

## Investigation of the socio-economic criteria, indicator and indices in desertification

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### Abstract

Undoubtedly, land degradation causes apparent decrease of natural resources potential which are highly linked to desertification. Different countries and also international organization have realized a great number of projects to combat desertification. Unfortunately these projects have not reach to their goals. The experiences shows that the reason of these unsuccessful works is lack of consideration on human factors as well as socio-economics issues. To find out the criteria, indicator and indices in desertification, the mentioned factors should be noticed. The importance of socio-economics issues, and establishing a realistic framework based on qualitative indicators and indices, are the main objectives of current research, which are adapted to situation of Iran. They are summarized in four groups and classified items as; population, poverty and economics, rights and institution and socio-cultural criteria.

*Key words:* Desertification; Human factors; Socio-economics issues; Iran

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### 1. Introduction

Socio-economic problems, cause ecosystem degradation in terms of ecological capacity and land suitability. These problems have been emerged in recent decades, because the majority of natural resources and agricultural development projects executed by the international as well as governmental organizations could not reach their goals. Initial goal of these projects was preventing natural resources degradation, well managed exploitation of natural resources and agricultural activities. But they were faced two serious problems, in one hand these projects were performed sporadic and dispersed, without any linkage. Even in successful cases, they could not lead to an extensive movement and then have

been forgotten. Unfortunately it wastes a huge amount of financial sources and national funds.

Another reason of unsuccessfulness was lack of realistic view on the human factors. The dominant viewpoint on this procedure was technical. Designers of natural resources project believed that when natural factors and elements were studied in a scientific method and technically manner, if society and people respect the principals, decreases of potentials and land degradation will be prevented and ecosystem capability will increase. Unfortunately this principal were not used in projects, because of the life style and values of local peoples, which are different from designer's vision and their institutional rules. Furthermore, utilizers of natural resources have their own needs and problems of daily life. So they have to adapt themselves with the situation. These aspects include cultural, political, rights and juridical problems generally called socio-economic problems. In fact, knowing the socio-

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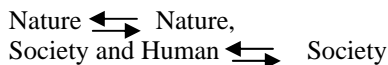
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economic aspects of natural resources are more complicated than technical issues. One of the essential differences is the behavior of natural factors with relation to human behavior. Human reaction affects directly the environment and nature. In long term, lack of knowledge on human conditions leads to unfavorable outcomes. To consider these aspects, some questions should be asked in socio-economic issues of natural resources as follow:

- What is the relation between adaptations of human societies in regards to natural resources?
- Where is the real position of human behavior and the nature in logical and a scientific viewpoint?
- Which one is the determinant element of this relation?

Finding relevant answers to these questions are necessary for preventing natural resource degradation desertification and combating desertification.

Morin (1973) in his book "Pardigme perdu" which is a preface on methodology of natural and human events noted from Serge Moscovici that: "every thing leads us to leave out, the nonhuman nature and unnatural human". Infact human and human societies have used natural resources, altered the nature for their needs and also have changed themselves in this relation." He shows the relation between human and nature in a pictorial view as below (Amin, 1995):



Muteplo (1990) in his published article introduced human and nature factors as two obverse and recognized same situation for them. In his idea, humane and natural factor's relationships are vice versa in desertification. Basically, desertification is because of climate and humane activities (Mehrabi, 1998). In fact, goal of these subjects is reaching rational use of land, water and soil.

Herein, management and so-called traditional societies reflect the deep knowledge and experience of societies. Unfortunately less attention have been paid to this aspect until now (Mehrabi, 1998).

Since 1960, scientists have had attention on socio-economic growth, methods and condition of natural resources. After Stockholm Conference in 1972, concerns to natural resources limitation has increased, till in Rio Conference (1992), Agenda 21 was approved.

