

Evaluation of Applications of Sustainable Agricultural Development in Iraq

Ibraheem M. Aliyas

PhD, Lecturer, Technical Institute of Mosul, Iraq

Emad Y. Ismail

PhD, Assistant Professor, Agricultural Technical College of Mosul, Iraq

Mohammad A. H. Alhadeedy

PhD, Assistant Professor, Agricultural Technical College of Mosul, Iraq

Abstract

Iraq is situated in the Southwest Asia. It is one of the Middle East countries at latitude 33°19'15.60" north, longitude 43°48'07.20" east, in the Northern hemisphere. The major challenge for Iraq is the food security, where there is no self-sufficiency of food due to soil deterioration as desertification, salinity and military operations. Iraq suffers of drought due to low rainfall which is about 150 mm/year. Table 1 indicates the production of cereal crops in 2016 which do not cover the local needs. Figure 1 shows the land utilization that more than 75% of it is located within the semi-desert and desert. The field crops require the expansion in agricultural area to increase the production to meet food security according to the population growth by sustainable agriculture. There is environmental degradation and non-eco-friendly products due to the use of chemical compounds such as: fertilizers, pesticides, herbicides, all these factors have effects on the ecosystem negatively. The agricultural sector is very consumptive which use 40% of land and consumes 70% of national natural resources. Therefore, sustainable development cannot be achieved without sustainable agriculture. Figure 2 shows how to achieve sustainable agricultural development through the application of ecological agriculture, zero tillage of agriculture, organic agriculture and alternative agriculture which contribute to the production of green products through green techniques to activate the relationship between producer (plant), consumer (human, animals) and analyst (microorganisms). Figure 3 shows the import of cereal crops between 2012 and 2018 to cover local needs. The conclusion from the study is that Iraq does not meet the level of application of sustainable agriculture.

Notice: dunum is Iraqi unit scale equal to one quarter hectare.

Keywords: sustainable agricultural development, application, food security, Iraq.

JEL Classification: Q01, O13, Q18.

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Introduction

Sustainable development has three principle dimensions: economics, ecology and society. There should be a real activation of these factors to achieve the natural balance. The excess depletion of the natural resources will result in the deterioration of the ecosystem [1]. It is estimated that 25% of global greenhouse gas emissions are directly caused by agricultural production due to emission of gases in service of soil and crop mechanically. In addition to forestry burning, deforestation also by using of fertilizers, herbicides and pesticides [2]. Conversion of natural ecosystems to agriculture causes emitted about 80 tons of gases / hectare most of it losses from soil organic carbon to via the atmosphere [3]. Agriculture also suffers from the consequences of ecological changes as: temperature fluctuations, pest and disease infections, water shortages, extreme weather changes, loose of biodiversity and other effects. Crop productivity is expected to decline in some regions due to these adversely factors and pollution. The total world food production will decrease by 8% until the year 2050 due to the damage of the biosphere [4]. We have to innovate new eco friendly techniques to overcome these risks and disasters that is strategic option [5, 6]. It involves preventing adverse effects to air, soil, water, and biodiversity. There are many practices to service sustainable agriculture and sustainable food systems, such as: promote soil and air health, minimize water use, and lower pollution levels on the farm and produce green crops environmentally friendly [7, 8, 9]. Elements of sustainable agriculture include sustainable culturing, forestry, mixed farming, multiple cropping, and crop rotation. Smart farming technologies that enhance

quality environment for humans to living, also reclaiming and transforming deserts to farmlands [10, 11]. The ability of the agricultural system to maintain production over time under the influence of social and economic pressures, as a technical approach to the conservation of natural resources with continuous economic progress through a rational management approach to the exploitation of natural resources and achieving sustainable productivity. Sustainable agriculture ensures the provision of environmental safety without causing any harm to the natural environment. It also helps to find equitable agricultural systems that serve the environment and enrich them with the results of scientific discoveries. It ensures environmental safety through the conservation of natural resources while developing the vitality of the whole agricultural system. It also aims to achieve economic feasibility by reducing the cost of production and increasing the production unit to obtain a reasonable return in a manner that meets the need of the market. This can be done by minimizing the external inputs used by encouraging internal resources or by combinations of both [12, 13]. Most policies still encourage actively the independence on external inputs and technologies. Also, the leaching of fertilizers & pesticides in water and drainage, flooding causes contamination for both soil and water by using pesticides and chemical fertilizers. This is also a serious problem in air quality by emissions of agricultural gases which is responsible of causes global heating due to gases emitted to via greenhouses. But in traditional farming the proportion of gases pollution rises to 30%, the issue is the effect of agricultural practices on human, animal health in addition to ecosystem [14]. The importance of sustainable development in a planning approach comes from its ability to achieve many national and comprehensive goals. Iraq has good potentialities such as oil, population and agricultural Industries. But there are many other challenges like; natural balance, population distribution, economic balance, the infrastructure, unemployment, poverty, illiteracy, desertification, drought, military operations and corruption. It is possible to overcome all these challenges depending upon sustainable agricultural development in Iraq [15]. Most agricultural assessments of environmental changes made until now have not focused explicitly on agricultural sustainability in the current crisis. We must be aware to find solutions, where the ecosystem in continuous deterioration, so require their sustainability through researches and formulates of positively policies interact with it to providing the needs of communities and economic development in balanced situation with the environment [16]. The objective of the study is to assess agricultural production, especially the main food needs, which are cereal crops the main source of food energy in Iraq, analysis of the factors of production and their impact on the biosphere, determinate the reason of the deficit in production, methods of producing healthy food eco-friendly and achieve self-sufficiency in food security by applying sustainable agricultural development method.

