

RESEARCH ARTICLE

Land Use Changes, Fragmentation, and Traditional Peasantry in Iran: Situations and Problems

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ABSTRACT

Environmental conservation is not in conflict with development. Nowadays observe a huge amount in changing land use patterns in natural resources and rural areas toward establishing vacation homes (second houses), touristy restaurants and hotels, recreational centers, etc., in them that caused destroying these unique valuable lands and great threats for sustainable development (SD) in Iran. In most places of Iran the acreage of productive lands is limited and balancing food security and economic development are two important and critical goals for policy makers and governmental authorities. In these regards, author discussing various aspects that caused of changing land use patterns in natural resources and rural areas in Iran. Furthermore, author discussing various aspects that caused of land fragmentation, traditional peasantry and small holdings and their effects in confronting for utilizing modern technologies and increasing productivity and receiving to food self-sufficiency and security in Iran. In the end of article, present final and exigency acquired model on the ways of confronting to these in the end present two final and exigency acquired models on the ways of confronting to these land use changes and traditional land use patterns for accessing to SD goals and criteria in agricultural production system in Iran.

Key words: Fragmentation, Iran, land use changes, rural areas, small holdings, sustainable development

INTRODUCTION

Sustainable land management can promote the use of agriculture land by motivating owners to manage land, develop farms, and benefit from the environment without endangering it. The use of agricultural land is important for sustainable land management, whose mission is to maintain or improve production and provision of services, protect natural resources, ensure economic viability, prevent water quality deterioration and reduce soil degradation, reduce production risks (Cintina and Pukite, 2018).

In most places of Iran, the acreage of productive lands is limited and balancing food security and

economic development are two important and critical goals for policy makers and governmental authorities (Moein *et al.*, 2018).

The global consensus had shifted toward the view that environmental conservation was not in conflict with development (Adhami *et al.*, 2018).

Due to factors such as climate characteristics and limited acreage of productive lands in Iran, it is very important to protect such resources from excessive encroachment of urban areas and human made surfaces (Moein *et al.*, 2018).

Today, natural resources are exposed to increasingly numerous interests and demands, which sometimes generate conflicts (Gandin, 2012).

We must protect nature not only for us but for the whole planet. If it is questionable to say that communities are really only practical to protect the environment, there is no doubt they are the main victims of environmental degradation (Gandin, 2012).

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Sustainable development (SD) and successful management of the watershed would not be achieved unless demands of rural communities are addressed (Adhami *et al.*, 2018).

Social change processes are experienced as human impacts. In many developing countries, local residents were not always aware of the extent and nature of land use change, and had difficulty attributing social changes and their impacts to the land use changes that underlie them. Furthermore, the felt impacts of land use change appeared dependent on a person's awareness of that change, and on their beliefs about the causes of social change rural land use is changing rapidly in many parts of the world. While shifts from agricultural to non-agricultural land uses. All types of land use change have the potential to significantly impact rural communities through both positive and negative socio-economic change, often accompanied by social contention and debate. While policymakers seek to promote positive benefits of rural land use change and reduce any negative impacts, these efforts may be complicated by conflicting views among stakeholders and the general public regarding the impacts of land use changes. Understanding the reasons for different views on the impacts of land use change is crucial to developing appropriate responses to community concerns (Kathryn and Williams, 2012).^[1-10]

Regional land use change is the outcome of many small scale drivers and changes, with decisions made at an individual or property scale influenced by regional, national and global norms, environmental change, policy, and market forces. As such, the extent and impacts of change may be highly variable across even relatively small areas. Understanding and addressing social impacts of land use change are highly complex, as impacts will vary depending on both the nature and extent of land use change and the way people experience the social changes that result from this land use change. multiple land use changes are often occurring at once; these together with other factors contribute to social change, which in turn is experienced in varying ways by different people. As such, attribution of social change is uncertain; residents may attribute negative or positive experiences to a land use that is not causally associated with the relevant socio-economic change. Despite this, there is little evidence that factors such as awareness and attribution are being considered in social impact

assessment. We must focus primarily in rural land use change on two aspects of socioeconomic change: changes in population, particularly population decline and turnover; and changes in employment (Kathryn and Williams, 2012).

It exclaims that real people who protect nature are local communities themselves. Since neither policy nor financial or technical assistance benefits local communities, the efforts of each peasant, villager, farmer or rancher is considered the only real action to protect the environment (Gandin, 2012).

Local participative processes are thought to help overcome opposition in changes in rural land use. In this regard, social learning is a challenging target in participative processes during policy implementation (Rouillard *et al.*, 2014).

The key to achieve the goals of SD and water and soil conservation depends on people who directly are contacted with these sources (Adhami *et al.*, 2018). Nowadays, we see a huge amount in changing land use patterns in natural resources and rural areas toward establishing vacation homes (second houses), touristy restaurants and hotels, recreational centers, etc., in them that caused destroying these unique valuable lands and great threats for SD in Iran.

Nowadays, agricultural methods developments that are productively, economically, environmentally, and socially sustainable are required immediately (Tohidyan Far and Rezaei-Moghaddam, 2018).

Agricultural systems can be managed to minimize the environmental impact of agriculture without sacrificing productivity or conversely, to maximize the ecosystem services provided by agriculture, including productivity (Syswerda and Robertson, 2014).