In this Agenda, the articles 9, 10, 20 and 22 have been attributed to socio-economic issues,

partnership of local and native people, women and individual rights. After Rio Conference (1992) countries with desertification problem, had to combat and control the desertification, therefore government and scholars codified the desertification convention. In this convention which is named desertification convention, besides to technical aspects several points are about the local peoples, poverty, participation, the rights and law aspects. Generally these aspects, called socio-economics issues (F, Muteplo, 1990).

Based on available references, desertification is an event with environmental degradation in arid, semiarid, and semi humid lands.

Loss of ecosystem fertility is one of its consequences is because of physical and biological tension. This situation leads to gradual decrease of people income and degradation of life quality.

In fragile ecosystems, desertification may change into irreversible procedure. The result of low ability and capacity of deserts is unstable human life and nature.

In general scale, this event is a human and social problem which represents an urgent solution in places with need to necessary action, Furthermore it make social huge costs. In other word, desertification is an event which increases automatically in numeral progression way and raises the cost of reclamation. Preparing methodology for evaluation and prevention of mobility is one of the efforts to combat desertification. What is happening and what will happen, must be shown in the program. Unfortunately, one of the problems in methodology of desertification is lack of equal methods.

In fact, in studies, the majority of factors that are drastic in desertification are evaluated but always lack of a holistic view in desertification is obvious.

Therefore the following cases can be considered:

- A general and comprehensive view on desertification to focus on some concepts and indices.
- Forming technical and scientific methods, and socio-economic issues which are effective against desertification.

In a research and evaluation in Latin America, six levels including political, ministerial, institutional, cultural, socio-economic are considered for desertification event. A nothers research in Latin America, analyzed the desertification in seven levels, in order to elaborate in directors as political,

institutional, cultural, administrative as well as economic and social levels.

LADA project (Land Degradation Assessment in Dry Lands) has made a detail list of indices in the village scale. LADA project is a combination of concepts that consider different states of a factor or index. These concepts are nominated in DRSIR frame including promoter forces, pressures, indicators and actions. Factors and indices at this project are presented at the end of this article. Finally defined indices are selected based on Iran's situation. Note that desertification situation is different from country to another country and even in different places of a country and it must be adapted with situation of that place through field studies.

## 2. Materials and Methods

### 2.1. Search for viewpoint and framework

This research describes the analysis on estimation of desertification Criteria and indices based on field works of three case studies in Kashan, Kerman and Garmsar in Iran. The

objective was to establish a frame work, based on the findings of current research and personal experience, to find out the socio- economic aspects of desertification.

When considering desertification phenomena, a number of actions and reactions between society and natural resources are involved. The range of this complicated action includes, not only nature and natural resources but link to global socio-economic scale. Even some of researchers believed that desertification in a big part of Africa is due to the colonialism period (Morin, 1992). In a general view, the scientists give a triple systems with their interaction, including; Physical system, biosystem and social system. Every system has also some sub-systems, which produce a network as shown in Figure 1.

This figure represents general and macro viewpoint. For better understanding, their relations and functions is shown in Figure 2. Infact considering this approach, it is obvious that there is a clear relation between land degradation, migration, sustainable production system and poverty.