Materials and Methods

This study were conducted by means of follows and applying scientific analysis for agrarian sector components in Iraq depending on agricultural survey data for evaluation of agrarian production and ecosystem to promote this sector towards achieving sustainable agrarian development and promote productivity and quality for the agricultural crops, in order to ensure the environmental security of the biosphere and the living organisms. The original data were obtained from the annual reports of the ministry of planning and the ministry of agriculture in Iraq. For the evaluation of the application of sustainable agriculture. These data were subjected to interpretation using scientific analysis. It is worth to bring back these organisms to interact with each other and with their environment in harmony without causing any defect and damage in the normal biological cycle, that by their achievement the interaction and correlation between the producer (plant), consumer (humans and animals) and the analyst (microorganisms) and their enrichment by scientific researches to achieve the desired goals and reluctance to use chemical compounds.

Results and Discussion

The planet Earth faces many challenges especially in developing countries like Iraq due to population growth, increasing of food demands, and expansion of industrial production, which requires agriculture implementation of sustainability for production and improves quality of crops. Agriculture is one the great sectors occupying a large area of land which uses 40% of land and consumes 70% of the natural resources. If the ecosystem is not been protected then the environment will not be suitable for sustainability of agricultural investment and food security. Environmental agriculture includes safe farming, clean agriculture and healthy food production, through the optimal utilization for natural resources and no pollution of ecosystem such as: soil protection, water and climate conservation, biodiversity promotion, abstaining from chemo-compounds. where 60% of ecosystem services are vulnerable to deterioration due to unsustainable agriculture, and 25% of greenhouse gas emissions are caused by traditional farming practices which it has adverse effects on the agricultural ecosystem and caused desertification, flora damage, deforestation and forest burning. Also the use of chemical

fertilizers, herbicides, pesticides, livestock chemo-feeding, the stripping of green cover due to wars, urbanization and excessive mechanical service operations for soil & crop,... etc. Which have an adverse impact on biodiversity and the biosphere. Therefore, we must apply agricultural practices adapted to the environment; we must also have knowledge of the weather of each agricultural area to ensure that the crop responds to the prevailing climate. Taking into account the necessary rainfall lines for each crop for ensure great production in following crops wheat, barley, lentils, chickpeas and broad bean in areas secured by rain and semi - secured rain, with the exception of supplementary irrigation, preferably using zero tillage agriculture because of its positive effects and results with applying biological control for pests and reduction of yield losses being procedure the harvesting in the fit time. In order to preserve production must be utilize modern scientific techniques in agricultural processes. Then protecting agricultural products during marketing and storage, where environmental agriculture protects; the soil from erosion, increases soil fertility, conserves water and the natural environment, reduces greenhouse gases emissions, and the clean agriculture reduces climate change. The needs of the Iraqi country of wheat which considers major food ranges between 4-5 million tons per year, while production does not cover the needs due to desertification, salinity and land deterioration that Figure 1 shows more than 75% of the Iraqi land is deserts or semi-deserts, due to the ecological changes and technogenic (anthropology), the impact caused by military operations from 1980 to 2018, which adversely affected the ecosystem and agricultural production. The main challenge in Iraq is food security. Most of Iraq's damaged land is in arid and semi-arid areas. Iraq suffers from drought, soil salinity due to lack of rainfall not exceeding 150 mm per year and high temperature during the summer season which reaches 50-60 degrees Celsius. The following are statistical data for the agricultural sector through which sustainable agriculture can be assessed in Iraq. The total land area of Iraq is 437.072 km². The agricultural area is 10.5 million hectares, representing 24% of the total area that provides 30% of the agricultural productio. The best way is to produce eco friendly crops by using green techniques. like organic farming, environmental cultivation, zero tillage farming and alternative crop farming to reach sustainable agriculture to achieve food security in Iraq.