Agrarian structure and in particular the system of land tenure in many countries, prevent a rise in the standard of living of small farmers and agricultural laborers and impede economic developments. Small holdings or peasant land-scattered strips (Khordeh Maleki in Persian), are too small to be cultivated with today's modern equipment (Mahmoudi, 1961). More efficient production processes and better environmental management systems can significantly reduce pollution and waste, and save water and other resources. Land resources have an impact on effective agricultural activity, as well as economic, social, and political stability (Cintina and Pukite, 2018).

The biggest problem in transition from traditional agriculture to modern and up-to-date agriculture is

the lack of land consolidation of the fields. Small production units and scatter of the parts cause problems for fundamental equipment, watering yield increase, agriculture machinery usage, and mechanization which are barriers to the usage of advanced production methods. All these elements and lack of proper exploitation system have negative effects on financial efficiency, sources, and production factors in agriculture (Rashidpour and Rasouliazar, 2019).

At present, Iran's agriculture supplies about 90% of the domestic food demands but at the cost of consuming 92% of the available freshwater (Mesgaran *et al.*, 2017).

In rough terms, the net value of agricultural imports is equal to 14% of Iran's current oil export gross revenue. Located in a dry climatic zone, Iran is currently experiencing unprecedented water shortage problems which adversely, and in some cases irreversibly, affect the country's economy, ecosystem functions, and lives of many people. The mean annual precipitation is below 250 mm in about 70% of the country and only 3% of Iran, that is, 4.7 million ha, receives above 500 mm/year precipitation (Mesgaran *et al.*, 2017).

Agricultural land management commodities in Iran are individually owned by farmers (about 99 percent) and farms tend to be small units (Faramarzi, 2012). Land fragmentation at the household level depends on external policy and market factors, agro-ecological conditions, and farm household characteristics. The resulting level of fragmentation, together with external factors, agro-ecological conditions and farm characteristics, affects agricultural production (Shuhao, 2005).

Countries with traditional agricultural structures face small and fragmented plots; cultivation is carried on to non-geometric small-scale plots which limit application of farm machinery, mechanization development, and putting to practice new cultivation methods. Therefore, application of modern technology, aimed at increasing yield and reducing production costs, has a direct relationship with land consolidation and optimum size of cultivation plots (Kalantari and Abdollahzadeh, 2008).

Although land fragmentation may have different meanings in different countries or regions, it covers two main aspects: (1) It refers to the spatial dispersion of farmers' plots over a wide area; and (2) it implies

the subdivision of farm property into undersized units that are too small for rational (efficient) cultivation; and (3) the last type sees distance as an important aspect of land fragmentation (Shuhao, 2005).

In a study by Kalantari and Abdollahzadeh (2008) they showed that household average annual income, per capita arable land, size of land rented by household, labor force of household, family size, number of crop planted by household and size of land rented out, contributing to land fragmentation in Fars province, and south center of Iran (Kalantari and Abdollahzadeh, 2008).

Some studies showed that when there is a missing market for the commodities, farmers tend to diversify their cropping mixture to satisfy their consumption, which will be best suited by fragmented land. Indeed this is an extension of risk reduction examples. The different emphasizes in causes of fragmentation have a very strong practical implication. If fragmentation is a result of farmer's rational choice, we would assume that land consolidation would not be carried out unless conditions related to farmers' decision of cropping changed. If, however, land fragmentation is a result of supply side factors, land consolidation may have its benefits exceed its costs (Kalantari and Abdollahzadeh, 2008).

Problem of fragmented land began from the 19th century in the world, and in the Iranian year 1341 (equal to 1961 A.D.).

Land Reform (1960s) processes in agricultural sector are the origin of land fragmentation in Iran (Kalantari and Abdollahzadeh, 2008).

Land Reform in Iran, caused land fragmentation, increased low-land farmers, respectively. scattering and small land areas are some of the structural elements of traditional agriculture. the distribution of parts will be considered a deterrent. The fragmentation of agricultural lands has been seen more or less in all countries. With regard to problems of land distribution, agricultural planners and politicians recommended integration of land use to solve this problem (Keikha and keikha, 2012).

Nevertheless, 25% of the rural population is landless in Iran, and 33% of the remaining have small lands, with poverty level income and frequent underemployment. Fewer farmers enjoy better conditions, with a more dynamic agriculture, capable of providing higher per capita income in Iran. Widening rural and urban disparities persist,

with rapidly growing urban population, migration to urban areas and reduced employment opportunities in rural areas, affecting access to available food for both urban and rural population in Iran. Iran has a rich knowledge base, mass of expertise and a widespread network of research, training and educational institutions, although the full potential of this reservoir is not being harnessed because of archaic management practices (CPF, 2016).

However, the small sizes of land holdings and the high degree of land fragmentation may be important obstacles to the adoption of new technologies by smallholders. Under existing technologies, considerable productivity improvement can be achieved by addressing the factors constraining technical efficiency. Land consolidation can be an important option in this respect (Shuhao, 2005).

Land consolidation, reducing the number of parts, increasing acreage, increasing land values, reduced water consumption, increased use of agricultural machinery, agricultural products, and ultimately increase the income of farmers had a significant effect. Hence, there is a direct relationship between the land consolidation and mechanization of the agricultural products. Land consolidation should be considered in the framework of general policies of rural development and agriculture, because it is an essential tool for achieving SD in rural areas (Keikha and keikha, 2012).

Small holdings or peasant land-scattered strips (with and without belonging land to farmers) are major types of agricultural lands in country and 87% of them are in this category (Iranian Bureau of Statistics, 2020).