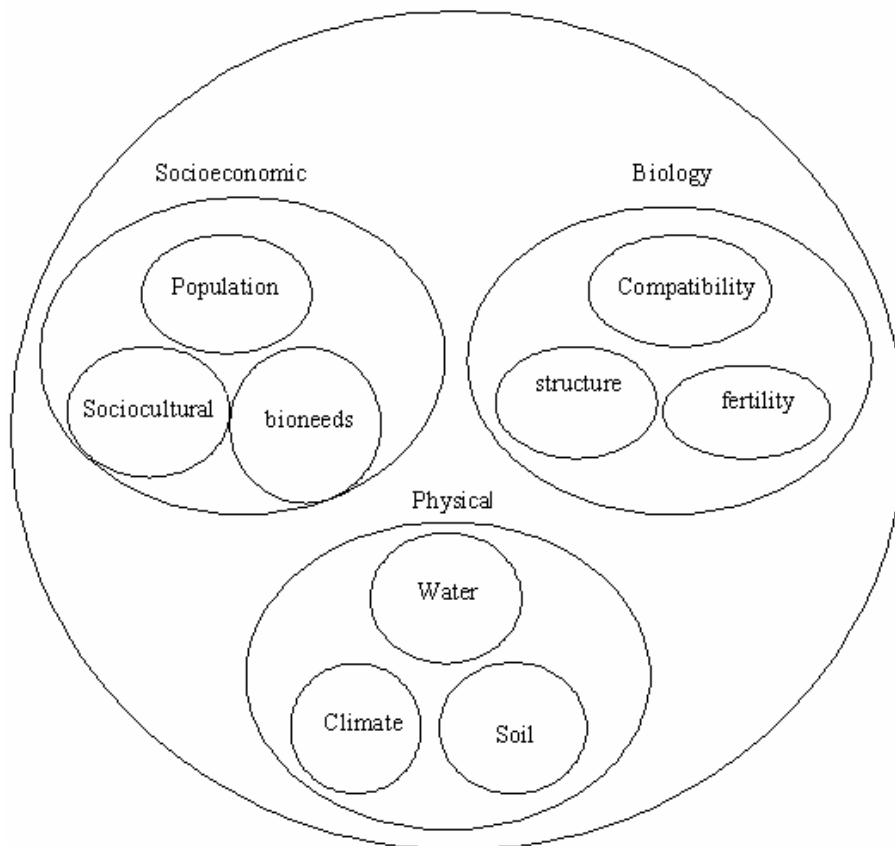


Fig. 1. Social, physical and biosystems

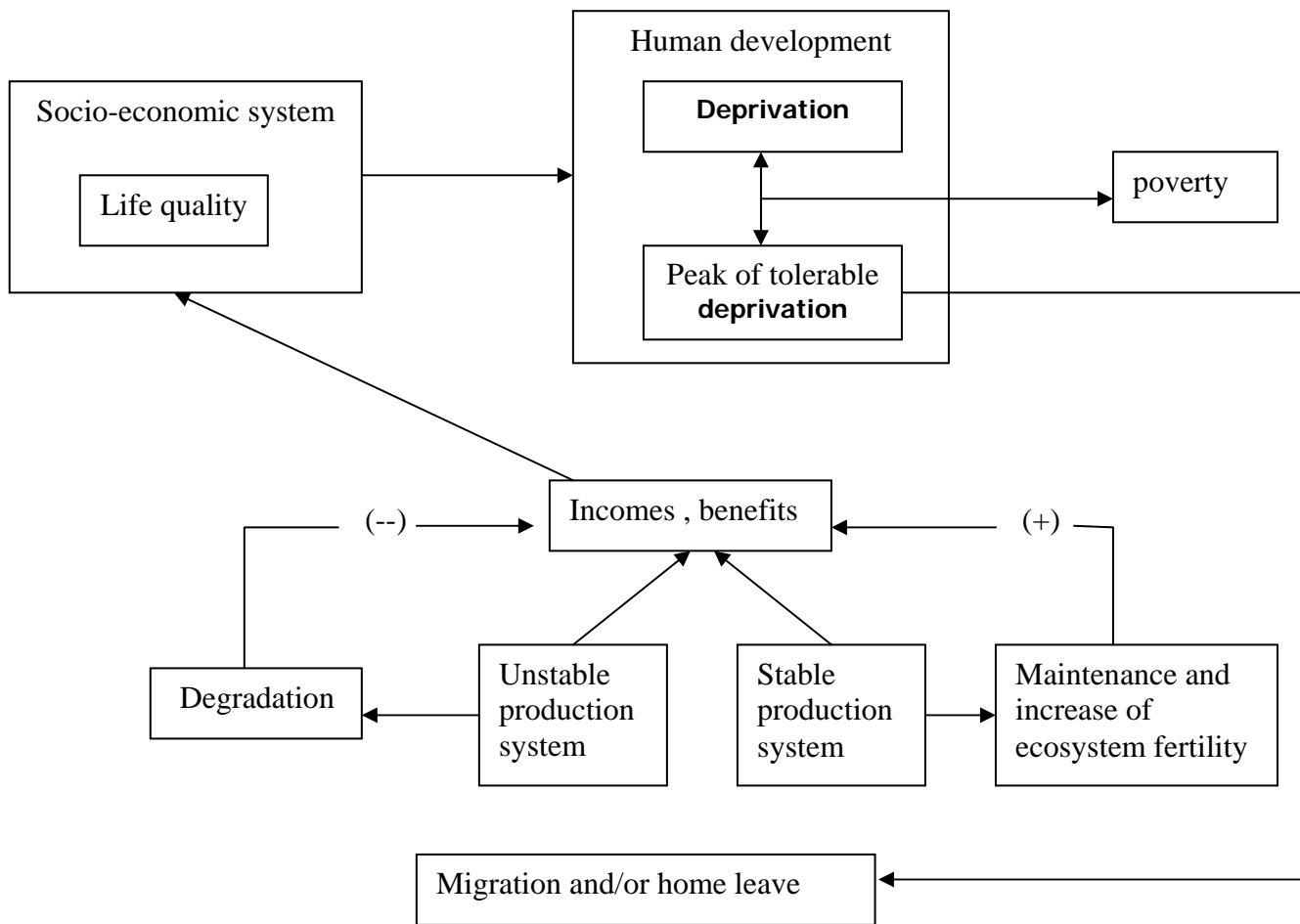


Fig. 2. The relations and functions among various sub-systems

As shown in Figure 2, there is a relation between poverty, deprivation and human developmental processes. Although this represents the relation between human development and desertification but for methodology of data production, desertification data analysis and changing it to tangible quantities in respective indices and factors frame, different levels, production stages and data combination must be used.

## 2.2. Criteria, indicators and indices

### 2.2.1. Criteria and indicators

Recently, socio-economic factors are considered as one of the main aspects of desertification factors; therefore, paying attention to two points is necessary. First, some factors directly affect desertification while some others indirectly. So in desertification indices, they must be differentiated from each other. Secondly, while accessing to quantitative factor is a base for suggesting indices, some of socio-economic

factors are qualitative and sometimes are important in desertification and is not possible to ignore them. Because elaboration of indices in quantitative way is possible therefore any quantitative or qualitative factors can be paraphrased in a quantitative approach. It is obvious that elaboration of this kind of indices knocks against difficulties.

Nonetheless, this article tries to quantify any effective factor in desertification, therefore by using available references and consulting with socio-economic groups, some factors with different aspects are determined.

