Journal of Humanities Insights *3(4): 232-235, 2019*

Research Paper

Water Resource Management and Water Tension in Iran

Lee Chen[1], Ahmad Ghazi, Xie Feng

Soil and Water Conservation Research Institute, Shanghai, China

Received: 28 September 2019 Accepted: 12 November 2019 Published: 01 December 2019

Abstract

Water tension is growing with the growing population of the world. The demand for healthy and adequate food in any sustainable development is among the most important sustainability indices. In this context, water resource management plays a very important role. At present time, most of the countries in the Middle East and North Africa are under water tension. In a sustainable development, a sound management of water resources is crucial in the socio-economical development of these countries in these regions. The objectives of this paper are 1) To review the present state of water resources management and water tension in the Middle East and North Africa, 2) To review the water resources managements in Iran, and 3) To discuss some case studies in the central desert arid condition of Iran. The definition of sustainability with regard to arid and semi-arid conditions is discussed here. However, sustainability as used in the environmental policy and research arena is indeed a complex issue. In general, sustainability even on a local level has to address and relate to global issues. With the advances in technology the water utilization has boosted the underground water resources. The sustainability of the present state of utilization with the emphasis on the groundwater resources could be very questionable. In the Middle East, for example, Syria, Iraq, Lebanon, Jordan, Israel and the Occupied Territories (The West Bank and Gaza) have a combined population of nearly 42 million. Of these people, an estimated 41.5% rely on transboundary streams and 52% utilize springs, wells and rivers supplied by local precipitation. The remaining 6% turn to water pumped from deep wells. At present time, these water supplies are being taxed to their limits. it is the point of view of the author that we should consider ancient integrated systems as sustainable ones.

Keywords: Soil; Semi-Arid; Resource Management; Water Supply

How to cite the article:
L. Chen, A. Ghazi, X. Feng, Water Resource Management and Water Tension in Iran, J. Hum. Ins. 2019; 3(4): 232-235, DOI: 10.22034/jhi.2019.80954.

1. Introduction

Demand for water is on the rise everywhere in the world, particularly in arid and semi-arid countries including Iran. A general increase in the standard of living over time has created a gap between access to and the need for water. Rapid population growth and expansion of irrigated farmlands during last 2 decades in Iran have imposed more pressure on the water resources. Over 2/3 of the total area of Iran suffers somehow from the lack of precipitation. Low recharge rates of underground resources lead to the negative balance of 5 km^3 per year for the aquifers and rapid drops in water tables [1]. Therefore, there is an urgent need for finding ways and means for solving the conflicting interests of urban, industrial and agricultural sectors in utilization of water. Since new resources of fresh water are very limited, proper water resources management plays a very important role. Concern about future food production and environmental degradation has increased awareness of sustainability. Although an abundant literature is now available, some fundamental questions have not yet received adequate answers. This paper

[1] Corresponding Author Email: Lee.chen1982@yahoo.com

intends to address some issues concerning the definition, assessment and implementation of the concept of sustainability, specifically in relation to land management for agricultural purposes. The semi-arid regions of Iran are under increasing pressure to supply the staple grains (wheat and barley) required by the steadily growing population of the country. A population of 150 million is expected in 30 years time, which means 30 million tons of cereal will be needed. The present production of wheat is about 5.5 million tons and that of barley amounts to 2.5 million tons, almost all produced in semi-arid conditions. It is clearly a complicated matter. We need more water to reach to such a record [1].

2. Definition issues

Sustainability, as used in the environmental policy and research arena is a
complex and sometimes controversial concept. When applied to agriculture, complexity is compounded [2]. Because of this confusion, some authors who believe that an improved model of agricultural development and a sustainable land management system cannot be properly implemented without previous conceptualization continue searching for a multifaceted, though unifying and consensual definition [3]. Sustainability attempts to address global issues, such as resource degradation, deforestation and ozone layer depletion etc. but also local issues, such as the maintenance of specific eco-sociosystems or combination of these [4].

3. Dimensions of the issue

The perspectives of sustainability and sustainable land management depend on one's specialization. Ecologists concentrate mainly on the stability (or fragility) of the ecosystems as a function of beneficial constituents of the environment. The agronomic point of view might be considered comparatively narrow. They are still aiming at the maximum productivity. In contrast, sociologists take a broader view, striving for social welfare and emphasizing social variables such as the organization of labor, unemployment, migration and so forth [4]. To many economists, economic efficiency, usually associated with political issues, controls sustainable development. Profit maximization through conservation of money into goods or services could just as easily be taken as objective since sustainable systems maximize resource conservation subject to a profit constraint by minimizing degradation [5]. Politicians' viewpoints are often confined to sort-term plans. To many politicians, particularly those in some developing countries, stability within time spans of 3-5 years, rather than sustainability, is the issue [6].

