

## Small Scale Sustainable Farming Activities in the United Arab Emirates: the Case of the East Coast of the UAE

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**Abstract.** Farming activities constitute one of the main economic activities in the East Coast (EC) of the United Arab Emirates. Historically, the area was known as the fruit basket of the UAE, producing mainly mangos, dates, and bananas. In recent years, with the increasing population growth rate, sustainable farming has become a major challenge to EC farmers. The aim of this paper is to discuss the dilemma of these farmers; On the one hand, they cannot stop farming because they are attached to their farmland. On the other hand, the harsh farming environmental conditions in which they live require heavy use of modern types of fertilizers and pest control. This paper argues for the need to use sustainable farming methods to continue the farming activities with an eye on the environment. As part of the field study, personal interviews were conducted and feedback from the farmers was discussed. The conclusions point towards the need to continue farming activities in order for the country to meet the growing demand on farm crops and the importance of ensuring financial support to the local farmers to allow them to meet that demand while preserving the environment.

**Keywords:** sustainable farming, coastal areas, small-scale farming, water, soil

### 1. Introduction

Producing food in arid zones is a big challenge to many nations, especially with increasing populations and the development of the life style in many countries. The United Arab Emirates (UAE) is no exception. The UAE is located in the northern part of the Arabian Peninsula. Given its location, it has less precipitation, very little fertile soil, and no running water. The UAE population increased from 1.5 million in the middle of the 1970s to more than 8.5 million in 2014. The UAE became a land of fortune to many expatriates. Many came to work, but an increasing number of expatriates also choose to settle in Dubai and Abu Dhabi, attracted by the country's high standards of living, the availability of high quality services, and its geographical location, being both close to the Indian Sub-Continent and within a few hours from other Arab countries. The term 'sustainable farming' is used in this study to refer to the cycle of farming activities: "*making a cycle requiring no inputs from outside*" [1]. Because of the limited fertility of its soil and the shortage in water supply, sustainable farming became a big challenge to the farmers in the UAE, on a par with their counterparts all over the World [2], [3].

This paper focuses on the dilemma and the challenge facing local farmers in the EC, being torn between the desire to continue to grow competitive farm crops to contribute to feeding the country's population and the lack of the necessary resources such as underground water and fertile soil. In addition, the paper highlights the role of the government in helping these farmers to hold on to their farms and fulfil the high demand on food supply as part of the government food security policy.

Worldwide, there are several local and international agencies giving consultation on sustainable agriculture e.g. the Department for International Development (DFID) and the Food and Agriculture

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Organization (FAO) [4]. These agencies help other nations to continue to grow their own food to reduce the amount of money spent on feeding world population.

There are several studies, which covered the shortage of water in some arid zones and the challenges of farming activities in some parts of the world, including the UAE [5]-[7]. In addition, some studies [8]-[10] focused more on the water crisis and the government efforts to manage water irrigation in various areas, as well as on food security. Unfortunately, there is limited research on EC farming activities and sustainable farming in this region.

This paper is a descriptive study based on-going farming activities field observations and interviews, which were conducted by the researcher with local farmers and the inhabitants of the EC area. The researcher managed to visit most of EC farmland and conducted interviews with some national and foreign farm laborers and EC farm owners (250 cases). The aim was to shed some light on how EC farmers maintain their farmland with small scale farming activities despite such harsh environmental conditions as characteristic of the region, water shortage, hot climate, and limited soil fertility. Some of the data used in this paper is collected from the Ministry of Environment and Water (MEW) database and the UAE National Bureau of Statistics. In addition, some information was gathered from other resources such as local EC municipalities.

## 2. The Nature of Faming Activities in the East Coast of the UAE

The East Coast of the UAE is located in the northern part of the country. It lies along the Indian Ocean with 90 kilometers long and an average of 3 kilometers wide, with a total population of around 200,000 people working in the government and private sectors.

Farming has been practiced in this area for a long time. People used to farm their land using old methods of farming and irrigation. In recent years, and as government subsidies became available, EC farmers have however tried to implement new farming techniques to save water and reduce the demands on farm labor force. Due to the expanding urban settlements, some EC farms converted some of their land to other uses e.g. to host commercial and industrial buildings. Like many other semi-arid areas around the world, EC farms face a water shortage [11]. EC has more than 4,511 farms with a total area of 55,788 Donum (one Donum equals 2500 square meters) of farmland (table 1). 21% of this land is used for growing vegetables, farm crops and fodders, while 56% is used for growing fruit trees [12]. This type of small-scale farming uses an intensive method in farming and makes sustainable farming very difficult to implement because of the intensive use of chemical agents to increase the farm product in a shorter farming season.