In classification of desertification factors, its necessary to understand all factors from top to bottom and bottom to top or macro level to micro level and vice versa (e.g. individuals to society and government) have relation with each other although logical, socio-economic and cultural functions are connected. But they work separately and without any relation.

These levels are divided as below:

### 2.2.2. Top and macro level

- Group of factors
- Institutional
- Policy and politics

### 2.2.3. Bottom and micro level

This level, has direct relation with action and reaction of local people and exploitation of desert resources.

### 2.2.4. Intermediate level; Between macro and micro levels

Although this relation is tangible but based on external, its appearance is intangible. In fact, things that connect or separate macro and micro levels from each other are several factors which include cultural, institutional, juridical and legal factors.

This level shows the manner of harmony between macro and micro levels in terms of suitability or unsuitability of relation of beneficiaries in micro level with macro level. Because of reliability on direct exploitation of natural resources which shows the concern on desertification.

In Iran, from 3 mentioned levels, the macro level is related to institutional and policy which needs different methods and procedures and is not related to the topic of current manuscript. But in level 2, it is tried to appoint the main and key factors for introducing effective factors in desertification to find out the manner of relation (harmonic or disharmonic) on this level with upper level that shows the shortages.

## 2.3. Indices

### 2.3.1: Population

Among effective socio-cultural indices on desertification, population factor is directly and indirectly drastic in spread of desert and arid lands.