Also clears from figure (1) which refers to rain precipitation zone that forms with 49.8%, while irrigated land is 50.2%. Iraq depends on the wheat and their derivatives as nutrients. Table 1 shows cereal production in 2016, which does not cover local needs. So the Sustainable agriculture is a manner of the techniques strategic option and rational agriculture for achievement of food security in Iraq. Which characterized; that provides; 30% of the time, 40% of employment, 60% reduction of fuel consumption, 40-50% of water consumption, reduces sowing rates, facilitates farming methods, reduces soil erosion, and increases organic matter in soils. While traditional agriculture causes the following: environmental deterioration, production of non-eco-friendly products, also the use of chemicals in crop & soil service processes such as; fertilizers, pesticides, herbicides. Then these factors will cause adverse effects on the ecosystem. The agricultural sector consumes 40% of the land area and 70% of natural resources. This requires the application of sustainable agricultural development. Sustainable development can therefore not be achieved without sustainable agriculture. Figure 2 shows how to achieve sustainable agricultural development by applying the following methods: ecological agriculture, zero tillage agriculture, organic agriculture and alternative crops agriculture such as buckwheat, quinoa, amaranth, oats, etc. Which contribute to the production of green products through green technologies to activate the relationship between producer and consumer and analyst. Figure shows the import of grain crops that not meet local needs. Through this scientific analysis of agricultural reality in Iraq, we suggest that this study be taken as a strategic approach to achieving food security through sustainable agricultural applications.

Conclusions

From the study it appears that Iraq do not meet the level of application of sustainable agriculture, Iraq imports huge quantities of cereal crops to meet the local needs. Iraq imported 3863000 tons as average during the period 2012/2013 – 2016/2017, and the total quantity of cereals imported during 2017/2018 was 4350000 ton. It is clear that Iraq is a consumptive country of cereals. Therefore, Iraq urgently needs to implement sustainable agriculture that achieves the both of food and environmental security.

Table 1. Indicators of cereal crops production in 2016 of Iraq

Crop type	Total cultivation area / dunum	Average yield Kg / dunum	Total yield / ton
Wheat	3697246	700	3052939
Barley	1061703	470	499222
Rice	154247	1175	181320
Corn	303969	854	259546
Sorghum	41261	309	12749

Note: One dunum = 0.25 hectare.