With considering above statements, we perceive that major type of agricultural production system namely small holdings and businesses are not favorable methods for accessing to increasing productivity and receiving to food self-sufficiency and security in the present and future in Iran. The main aim of this study is recognizing origins, situations and effects of land use changes, fragmentation, traditional peasantry, and small businesses and finding solutions for them in Iran Figures 1-4.^[11-20]

With regarding to above mentioned issues, this study attempts to answer the following question:

1. What are the main causes for land use changes, fragmentation, traditional peasantry, and small businesses in Iran?
2. What are the main threats of these unfavorable phenomenon (land use changes, fragmentation, traditional peasantry, and small businesses) for SD in Iran?
3. What are the main planning implications of decision makers for confronting a city based on competition resolution programs between urbanization and agricultural productivity of these destructive phenomena (land use changes, fragmentation, traditional peasantry, and small businesses) for SD in Iran? [Figure 3a-d].

URBANIZATION AND LAND-USE CHANGES IN ENVIRONMENTS OF IRAN

Iran as a dry country with limited water and soil resources is also facing several problems for protecting fertile lands and agricultural. It is estimated that urban growth is responsible for degradation of 10 km² of farmlands per day in Asian cities. Urbanization, as one of the most drastic forms of land-use change, substantially alters the structure of natural ecosystems and modifies their related functions (i.e. services) and processes. Urban growth process is mainly evident in urban boundaries, where fertile and productive lands provide valuable resources for agricultural activities. Therefore, as a worldwide concern, the conflict between urbanization and agricultural land protection is a challenging issue for planners to manage. Such concerns about notorious environmental consequences are caused not only by the area, but also by the spatial arrangement of urbanization process. In other words, policies that only concentrate on the reduction of the area of urban growth may result in undesirable outcomes on welfare and equity of residents, and in contrast, excessive urbanization processes are also responsible for many environmental impacts as well. Conversion of natural and semi-natural ecosystems into impervious surfaces is associated with many other biophysical processes such as salinization, soil compaction, organic matter decline, soil sealing, and soil biodiversity decline, which collectively lead to loss of many valuable soil functions and their corresponding services for crop production (Moein *et al.*, 2018) [Figure 3a-d].

Urban growth processes in Iranian environments are mainly initiated from rural centers, which are

largely surrounded by farmlands and fertile soils. Such proximity between these two utilities can cause conflict between multiple stockholders of different interests, which is normally associated with removal of agricultural fields and productive lands to provide space for more urban construction. In this regard, during the past four decades, the country has experienced 40% of growth in its population size and urbanism rate, which are also projected to continue during the upcoming decades. urban expansion on agricultural land-use intensity is associated with a reduction in agricultural land-use intensity and GDP in industrial sector negatively affects farmland intensity (Iranian Bureau of Statistics, 2019).

For example, in Vietnam farmers received any economic profit from urban growth projects and socioeconomic livelihoods are affected by such conversion processes. farmers have the possibility to convert their agricultural lands into non-agricultural ones with a possible higher income; however, they will face many challenges in sustaining non-agricultural utilities. Areas of open land were detected that can be changed to urban structures without trade-offing urban compactness against agricultural productivity (Moein *et al.*, 2018).

Appropriate management of urban-agriculture interactivities can contribute to food security based on a low threshold of built-up land necessary to grow important crops in urban environments. Based on the above-mentioned report, reducing land-use competition between urbanization and agricultural productivity is necessary for maintaining cities sustainability and food security in the future. Comprehensive land-use planning studies that attempt to reduce conflicts between multiple stockholders are important means for SD of a region and effective management of its land resources. Therefore, by adopting a comprehensive approach toward socio-economic and ecological dimensions of the environment, land-use planning studies attempt to optimize the configuration of land features and also to reduce conflicts between different stockholders (Moein *et al.*, 2018).

It should be noted that a realistic, practical and sustainable strategy for reducing land-use competition cannot completely prohibit urban growth, but the spatial pattern of future urbanized lands could be regulated based on detected competition zones. by establishing appropriate socio-economic and

cultural-recreational attractions in areas with the lower levels of competition, the pressure of future population growth can be shifted to areas with higher suitability for urbanization and lower competitions with farmlands (Moein *et al.*, 2018).

THE FACTORS INFLUENCING LAND USE

The factors influencing land use are indicated as follows:

1. Socio-economic factor
2. Environmental factor
3. Institutional factor (Cintina and Pukite, 2018).

The socio-economic factor is characterized by availability and use of land resources, introduction of innovative technologies, development of economic sectors and territories, environment and infrastructure, land capacity and productivity, living environment and population, credit facilities and investments, increase of competitiveness, and use of renewable energy resources (Allahyari *et al.*, 2013; Cintina and Pukite, 2018).

The use of agricultural land plays a major role in credit facilities, because the successful use of credit facilities can improve farms through the introduction of innovative technologies, as this can improve land management rapidity, save time, resources, and produce more productive yields. Land capacity and productivity also play an important role in utilizing agricultural land, the more productive the land is, the more likely it is that it will be managed and yielded. Furthermore, great importance is the territory, place where the land is located and its population or habitat area.

There is a regularity between the use of land and habitat area, for example, the larger the population, the more land is used in this territory, the less populated area, the more likely it is that the agricultural land will not be fully exploited in this area. Possibility of use of land is also influenced by the environmental factor (Cintina and Pukite, 2018).

Environmental factors are characterized by: Biodiversity (genetic diversity, diversity of species, and diversity of ecosystems), ecological integrity (ecosystem structure and processes), and natural capital (the soil in which we grow food, raw materials for construction and clothing, water for drinking,

and even the air we breathe). Environmental factor includes inadequate water supply, excessive drought or moisture, and the spread of plant diseases (Cintina and Pukite, 2018).