Table 1: Distribution of farm land use in the EC, 2012 (*Area: Donum*)

Crop	EC	UAE Total
<b>Fruit Trees</b>	31,464	<b>433,979</b>
<b>Crops &amp; Fodders</b>	7,365	<b>226,547</b>
<b>Vegetables</b>	4,665	<b>50,181</b>
<b>Forests</b>	210	<b>29,732</b>
<b>Temporary Fallow</b>	3,092	<b>174,176</b>
<b>Other Land</b>	8,992	<b>137,956</b>
<b>Total</b>	<b>55,788</b>	<b>1,052,571</b>

Due to limited regular farm conditions and the steady urban development, more than 26% of EC farms disappeared. The remaining farms are still growing farm crops, but they shifted to modern farming methods e.g., farming in cooled greenhouses and aquaponics. It is true that this type of farming is consuming less water and requires less labor force, but even the small amount of water needed for these farms remains difficult to obtain.

It is clear that an estimated 90% of the total EC farmers have water problems, in terms of quantity or quality of irrigation water. Government records show that the total number of farms increased from 2,525 in 1975 to 5,528 farms in 2012 (Fig. 1). This figure shows the total number of farms recorded by the MEW. There is no record of the number of the farms which have been converted to other uses, mainly because of the growth of EC cities which took place at the expense of converting farmland into residential areas and new infrastructure e.g. schools and roads.

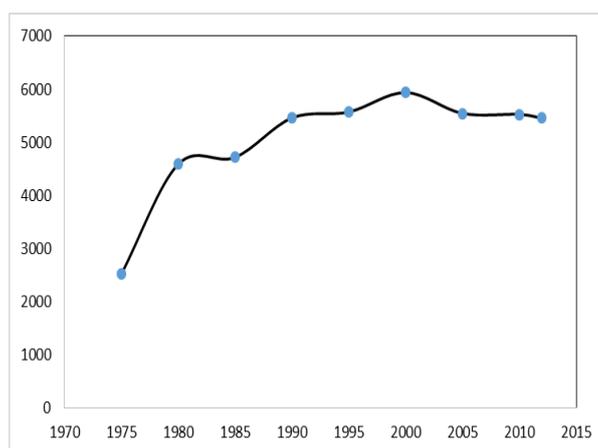


Fig. 1: Numbers of East Coast Farms 1975-2012

Small-scale farms in EC are geographically distributed in seven farming areas (see Table: 2); the area of each farm ranges from 2 Donum to more than 10 Donum. There are 5,272 water wells in these farms, 23% of these wells are inactive, which of course adds to the burden on existing water resources. Table 2 illustrates the highest number of active farms located in Massafi area, located 15 Km inland from the coast. This farming area is considering the highest elevation in the whole UAE.

Table 2: Estimated distribution of farms and water wells in EC in 2012

Region	Well		Farm	
	active	inactive	active	Inactive
Dhadnah	400	250	330	170
Dibba	1150	70	1000	54
Fujairah	280	150	450	40
Kalba	870	400	528	330
Khor Fakkan	350	230	420	474
Massafi	490	97	1100	70
Murbih	510	25	300	190
Total	4050	1222	4128	1328

## 2.1. Source of irrigation waters in EC farms:

Irrigation water in EC farms is obtained in the following ways:

- Farm wells: Most of the EC farms use underground water though digging small wells. However, the water in these wells is highly saline and does not suit growing vegetables e.g., tomatoes and cucumber.
- Desalinating plants: There are several small farms where the owners have built their own desalination stations that produce around 25,000 gallons of pure water per day. They use this water in irrigating their small vegetable fields or greenhouses.
- Home wells: Other farmers rely on water from their own house wells where water happens to be less saline. These farmers use small trucks equipped with a water tank to transport water from their houses to their farms. These farmers can make more than 5 trips per day between their farms and their houses to transfer water to their farms.
- Municipality residence running water: Due to their attachment to their farms, and despite the very expensive water bills, some farmers use the government water company running water to irrigate their farm crops.