If we believe that human makes deserts (against desert that is made by the effect of natural factors) because of unsuitable relation of human with nature and environment, quantitative dimension of human factor appears in frame of "population factor" and qualitative dimension in frame of "cultural, socio-economic behaviors" but investigations confirm that qualitative dimension in desertification or combat to desertification is more impressive than quantitative dimension. Nonetheless in methodology of desertification there isn't any

qualitative standard for population index as population threshold (growth, density, migration, ...) because there is a specific exploitation system proportionate to natural characteristics, resource capacity and its trend, environmental factors, kinds of technology, exploitation goal, culture system, socio-economic structures of every society or place and behavior (motivation, vision about circumstances). This specific exploitation system has different effects in various periods (constructive and destructive affects in low, medium and high levels) on present trend of desertification.

For this reason, regarding relation and effect of different aspects of population factor (quality and quantity) in desertification, we must pay attention to the following items:

#### 2.3.1.1. Growth and population increases

Determining of role and affect of population growth in desirable location is related to type of relation and exploitation.

#### 2.3.1.2. Density and population distribution

In this case, state of population density that is impressive in trend of natural resources and environment about animal husbandry, economic activities, tourism, and infrastructural projects must be evaluated.

Migration, in recent decades has become one of the basic subjects of agricultural development and use of natural resources, but in case of desertification and natural resources degradation, migration can be a reducer factor (positive) to prevent from desertification by decreasing the pressure on the resources. In other hand, if population balance is affected by young people migration, it increases the rate of older residents and it can play a negative and destructive role. Even mobilization to other places for finding job can involve less pressure on family economic and also utilized resources.

#### 2.3.1.3. Equilibrium between population and resources

The source is a commonly usable material or natural property for human needs. These sources include talents, natural and biological potential facilities, minerals, soils, animal and herbal life; and climate.

In population-sources ratio, regulating an actual quantitative standard for all of sources in a place just by considering number of population is difficult.

Population not only as promoter of sources but also as user of it has intensively variant essence and function, In other word without noticing cultural system, technology factor, population and natural resources relationship, if they be noticed as machines with individual needs to energy sources, correlation between special amount of sources with a fixed number of population is possible. Hence, in evaluating of population effect on sources based on socio-economic, cultural, geographic and climatic characteristics of any region in frame of a simple equation, we must define how the residents of the region balance, their production and consumption and consider indices in exploitation process.

### 2.3.2. Poverty and economics

#### 2.3.2.1. Poverty and human development

Many researchers believed in the fact that poverty is the reason of land degradation and its potential effect. Poverty is result of a connection of factors and situation but naturally when potential of ecosystem is weak, it leads to a poor facility of the society.

One procedure for estimation of poverty threshold is determined based on income level and furthermore, deprivation level of different societies with emphasis on human development indices such as literacy, hygiene and life hope. It showed that there is a direct relation between funding and release from poverty.

#### 2.3.2.2. Economic and exploitation

Livelihood of the people who live in deserts is one of the factors that is directly or indirectly impressive in desertification. In most of deserts animal husbandary is the main activity that must be considered, because of their direct relation with water, soil and natural resources. Therefore appointing indices of exploitation system, livelihood, economic and production is important, ofcourse these indices correlate with income and occupation. After finding the correlation of above mentioned indices and factors, combination of indices will be discussed.

### 2.3.3. Institutional, Rights and Juridical factors

These factors are represented in recent years. If natural resources subjects classified in two levels of macro level (comprehensive) and local level (small and micro), institutional, legal and juridical factors situate in medium level and

include macro and micro levels. Although these factors are tangible but can not be observed directly.

Infact, these factors include relation among different levels and are more fundamental than direct relation of human societies and natural resources. Although these factors are determinant, but basically are qualitative factors; therefore their, quantitative measurement is difficult. So, for achieving quantitative indices, qualitative factor should be changed to quantitative factors and certainly it is one of innovations in recognition of desertification factors.