The use of land is also influenced by an institutional factor that is characterized as the interaction of regulatory norms and organizations. It is important to harmonize land use with statutory norms and regulations so that the way of land use does not conflict with the norms established by law.

These factors also have a significant impact on the use of agricultural land and its effectiveness (Cintina and Pukite, 2018).

To determine the factors influencing the use of agricultural land, it is necessary to look at the factors influencing other factors as well.

In a study “Effective Factors on Agricultural Land Use Change in Guilan Province, Iran” identified five factors influencing the use of agricultural land:

1. Economic factor
2. Social factor
3. Governance and political factor
4. Technical and technological factor
5. Individual factor (Allahyari *et al.*, 2013).

The economic factors are high production costs, low prices for agricultural products, resulting in a decrease in profits from the use of agricultural land. Low income creates pressure on the owners and, as a result, decreases or the owners are forced to completely abandon the management of agricultural land. Intensive use of agricultural land reduces land productivity. To improve the productivity of agricultural land, it is necessary to invest in, for example, land fertilization, thereby increasing the cost of utilizing agricultural land, resulting in the loss of motivation to manage this land (Allahyari *et al.*, 2013).

Social factor is characterized by changes in the population, for example, growth in urban areas and a decrease in rural areas.

An important indicator is also the level of education of the population and opportunities for attending special courses to exit from traditional agriculture. Furthermore, social factor indicators include the migration of people from the countryside to cities, the lack of employment opportunities in rural areas. The use of agricultural land is also affected by the fact that agricultural production is largely seasonal, which

has a significant impact on the number of workers (Allahyari *et al.*, 2013; Cintina and Pukite, 2018).

Governance and political factors are characterized by lack of support for producers, import of products, inheritance of land, lack of support for young farmers, an increase in land rent, timely reimbursement of damages, lack of support for producers, resulting in the purchase, and sale of agricultural land. Foreign imports have an impact on production, because imported products can be cheaper to purchase than local produce. The use of agricultural land is also affected by the inheritance of the land, which is related to the wishes of the new owner to sell the land, but until the documents are arranged, the land is not used. In addition, the use of agricultural land is affected by the fact that, when inheriting land, it becomes a joint property between the heirs, as a result of which this land belongs to several owners as a joint property or it is divided into real parts, which leads to fragmentation of land. Such activities may result in non-economic production (Allahyari *et al.*, 2013; Cintina and Pukite, 2018).

Technical and technological factors are characterized by traditional production methods, changes in land treatment technologies, poor knowledge of the use of pesticides and chemical fertilizers, as well as inappropriate plowing system causing losses and changes in soil physical and chemical properties (Allahyari *et al.*, 2013; Cintina and Pukite, 2018).

The individual factor is characterized by physically heavy work related to the use of agricultural land, as labor productivity decreases as a result of aging, which may reduce the use of agricultural land, as well as the state of health affected land use and associated changes (Allahyari *et al.*, 2013; Cintina and Pukite, 2018).

The main problems associated with the use of agricultural land are the increase in unused agricultural land and the continued degradation of land, but the major problem of land use is the existence of a fragmented property structure. These factors are affected by the economic, social, governance and political, technical and technological, environmental, and individual factors. When problems and factors affecting the use of agricultural land are identified, it is necessary to look at the ways to ensure more efficient land use (Cintina and Pukite, 2018).

SHORTCOMINGS OF LAND FRAGMENTATION AND NECESSITY FOR CONSOLIDATION

Land-use efficiency differs according to land use needs, for example, whether the land is used by large agricultural enterprises: Associations, cooperatives, research, and education establishments or used by smaller or larger private households.

Increasing land-use efficiency is a topical issue in many countries; therefore, indicators of land efficiency measurement systems and ways of calculating economic land efficiency are being developed (Cintina and Pukite, 2018).

Low productivity of small-holder farmers, their limited access to land, combined with water shortage, excessive ground water withdrawal, inadequacy of irrigation systems and excessive post-harvest losses, aging farmers with low literacy, who have limited access to quality seeds of improved variety, are main problems in agriculture system in Iran. For them, low productivity interacts with food security conditions (CPF, 2016).

It is true that in traditional systems, fragmentation had some advantages, but under an agricultural renovation condition, fragmentation is a serious limiting factor. It causes a high increase in costs and makes productivity improvement activities uneconomical.

Therefore, consolidation of fragmented plots of lands for achieving optimum size and shape of farmland, directly affects productivity. The experiences of different countries confirm this claim. In view of these considerations, numerous land consolidation and land reform policies have been implemented to reduce fragmentation in European countries like the Netherlands and France, in African countries like Kenya, Tanzania and Rwanda, and elsewhere. Small landholdings were well-adapted to Iran's agriculture sector. With increasing population pressure and more efficient technology, they are coming under increasing strain. In the long run, they may be not adaptive at all.

Therefore, for economic crop production, it is necessary to execute land consolidation programs that can provide appropriate living standards for farmers. According to some studies, the optimum farm size for economic crop production should be at least 12 ha (Lahsaeizadeh, 2007).

Because farmers with smallholdings are unable to take advantage of the new technology and were thus less productive. The low productivity of small farms constrains sustainable crop production at regional and national levels. Summarizing these arguments, land fragmentation is considered as one of the major obstacles to achieve sustainable rural livelihoods, in Iran. Accordingly, the extensive arrays of smallholdings need to be restructured and consolidated. Although land fragmentation is a recognized problem in Iran, little empirical research has been done on its driving factors and their relative importance.