All these types of water resources are too costly for the small amount of farm crops produced, which makes sustainable farming in EC hard to achieve.

## 2.2. The growing demand on organic food in EC

In recent years, and with the growing demand on organic food, especially from European and North American expatriates [13], several local supermarkets have started putting organic food grown in local farms on their shelves. This encouraged EC farmers to focus on growing organic food, both as part of sustainable farming in the area and in response to the new consumer demands. This type of farming requires buying organic fertilizers and using organic pest control. For example, some farmers use egg yolks mixed with cooking oil to spray their vegetables instead of pest control chemicals, while others use animal and chicken wastes as organic fertilizers. However, the latter type of organic fertilizers comes with its own problems, as it contains undesired weeds, which grow and then require a great effort to be removed from the field. In addition, some of these fertilizers contain insect eggs, and once they are used in the farm field, the insect eggs hatch producing large numbers of insects. This puts yet another burden on the farmers. When this happens in greenhouses, the farmers could easily lose their entire yield. The government of the UAE represented by the MEW supports farmers who shifted to organic food farming supplying them with the necessary supplements with 50% of the cost price. This leaves room for the farmers to make some profit and stay in the market, and allows the government to reduce the amount of imported food.

### **3. New Farming Techniques Used in the EC**

Recently, EC farmers have started to try new farming methods in order to increase their farm crops and to sustain their farming activities. Aquaponics and farming in greenhouses are among the new methods adopted by many EC farmers. For several years, the UAE government encouraged EC farmers to use new farming techniques, for example, though financing 50% of the total cost of greenhouses. In 2013 alone, there were 1,164 greenhouses in the EC covering an area of 385 Donums. This technique reduces the amount of water used in irrigation and limits the number of farm laborers needed compared to farming in an open field.

In 2010, the government encouraged EC farmers to reduce the use of soil by introducing new farming techniques e.g. aquaponics. The only problem with this type of farming is the use of small amount of supplement agents to increase the growing of some farm crops like tomatoes, cucumber and lettuce. Some EC farmers use eggshells to produce calcium, in addition to the use of fertilizers and organic pest control added to the water in grow vegetables.

### **4. Results**

Generally speaking, the socio-economic changes have affected the sustainability of farming activities, not only in the EC of the UAE, but in the whole world [14]. The researcher found that most of EC farmers are willing to use all means of sustainable farming, such as organic farming, and to try the new methods of farming just to keep their farms running. Many farmers feel strong emotions about their farms. Many hold on to their farms in memory of their fathers and grandfathers and refuse to sell them or transform the land into land serving more lucrative activities such as residential and commercial buildings.

The main results of this study can be summarized along the following lines:

- 82% of EC farm owners depend mostly on expatriate labor force to manage their farms;
- 90% of the farmers face the problem of water shortage on their farms and struggle daily to find irrigation water supplies;
- During the interviews, some of EC farmers spoke out about their farming problems and how they cannot see any short-term solutions to some of their problems (e.g., water salinity);
- Many EC farmers transport irrigation water daily from their houses to their farms. The trips incur additional costs and more efforts;
- Sustainable farming could be achieved in EC with the use of the new farming methods, provided the government give support in the form of the government itself buying the farm products and redistribute them to the local vegetable markets. This will essentially ensure that the farmers sell their harvest at a decent price.

### **5. A Long-Term sustainable small scale farming project**

Due to the limited water resources, high temperatures, and the high humidity in EC, the area needs a

long-term sustainable farm project to be used as a model for farmers in the UAE. Such a project needs to be developed, sponsored and monitored either by the government or by the private sector. The objective is to establish a form of interactive relationship in term of exchange benefits between EC farmers and the local communities to sustain the farming activities for a long time [15]. This project could be one of its kind in all of the UAE, and one from which other farmers will learn. Such a project may require a clear plan focusing on sustainable resources and benefiting from government support to allow farmers to produce selected vegetables and fruits. It requires that physical and social capitals share the benefit. In addition, such a project will raise the awareness about the environmental issues and the need to cope with the climate and other human changes [16].

