporting: Improving recreational facilities and infrastructure for the quality of life of intensive population as well as for the well-being of ecosystems is necessary to achieve resilient community.
Cultural: Sharing, generosity, reciprocity, redistribution, respect, patience, humility, equity are fundamental for a developed social network. Moreover, generation, accumulation and transmission of ecological knowledge and the construction of ecological data-base are important for the strengthening of social-ecological networks.

- Ecological

Provisionary: Agricultural land (crop fields, livestock production), water bodies (Surface water resources, Ground water storage, Fishing areas), forests, bush-lands and heath-lands (endemic species) should be protected.
Regulatory: Pollination, water regulation, erosion regulation, natural hazard regulation, air quality regulation, climate regulation, water purification and waste treatment, disease regulation and pest regulation should be provided.
Supporting: Nutrient cycling and water cycling primary production should be considered.
Cultural: Recreation and ecotourism can be considered as sustainable cultural policies, including the aesthetic values. Furthermore, generation, accumulation and transmission of ecological knowledge and the construction of ecological data base are essential for the educational policies and programs.

- Administrative & Urban Planning

Provisionary: It is necessary to strengthen participatory processes for spatial management of ES' provisionary services.
Regulatory: Improving and supporting individual-institutional (private-governmental) communications; land acquisition/regulation of critical ecosystems for critical services; extending mixed-uses on the benefit of ES services; disseminating/ advertising ecologically sensitive technologies; and ES services based watershed management tools and regulations.
Supporting: The change in ecosystems and in resource abundance should be monitored. Total protection of certain species, specific habitats and the protection of vulnerable stages in the life-cycle of species should be managed. Landscape patchiness management and integrated management for multiple species should be provided. Temporal restrictions of harvest should be programmed.
Cultural: Generation, accumulation and transmission of ecological knowledge and the construction of ecological data base should be directed by regulatory and implementation tools for management and urban planning purposes.

Although in the literature, there are studies such as explaining not only the ecological characteristics but also the social and administrative characteristics of resilience theory (Berkes et al. 1998; Lebel et al. 2006), this paper aims to present an integrative aspect of the socio-economic, ecological, administrative and urban planning indicators of resilience with the four basic ecosystem services (provisionary, regulatory, supporting and cultural services). Although it may not be the complete list of the aspects on ecosystem services and resilience interaction, however, it may open up a discussion for the further researches. Some of the indicators may be relevant for other crosschecks too. The aim was to represent the possible indicators of the integration of ecosystem services and resilience concepts at the urban planning scale for policy development and spatial organization.

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