A better understanding of the causes of land fragmentation in Iran is needed, especially now that the country is confronted with the challenge of agricultural modernization resulting from its entry into the World Trade Organization (Kalantari and Abdollahzadeh, 2008).

CAUSES OF FARMLAND FRAGMENTATION (FF)

The causes of FF listed in the literature can be divided into two broad categories. The first regarded fragmentation as a result of exogenous or so-called supply side factors. Apart from the natural restriction, other factors include (1) partial inheritance system or population pressure; (2) significant imperfections in the land market; and (3) the breakdown of common property system under the pressure of population growth.

It is logical to argue that partial inheritance leads to land fragmentation when land with similar quality is equally divided by heirs. Other studies indicated that high transaction costs in labor markets and failures in commodity market were also responsible for the land fragmentation (Kalantari and Abdollahzadeh, 2008).

ADVANTAGES AND DISADVANTAGES OF SMALL UNITS AND LAND FRAGMENTATION

Households with many fragmented plots may use the land rental market to decrease the dispersion of their land and increase production efficiency. In other words, land renting in and out depends positively on land fragmentation. At the village level, number

of crop planted by household as sign for traditional and livelihood agriculture plays an important role on land fragmentation. In this case, land fragmentation may be a perfectly logical and sound response to soil and crop variations or to spreading the risk of climatic and other hazards.

Small field tends to lessen the damage of soil erosion and protect crops in a severe climatic condition. Since crops have distinctive growth requirements, a diversification in agricultural production caused by land fragmentation may reduce risk in total agricultural production. Per capita arable land availability is likely to be correlated with variation in land quality (soil types, water access, drainage conditions, road access, and so on). Income from off-farm employment increase land fragmentation by improving the land rental market by households (Kalantari and Abdollahzadeh, 2008).

Such subdivision into small units may however be beneficial to farmers in certain circumstances (if markets for insurance, agricultural labor and so on are missing) and at certain points in time (depending on the technology level and institutional arrangements).

In addition to private gains, fragmentation may offer social benefits. Fragmentation induced by land distribution during land reform in many countries (Bulgaria, Vietnam, and China, e.g.) realized a high degree of equity among smallholders and contributed to a high degree of national food self-sufficiency.

The costs associated with high levels of fragmentation are seen principally in terms of inefficient resource allocation (labor and capital) and the resulting cost increase in agricultural production. Small and highly scattered land plots will remain an important obstacle to cost reduction and productivity in rice production, and possibly even to soil quality improvement in the near future (Shuhao, 2005).

For example, in China consolidation of small, fragmented plots into a smaller number of larger plots located at smaller distances to the homestead have obtained following goals:

(1) reduces production costs, (2) causes a shift from labor-intensive methods towards the use of modern technologies, (3) reduces technical efficiency and increases input use efficiency, (4) contributes to soil quality improvement, and (5) increases the availability of the two major yield-limiting factors

in rice production, namely the available phosphorus and potassium in the soil.

Land fragmentation also plays a role in farm management. Consolidation of small, fragmented plots into a smaller number of larger plots increases input-efficiency by inducing lower quantities of labor and herbicides use at given yield levels (Shuhao, 2005).

MATERIALS AND METHODS

One challenging factor in land-use conflicts (land use changes, fragmentation, traditional peasantry, and small businesses) studies is the multidisciplinary nature of such issues, and thus, different stockholders from various influential parties are involved. In addition, the dynamic nature of interactions between land resources and human decisions is another barrier, which requires planning efforts to have a predictive dimension to ensure their accuracy and applicability. It should be noted that urban environments are complex systems with many feedback and feedback loops with their vicinities, and therefore, informed decision making processes are required to increase the efficiency land-use competition resolution programs in these regions (Moein *et al.*, 2018).

For doing this study utilized qualitative approach with its main tools for gathering information such as participatory observation, maps, scientific articles, pictures, documents (Iranian and foreign scientific magazines and journals, TV and radio programs, and Iranian Bureau of Statistics), discussion with experts, professors and beneficiaries, and field research.

As Creswell (1994. PP. 94-95) noted in a qualitative study, one does not begin with a theory to test or verify. Instead consistent with the inductive model of thinking, a theory may emerge during the data collection and analysis phase of the research or be used relatively late in the research process as a basis for comparison with other theories [Figure 1].

Main locations of study were six provinces that land use changes, fragmentation, traditional peasantry, and small businesses in them are more stronger and visible in Iran, namely, Tehran, Golestan, Isfahan, Razavi khorasan, Chaharmahal and Bakhtiari, and south Khorasan provinces. In below map showed

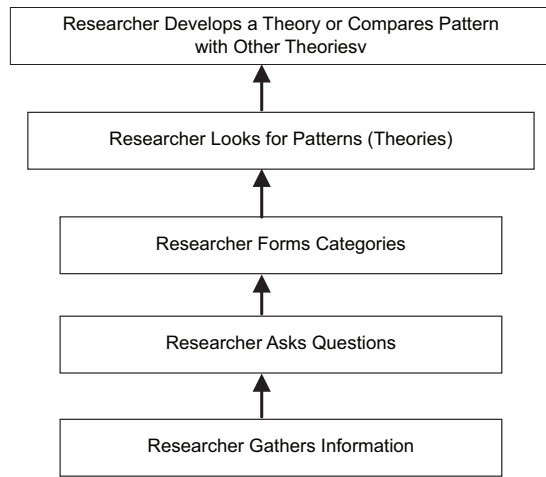


Figure 1: The inductive mode of research in a qualitative study (Creswell, 1994. p. 96)

locations of this study as A, B, C, d, E, and F [Figure 2].