4. It is multi-scalar

The concept of sustainability has different meanings at different spatial levels (local to global), according to the geographic variations in natural and human resources. Since sustainable agriculture and land management aim at reducing the use of external inputs, the quality and properties of the natural resources base become much more important. For example, the term of agro-ecologic sustainability varies from arid areas, where sustainable land management is controlled by the efficient harvesting and application of water, to humid tropical areas, where this is done by nutrient conservation and cycling. Similarly, the geographic diversity of social economic and institutional conditions determines the spatial variability [7]. At international levels, while industrial countries are swinging from conventional, highly mechanized and specialized production systems to more integrative, low input farming to promote sustainable agriculture and land management, developing countries have embarked on the opposite strategy, to promote aleatory development. At the national level, the terms of sustainability may also vary.

5. Time variability

The term sustainability refers to the productive performance of a system over time. The questions are: how long can systems last without being disturbed? The length of time, whether for disturbance or recovery, depends the intensity and kind of land management, the latter being a function of population pressure and type of land use. Under natural conditions, most land systems are intrinsically long-term sustainable. In the not-too-distant past, land use was governed by respect for long proven rules for sustainability; such as follow periods and other traditional soil and water management practices and was so for water resources systems as well. Time was available for soil resilience and for agro-ecosystems to be maintained. With increasing in population pressure, land has to be used more intensively and more marginal land has to be put into production. So more water has to be used. Water quality decreases gradually. Both conditions endanger the short and medium-term sustainability of land quality.

6. Sustainability indicators are required

Sustainability is a concept and cannot be measured directly. Therefore, appropriate indicators should be selected, tested, and validated to determine levels and durations of sustainable land and water resources management. An ideal indicator should be unbiased, sensitive to changes, predictive, referenced to threshold values, data transformable,

integrative, and easy to collect and communicate [6]. It is unlikely that all potential indicators would fully satisfy these quality requirements.

7. Implementation issues

Finally, conceptualization and assessment of sustainable land and water resources management have to be translated into applicable alternative models, which have to be tested and monitored under practical conditions.

8. System quality criteria

To be sustainable, a land and water resources management system is expected to incorporate a set of intrinsic properties, such as those proposed by Altieri (1989) [6]. It should be diversified in time and space, dynamically stable, self-promoting, productive and self-sufficient, based on economic potential adjustable to socially and culturally acceptable technology; provide self-help potential; and promote the conversation and regeneration of natural resources [4].

9. Water resources: An emerging crisis

The problem of water shortages in the Middle East and Northern Africa is a developmental issue, since water limitations are seriously impeding the economic growth and development of countries in the region. Even countries that are quite advanced technologically are experiences restraints on their future development. Water scarcity in the Middle East / Northern Africa region is rapidly becoming part of a widespread environmental concern for the region. The twin phenomena of depletion of existing water resources together with pollution of these resources is causing growing hardship in the area. Land deprived of its scarce water resources, either by natural phenomena or human activities, produces devastating consequences as recent events in the sub-Saharan region of Africa demonstrate. At the very least, water scarcity creates an environment where sustainable development is severely limited in the Maghreb (Libya, Tunisia, Algeria & Morocco) and in the worst case, extreme water shortages can create an environmental climate that exacerbate serious conflicts, as evidenced by water-related conflicts in the Middle Eastern region. Jordan faces possibly the worst water crisis in the Middle East [8]. Egypt is a key country in the region, serving as a link between the Middle East and northern Africa, as well as being the main water user of the vast Nile basin river for its water resources, with irrigated agriculture accounting for the vast majority (84%) of all the water used. Since the Nile River drains from nine countries, at great distances from Egypt, any major change in the water-use pattern in these countries would have a dramatic effect. In addition to water quantity consideration, indicators show that environmental degradation of the Nile waters is increasing [8].

Human dependence upon limited water supplies underlies any consideration of water resources management in the Middle East. The population of this region utilizes a combination of local springs, wells and rivers. Of the population of the region, 41.5% rely on transboundary streams flowing from non-Arabic countries, 52.5% utilize springs, wells and river supplied by local precipitation. The remaining 6.0% turn to water pumped from deep wells [8]. Table 1 shows dependency on different water supplies in different countries of the region.