## 6. Conclusion

Sustainable farming is one of the topics that need to be discussed by the international community. EC in the UAE is one of the regions, which need to receive attention from the government and the local communities. The idea of using old, organic methods of fertilizing and pest control needs to be fostered among EC farmers who can use natural fertilizers produced by locally raised cattle in their organic farms, and reduce the import of manufactured soil, chemical fertilizers and pest control. In the meantime, the government needs to promote sustainable farming among the people in the area. There is a strong desire for success among the EC farmers interviewed by the researcher. Some of them came back to farming activities after they retired, and they are willing to invest in this sector for a long time. Sustainable farming is would be a better and promising alternative for those farmers if they could keep their farms with no imports from outside. The farm yield may be small at the beginning, but, with time, the product will grow, and all parties involved (the farmers, the government, and the consumers) will benefit.

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## 8. References

- [1] L. Ware. Definition of Sustainable Agriculture. 2014 *Smallfarm* [online]. Available: [http://smallfarm.about.com/od/faqs/g/sustainable\\_def](http://smallfarm.about.com/od/faqs/g/sustainable_def).
- [2] C. Francis, (Ed.). *Organic Farming: The Ecological System*. (Agronomy Monograph 54). Madison, WI: American Society of Agronomy, Crop Science Society of America, Soil Science Society of America. 2009
- [3] D. Tilman, K. Cassman, P. Matson, R. Naylor, and S. Polasky, Agricultural sustainability and intensive production practices. *Nature*, 2001, 418: 671–677.
- [4] C. Pollock., J. Pretty, I. Crute, C. Leaver, & H. Dalton. Introduction. Sustainable agriculture. *Philosophical Transactions of the Royal Society B Biological Sciences*, 363(1491) 2008:445–446.
- [5] Department for International Development (DFID). Working Paper Series: Sustainable Agriculture. Dfid research strategy 2008-2013. Available: [http://r4d.dfid.gov.uk/PDF/Outputs/Consultation/ResearchStrategyWorkingPaperfinal\\_agriculture\\_P1.pdf](http://r4d.dfid.gov.uk/PDF/Outputs/Consultation/ResearchStrategyWorkingPaperfinal_agriculture_P1.pdf)
- [6] Environmental Agency – Abu Dhabi. 2010. Study reveals the effects of climate Change on the UAE. January 14, 2010.
- [7] Global Water Intelligence. 2010. United Arab Emirates. Available: <http://www.globalwaterintel.com/pinsent-masons-yearbook/2009-2010/part2/70/>.
- [8] P. SZABÓ\* and R. HÉDL. *Advancing the Integration of History and Ecology for Conservation*. *Conservation Biology*. Volume 25, Issue 4, pages 680–687, August 2011.
- [9] C. Johnson, Government Intervention in the Muda Irrigation Scheme, Malaysia: ‘actors’, expectations and outcomes. *The Geographical Journal*. Volume 166, Issue 3, pages 192–214, September 2000.
- [10] S. Jain, and V. Singh. Water crisis. *Journal of comparative social welfare* 26, 2-3. June 2010.

- [11] S. Al Qaydi. Food Security in the United Arab Emirates; the Role of the State in Overseas Farm Crops Production. *Asian Journal of Agriculture Extension, Economic & Sociology*, Vol. 3 Issue 6 November 2104. 3 (6), 2014; pp 569-579.
- [12] K. Spielmann, M. Nelson, S. Ingram and M. Peeples. Sustainable Small-Scale Agriculture in Semi-Arid Environments. *Ecology and Society* 16 (1): 26. Available: <http://www.ecologyandsociety.org/vol16/iss1/art26/>
- [13] National Bureau of Statistics (2014). Agricultural and Environmental Statistics. Available: <http://www.uaestatistics.gov.ae/EnglishHome/DepartmentsEnglish/tabid/104/SessionExpire.aspx?LanguageId=1>
- [14] F. Hole. Agricultural sustainability in the semi-arid Near East. Published by *Copernicus Publications on behalf of the European Geosciences Union. Clim Past*, 3, 193–203, 2007. pp. 200-201
- [15] M. Nelson, and K. G. Schollmeyer. 2003. Game resources, social interaction, and the ecological footprint in southwest New Mexico. *Journal of Archaeological Method and Theory* 10:69-110.
- [16] C. Funk. A Climate Trend Analysis of Senegal, U.S. Geological Survey Fact Sheet (2012). Available <http://pubs.usgs.gov/fs/2012/3123/FS12-3123.pdf>