DISCUSSION AND CONCLUSIONS

Author in this study attempts to provide a holistic insight regarding current conditions of these six provinces (Tehran, Golestan, Isfahan, Razavi khorasan, Chaharmahal and Bakhtiari, and south Khorasan provinces) and also a simulation environment for planners to evaluate the possible outcomes of their decisions on forests, hills, mountains, and fertile soils for future urban growth patterns.

Sustainability is related about how individuals should act toward nature and how they are responsible for the other and the future (Oyku Iyigün, 2015).

The moral values and principles of SD refer to three aspects: Economic, social and environmental, interconnected in a future plan to improve the present state of the world (Margareta Busoi, 2015). building sustainable communities is an important aspect of achieving SD (Shiel *et al.*, 2018).

In fact, the SD subsumes three dimensions: economic, social and environmental. The concept of social development refer to “the orientation of a community/institution towards accomplishing of a desirable state, established as attainable objective by a process planned in time, result of a set of conjugate actions” (Anghel *et al.*, 2014).

By guiding urban growth trajectories into areas that are also less potential for agricultural activities, these locations not only have potential lands for urban



Figure 2: Map locations of doing this study - A, B, C, d, E, and F - in Iran (Iranian Bureau of Statistics, 2020)

construction that is consumed, but also farmlands are protected from severe encroachment of urban structures. In other words, urban growth must be directed in these locations that are of low potential for agricultural activities and simultaneously these lands have highly potential for urban construction (Moein *et al.*, 2018).

A range of social and psychological factors are likely to influence whether and how social change processes result in particular types of human impact. Some land use changes are more visible than others in a physical or perceptual-social sense, and there is evidence that awareness of land use changes is variable. Even where there is awareness of land use change, identifying the nature of the social changes that accompany it, and attributing experiences (impacts) to those changes is fraught with difficulty (Kathryn and Williams, 2012).

It may improve communication, exchange, and provide the leadership for reaching of compromises and some social learning. Furthermore, fostering more in-depth reflection and learning during policy implementation is more challenging, and would require more flexible policy and institutional arrangements. For example, greater local autonomy for policy implementers to work outside regulations and organizational targets, and build long-term relationships with target populations could be beneficial (Rouillard *et al.*, 2014).

The increasing reliance on collaborative stakeholder partnerships to address watershed and other environmental issues has led to growing interest in understanding how such collaborative efforts operate. Of particular interest in this new form of governance is stakeholders' collaboration called as best co-management practices (Adhami *et al.*, 2018).

The proposed framework must balance the human benefits (e.g., water supply, agricultural products, employment, and increasing income) with environmental indices (e.g., soil and water conservation, reduction of NPS pollution, SD, and land use management).

Prioritizing different areas of a watershed based on different interests provides numerous benefits to managers and it is a useful tool for the government when preparing regional development strategies (Adhami *et al.*, 2018).

These areas, especially Golestan, Tehran, and Isfahan Provinces, are also the most potential zones for agricultural activities in Iran, which are mainly due to the existence of fertile and productive lands and availability of water resources (rainfalls, rivers, and underground waters). Such conditions have created much land-use competition such that planners in most of the cases have to find compromised solutions between the increasing demands for urban construction and protection of agricultural fields for future food security purposes.

Also in case of agriculture suitability surface, it must be considered factor layers including soil potential and accessibility to surface and underground water resources before changing utilization of land farms to new human settlements.

In these areas with natural attractions and sub-watersheds mountainous status, holly shrines, ancient cemetery, and verdurous grasslands tourism development must be proposed and considered [Figures 3a-d].

To provide a more sustainable local food supply individuals, communities, corporations, governments, and private foundations are supporting efforts that stimulate economic development in many of the world's semi-arid areas. However, the need for economic development and improved food production must be balanced with agricultural long-term sustainability and the services provided by grasslands (Clay *et al.*, 2014).



Figure 3: (a-d) Establishing modern and expensive apartment buildings over a natural hill in a land that belonged to natural resources and watershed organization previously. In rural regions - 5 Kms distance to Mashhad city, center of Razavi khorasan Province, north east of Iran. and did not destroying and sealing these buildings by related local legislation organizations and police power. because of paying their monetary penalties and other works by rich and powerful urban people. (pictures by author, winter 2018)

Conservation success is often predicated on local support for conservation which is strongly influenced by Perceptions of the impacts that are experienced by local communities and opinions of management and governance (Bennett and Dearden, 2014).

Before land reform in the 1960s that caused land fragmentation in all over the country, the Iranian agriculture sector, in addition to meeting the domestic food requirement, contributed to exports (Kalantari and Abdollahzadeh, 2008).

To promote the SD of agriculture, forestry and fisheries as a contribution to the eradication of poverty in a more diversified, productive, and competitive economy are main fundamental and basic goals in Iran (CPF, 2016).

Agricultural growth depends greatly on productivity improvement. Production resources can be increased through infrastructural development, appropriate technology, new farming methods, and



Figure 4: (a-e) land fragmentation, peasantry, and small holdings as major type of agricultural production system in Khorashad village - 35 kms. distance to birjand city, center of south Khorasan Province, east of Iran. (pictures by author, Dec 18, 2020)

farm management improvement (Kalantari and Abdollahzadeh, 2008).