### 2.3.4. Socio-cultural factors

#### 2.3.4.1. Partnership and organization

This topic like previous subjects is new. Nowadays it is believed that if producer and utilizer of natural resources do not have any organization for various reasons then it intensifies desertification because nomadic and rural societies that are main users of natural resources, without adapted and suitable societies loss the control of collectivism from natural resources.

In other hand, lack of a social and acceptable participation for beneficiaries for related people with macro polities and administrative organizations for control and preventing from desertification is difficult. Hence, in case of lack of society and unorganized beneficiaries, desertification will be increased.

#### 2.3.4.2. Culture, perception, experience and indigenous knowledge

This topic is new too, and some references ignore it but it is important because local people know that natural resources is destructing, because some are destructing them but they do not know what they are doing. Exactly if people understand what they are doing, then it should be evaluated in spite of perception, degradation existed.

In lack of perception, degradation is related to cultural level and their concern on the danger of natural resources degradation.

Sometimes, perceiving that in spite of experience and perception of people, degradation is increasing that may be, due to the lack of trust to administrative organizations. Unfortunately, less attention has been paid to indigenous knowledge and experience of local people about exploitation of natural resources.

2.3.5. Indices table

For representing of indices table notice that proficiency of socio-economic, natural and

political factors, has fluctuations and in some cases their relation is direct and in some cases is indirect. So, for indices evaluation, we must consider these variations.

Table 1. The detailed list of indices related to desertification

Quantity	Indices	Indicator	Criteria
0-5	Growth rate		
0-5	Total density		
0-5	Relative density		
0-10	Total migration		
0-15	Effective migration on population structure	Population	I
0-10	Home leave		
0-15	Unemployment		
0-15	Engagement		
0-20	Coordination of sources and population		
100			
0-15	Lees than 50% under poverty line		
0-10	Under poverty line		
0-5	Equal to poverty line		
0-15	Deprivation		
0-10	Income		
0-15	Output and productivity	Poverty and economics	II
0-5	Mode of exploitation		
0-5	Animal density		
0-5	Fuel		
0-5	Investment rate		
0-10	Loan and dept		
100			
0-10	Private ownership		
0-10	Public and national ownership		
0-10	Cooperative ownership		
0-10	Small properties	Institutional, and Juridical factors	Rights
0-10	Societies conflict		
0-10	Conflict of nomads and villagers		III
0-10	Conflict of societies		
0-10	Respect to common law		
0-10	Conflict with law and or lack of law		
0-10	Conflict with executive institution		
100			
0-10	Ancient and traditional organization		
0-5	New organization		
0-5	Lack of organization		
0-5	Socio-politic organization		
0-5	Financial cooperation in plans and projects		
0-5	Work cooperation and companionship		
0-10	Cooperation in decision making process	Socio-cultural factors	
0-15	Consciousness about resource degradation and desertification		IV
0-10	Trust on executive organization		
0-5	Knowledge		
0-5	Skillfulness and native knowledge		
0-10	Women situation		
0-5	Social trust		
0-5	Lack of consciousness on resource degradation and desertification		
100			

Table 2. Scoring of socio-economic indices

Group of indicators	Low	Medium	High	Very high
	0-25	26-50	51-75	76-100
I- Population				
II- Poverty and economics				
III- Institutional ,Rights and Juridical factors				
IV-Socio-cultural factors				

3. Conclusion

Nowadays, to understand the actual causes of desertification, it is obvious that, the importance of socio-economics aspects should be

considered that in a general point of view, could be named human factors. This is also important to be awarded, the difficulty of well perception of these aspects. Furthermore to qualify the indices, any effort in this approach may lead us

to achieve the goal. That is why as a conclusion of this contribution, the suggestions have been proposed in three levels and four groups of categories. Of course, based on Iran's situation, they should be considered as; I- population II- poverty and economics III- rights and institution IV- socio-cultural criteria. An innovation also could be considered, trying to quantify the indices which are considered as qualitative aspects, including: rights and legal aspects, also local participation and indigenous knowledge.

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