Table 1. Middle East population (1000s) and water resources upon they depend [8].

Country	Current total population (yr.2020)	Transboundary rivers	Local springs, rivers & wells	Deep aquifers (Nonrenewable)
Iraq	16000 (41808)	10800	5200	-
Israel	4400 (6643)	1400	2900	100
West bank & Gaze	1800 (4200)	-	1000	800
Jordan	3450 (9964)	1650	700	1100
Lebanon	2500 (4433)	-	2500	-
Syria	10500 (26094)	2200	8000	300
Total	38650	16050 (41.5%)	20300 (52.5%)	2300 (6.0%)
Turkey	55300 (86849)	-	55300	-
Iran	75000	500	26300 +23000(qanat)	-

Table 2 shows the distribution of water from surface and underground sources. As will be seen, these water supplies at the present time are being taxed to their limits.

Turkey and Iran are essentially self-sufficient with regard to water. At the same time, the former is the source of 98% of the flow of Euphrates and 43% of that of the Tigris River. The Zagros Mountains on

the border of Iran & Iraq, form catchments for waters of tributaries entering from the left bank of the Tigris in Iraq [8]. Table 2 shows water dependency in different countries of the region.

Table 2. Dependency upon surface and underground sources [8].

Country	Population (x1000)	Surface (1000 m^3/yr.)	Subsurface (1000 m^3/yr.)	Other (1000 m^3/yr.)
Iraq	16000	15680(98%)	320(2%)	-
Israel	4400	1760(40%)	2508(75%)	132(3%)
West bank & Gaze	1800	300(17%)	1500(83%)	-
Jordan	3450	17650(51%)	1690(49%)	-
Lebanon	2500	875(35%)	1625(65%)	-
Syria	10500	8715(83%)	1785(17%)	-
Total	38650	29090(75%)	9428(24%)	132(1%)

Considering gathered datum & reports, it can be seen water tension is increasing nearly all over the world, particularly in arid & semi-arid regions. In fact, water war and struggle has already begun. Governments put forward new plans and projects and these plans change existing balances. There is no need to say water tables are dropping rapidly etc. but we should search for new ways of using existing water.

10. Conclusion

In many countries (including Iran), environmental degradation is a by-product of development, along with land deterioration from conventional agricultural practices. In contrast, sustainable land and water resources carry a strong commitment to environmental quality. In conclusion, the choice of sustainability indicators and the determination of threshold values have to take into consideration the spatial variability of the natural and human conditions controlling sustainability. A crucial question is how to evaluate the time component of sustainability and estimate the longevity of a land system under specific management practices. Agronomic scientists have proposed periods 5-10 years for agronomic productivity and 5-10 decades for soil and environmental features (6). Others suggest the time scales of both internal and external processes acting on the system should be considered for agroecosystems at local and regional levels (5). In Iran, for example, traditional water management practices (qanats, Band, Bandsar, pot irrigation, etc.) that evolved over a long time into a socially and ecologically integrated system quickly collapsed when agriculture underwent modernization. It is the point of view of the author that we should consider ancient integrated systems as sustainable ones. Sometimes we forget that our ancestors formed frameworks of our present knowledge.

Land use evaluation should be considered as the main and initial decision-making factor. If one were to evaluate these systems it would take a long time, and it is beyond this paper's objectives.

References

1. Francis C.A., Younberg G. 1990. Sustainable agriculture: An overview. 1-23. Willey & sons, Inc., New York, NY.
2. Lockeretz W. 1990. Major issues confronting sustainable agriculture. Pages 423-438 in C.A.
3. Francis C. 1990. Butler Flora and L.D. King, Sustainable agriculture in temperate zones. Wiley & Sons, Inc., New York.
4. Allen P., Van Dusen, et al. 1991. Integrated social, environmental and economic issues in sustainable agriculture. *Am. J. Alt. Agric.*, 6(1): 34-39.
5. Ikard J.E. 1993. The need for a systems approach to sustainable agriculture. *Agric. Ecosyst. Environ.*, 46(1*4): 147-160.
6. Altieri A.M. 1989. Agro-ecology: A new research and development paradigm for world agriculture. Agric. *Ecosyst. Environ*., 27: 37-46.
7. Ikard J.E. 1990. Agriculture's search for sustainability profitability. *Soil water conserve*, 45(1): 18-23.
8. Farshad A., Zinck J.A. 1995. The fate of agriculture in semi-arid regions of western Iran: A case study of Hamadan region. *Annals of arid zone*, 34(4): 235-242.