Land use efficiency is based on agricultural production. Correct and effective land use could solve several problems in food production, improving the welfare and provision of social stability. The use of land and natural resources is an important issue in the development of the country. Efficient land use has an impact on different types of factors, which are mutually contradictory. The main directions for improving and increasing the efficiency of land use are the introduction of intensive farming systems as well as clear national policies and legal regulations related to agricultural production and the use of agricultural land. The main condition for efficient use of agricultural land is the increase in soil fertility. It is based on the improvement of agricultural systems in the holdings: The organization of land areas, the planning of rotational crops, the study of the structure of the sown area, the establishment of a soil treatment system, the maintenance and installation of drainage systems, fertilizer systems,

pest, disease and weed control, seed production, and environmental protection measures. In this regard, analyzing the problems that are associated with the use of agricultural land is seen as interactive interaction, as the fragmented property structure is one of the reasons influencing the use of agricultural land, which leads to an increase in unused areas of agricultural land, while unused areas of agricultural land are often overgrown with shrubs (Cintina and Pukite, 2018).

The economic efficiency of land use is characterized by the ratio between the amount of production and the cost per land unit area (Baumane *et al.*, 2014).

The efficiency of land use is reflected in materials, and labor costs can be used to determine the efficiency of production and economic land use.

The efficiency of land use is influenced by the set of economic measures undertaken to improve land quality and increase productivity. The essence of land-use efficiency is economic activity, on the one hand, and different resources, and (or) costs – on the other hand (Cintina and Pukite, 2018).

Increasing population has posed insurmountable challenges to agriculture in the provision of future food security, particularly in the Middle East and North Africa (MENA) region where biophysical conditions are not well-suited for agriculture. Iran, as a major agricultural country in the MENA region, has long been in the quest for food self-sufficiency; however, the capability of its land and water resources to realize this goal is largely unknown.

The overarching effects of climate change pose further threats to the sustainability of agricultural systems (Mesgaran *et al.*, 2017).

Sustainable land management is essential to meeting the global challenge of securing soil and water resources that can support an ever increasing population. There is a real need to analyze the economic benefits and long-term sustainability of future development against the protection of high class land for current and future production requirements (Curran-Cournane *et al.*, 2014).

There is little room for cropland expansion to increase production but redistribution of cropland to more suitable areas may improve sustainability and reduce pressure on water resources, land, and ecosystem in Iran (Mesgaran *et al.*, 2017).

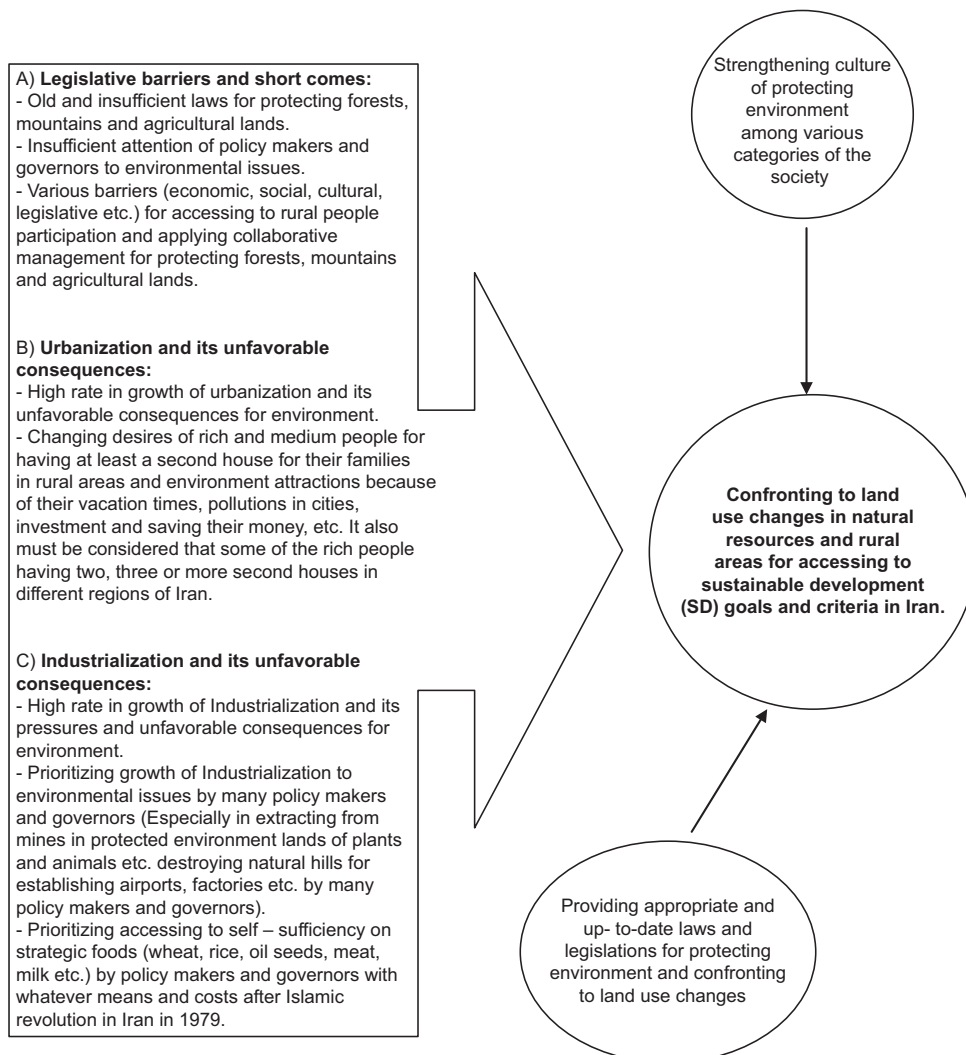
For the efficient use of agricultural land, there are several conditions that need to be met or improved

to achieve effective land use. Efficient use of agricultural land has both external and internal conditions that need to be met or improved to achieve effective land use. An essential element of the effectiveness of agricultural land is the organization of land parcels, which ensures proportionality between available land and available labor, financial resources, as well as proportionality with the use of agricultural land, areas of production and specialization of agriculture. Due to lack of work in rural areas, people do not object to work at a lower wage, which leads to lower productivity and, in the end, to inefficient land use, as employees lack motivation to work. Land use efficiency also affects the scarcity of agricultural land, which makes it difficult to organize rotational rotation, which in time affects soil fertility. Mechanical soil cultivation is an