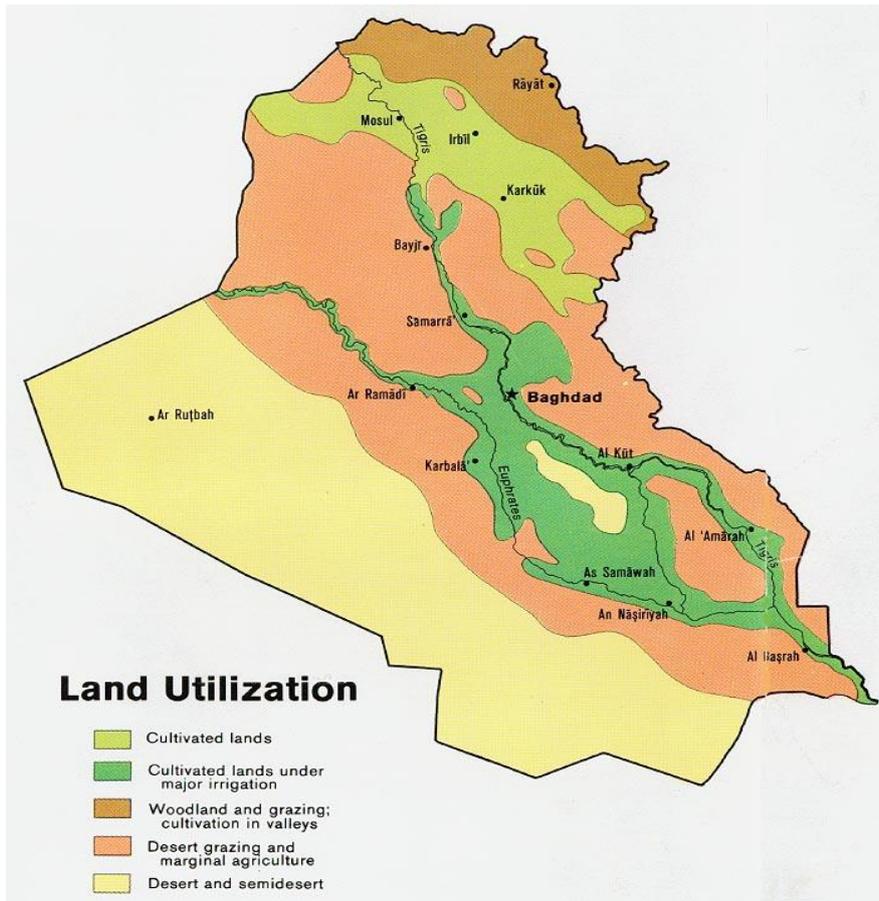


Figure 1. Map refers to land utilization that rainfed agriculture constituting 49.8% and irrigated 50.2

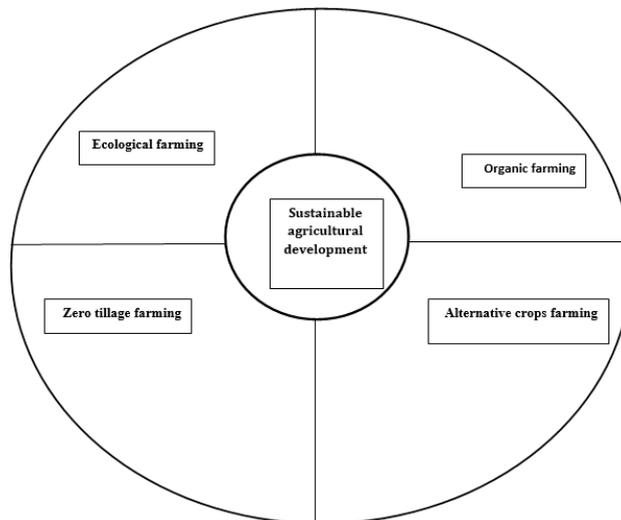


Figure 2. Utilization of sustainable agricultural development

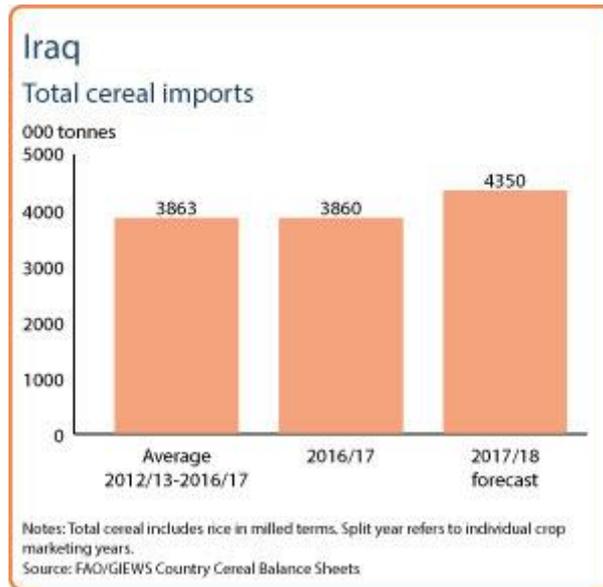


Figure 3. Reveals to import of cereal seeds in Iraq

Recommendations

1. Promote environmentally sound agricultural practices and refrain from using chemicals in agriculture for obtain green products.
2. Requires diversification of energy sources for food without relying on one crop, such as wheat with benefit from alternative crops like buckwheat, quinoa, etc...
3. Sustainable production practices can improve agricultural productivity to achieve food security while conserving biodiversity, soil fertility and efficiency of water use and while reducing the pressure to clear forests and reduce desert area.
4. Pay attention to the economics of water resources and benefit from the idea of rainwater harvesting and the use of modern irrigation techniques such as spraying and drip irrigation.
5. Expand the development of nature reserves, habitats, meadows and all agro-ecosystems to achieve biodiversity and production.
6. Maintain the stability of biological diversity at the seasons of regeneration and seed production such as not hunting animal and grazing at reproduction seasons to ensure their sustainability and ecological biodiversity.
7. Control of desertification, which is estimated 75% of the lands of Iraq.
8. Must protecting the ecosystem because it is the ownership of all and its security is reflected positively on everyone.
9. Following the program of the sustainable agricultural development as suggested in this study.
10. Investment of renewable energies in the service of soil and crop to reduce pollution and achieve natural balance.
11. The preservation and sustainable management of biodiversity is crucial for supporting all life forms, including national food security and development of new crop varieties such as pseudo cereals crops.

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