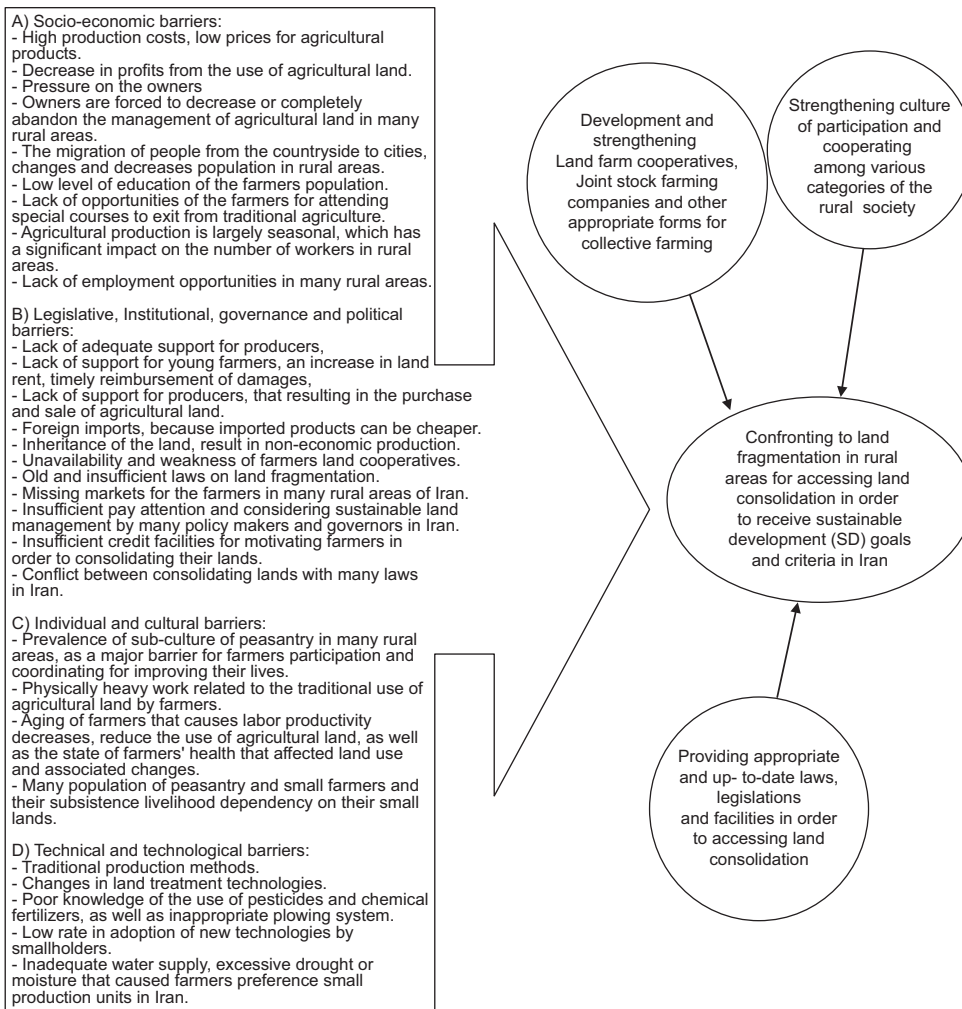
essential element of the effectiveness of using agricultural land as it improves soil fertility. It accounts for 30–50% of all costs in crop production. Extreme conditions affecting land use efficiency are national legislation, land policy guidelines, credit facilities, land tax rates as well as relationships with agricultural production partners at local, regional, and international level (Cintina and Pukite, 2018).

Land fragmentation in Iran is the result of several processes (social, cultural, economic, physical, and operational processes) working either together or independently and is caused to a large extent by traditional and livelihood agriculture structure (Kalantari and Abdollahzadeh, 2008).

Enhanced capacity of smallholder producers to achieve higher productivity/production, higher competitiveness of agriculture, forestry and



Model 1: Final and exigency acquired model on the ways of confronting to land use changes in natural resources and rural areas for accessing to sustainable development goals and criteria in Iran



Model 2: Final and exigency acquired model on the ways of confronting to land fragmentation in Iran

fisheries, and diversification of production are main solutions for promotes the SD of agriculture in Iran (CPF, 2016).

In the end it must be emphasized that during establishing new urban regions, governors and policy makers must be considered several criteria including distance from main roads, distance from current residential zones, distance from the city center of province, distance from cultural-recreational centers, and distance from economic-commercial sites for urbanization suitability mapping [Model 1].

Furthermore, it must be emphasized that for confronting to unfavorable effects of land fragmentation and accessing to optimal land consolidation, governors, and policy makers must removing major barriers in domain of social, cultural, economic, physical and operational processes and consider several appropriate criteria and processes to accessing land consolidation. An abbreviation of them drawing in Model 2.^[21-29]

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