Book of
The First Scientific Conference of the Faculty of Sciences

"Environmental Pollution and Challenges of Environmental Sustainability"

(Reconciliation with the Environment)

Sirte, October, 14, 2025

Edited by:
Prof. Abdussalam Salhin Mohamed.
Prof. Hisain Masoud Abomadina.
Dr. Ashraf Mustafa Abusenaina.
Dr. Fathia Abdulljawad Mosa

Publications of Research and Consultation Center– Sirte University
First Edition 2025

Types of Article

Open Access

The First Scientific Conference of The Faculty of Science – Sirte University "Environmental Pollution and the Challenges of Environmental Sustainability"

EPESC October 14, 2025

Part One: Dedicated to papers submitted in the English language

Libyan Agency for the International Standard Book Number (ISBN)
ISBN 978-9959-891-67-9

Conference Committees

Higher Committee

Prof. Dr. Sulayman M. Alshatir	University President
Prof. Dr. Eltayeb M. Elgobbi	University Vice President
Dr. Ashraf M. Abusenaina	Dean of the Faculty

Scientific Committee

Prof. Dr. Abdussalam Salhin Mohamed	Faculty of Science / Sirte University	Head
Prof. Dr. Hamid M. Younis Ahmed	Faculty of Science / Sirte University	Member
Prof. Dr. Ramadan Abdel-Mawla Al-Hindawi	Faculty of Science / Omar Al-Mukhtar	Member
Prof. Dr. Tahani Younis Omar	Faculty of Science / Sirte University	Member
Dr. Fathia A. Mosa	Faculty of Science / Sirte University	Member

Preparatory Committee

Ms. Zainab Ragab Al-Fitouri	Head
Mr. Ali M. Naji	Member
Mr. Ali A. Alghazali	Member
Dr. Souad A. Abumaryam	Member
Abdulhalim M. Alshatir	Member
Khaled J. Amhalhal	Member
Sofian S. Alshaali	Member
Ali M. Almaedani	Member
Yousuf M. Alkirrami	Member

 ISBN 978-9959-891-67-9

Editorial Team:

Prof. Dr. Abdussalam Salhin Mohamed
Prof. Dr. Hussein Massoud Abu Madina
Dr. Ashraf M. Abusenaina
Dr. Fathia A. Mosa

Contact Email: epesc@su.edu.ly

Conference Website:
https://su.edu.ly/research/index.php/conferences/science/sc1

Contents

The First Scientific Conference of the Faculty of Science – Sirte University
Environmental Pollution and Challenges of Environmental Sustainability (EPESC),
Oct.14, 2025

Socio-Economic Impacts of Wastewater Pollution on the Agricultural Activities in Wadi El-Shees, Al-Bayda, Libya

Baset Saeed [1]Mohamed Awad[2], Manal Fawzy[3], Kamal Shaltout[3], Yacoub El-Barasi[4]

[1]Environmental Sciences Department, Faculty of Natural resources and Environmental Sciences, Omar Al-Mukhtar University, Libya
[2]Department of Environmental Sciences, Faculty of Science, Alexandria University, Egypt
[3]Botany Department, Faculty of Science, Tanta University, Egypt
[4] Botany Department, Faculty of Science, University of Benghazi, Libya
***Corresponding Author Email**: baseet.mobark@omu.edu.ly*

Article History:

Received: 30 March 2025

Revised: 29 May 2025

Published: 15 November 2025

Keywords:

Agricultural productivity; Libya; public health; socio-economic impact; Wadi El-Shees; wastewater irrigation.

Abstract: Many places in Libya rely on low-quality water sources for agriculture such as in Wadi El-Shees Al-Jabal Al-Akhdar, Libya. The present study analyzed the socio-economic impacts of using the wastewater drainage on the farming populations. A "with-without" methodology was employed, comparing 30 farms using polluted water (mixed with wastewater) with 30 control farms using non-polluted water. Data were collected via face-to-face interviews using a standardized questionnaire. Results indicated no significant demographic differences between the two groups. However, farms using polluted water incurred significantly higher cultivation costs (e.g., for soil additives) and veterinary expenses. While crop yields were similar, revenues were significantly lower in the polluted area due to diminished crop quality and lower market prices. Consequently, average annual farm income was substantially lower for families in the polluted site (70,871 D.L.) compared to the non-polluted site (116,287 D.L.). Despite a compensatory increase in off-farm income, total family income remained significantly lower in the polluted area. Furthermore, families using polluted water reported a higher incidence of water-related diseases, leading to increased healthcare costs. The study concludes that wastewater pollution has severe negative socio-economic impacts, reducing agricultural profitability and compromising human health. It

	underscores the urgent need for a wastewater treatment system in Wadi El-Shees to protect livelihoods and public health.

1. Introduction

The use of urban wastewater for agricultural production is receiving increased attention in many parts of the world due to the increasing scarcity of freshwater resources and high cost of food (Mutengu et al., 2007). Those issues are of great importance in semi-arid and arid countries such as Libya which experiences severe water scarcity (El-Barasi & Saaed, 2013) available for drinking and agriculture. Hence, many places in Libya rely on low-quality water sources such as wastewater drainage for crop cultivation and animal husbandry (Hamad, 2012) as in the study area in Wadi El-Shees near Al-Bayda in Al-Jabal Al-Akhdar, Libya. The present study was conducted to analyze the socio-economic characteristics of the farming populations in the study area. The study also assessed the socio-economic impacts of using the wastewater drainage on the agricultural activities of those populations.

2. Methodology

The with-without approach (Karki, 2004) was adopted to achieve the study objectives because Wadi El-Shees branches into two adjacent tributaries. The farms around the first tributary acted as the control (non-polluted) site of the pollution impacts because they are irrigated using water which is not contaminated with the wastewater discharge. The second tributary was labelled the polluted branch because it has farms using water mixed with wastewater discharge. A stratified systematic sampling method was applied to selected 60 farms which were subdivided to 30 farms from the non-polluted site and 30 farms from the polluted site. The socio-economic data collection relied on face-to-face interviews conducted with the household heads of the farming families in the study area using a standardized questionnaire (Awad, 2006).

3. Results and Discussion

The socio-economic analyses indicated substantial similarities between the two study sites in demographic characteristics (e.g. family composition and education), resource ownership (e.g. labor and land) and farming activities (crops and livestock) (Table 1). This is concrete evidence of the suitability of subdividing the study populations into two groups, one from the polluted site while the other from non-polluted site. The results also showed that crop expenses were significantly higher in the polluted farms as more additives are needed to abate the pollution impacts. Although the yields of most crops were similar between the two study sites, the crop revenues were higher for the non-polluted farms. The farmers attributed that to the deterioration in the yield quality, especially for fruit crops such as apples and peaches which reduced their selling prices. The pollution also has negative impacts on the animal husbandry in the area with higher veterinary costs in the polluted area which compromised their market value. Farm income was consequently higher in the non-polluted site.

The farmers in the polluted sites had substantially higher off-farm income because they needed to compensate for their reduced farm income. Nonetheless, their family income remained much lower than the families in the non-polluted site. Hence, farm income remains the most important income source in the study area (Table 2).

Table 1: Family composition and resources

Location	Non-polluted n=30	Polluted n=30
Family composition		
Number of adult males per family (age: 14-60 years)	4.03[a] (±1.49)	3.50[a] (±1.91)
Number of adult females per family (age: 14-60 years)	4.30[a] (±1.56)	4.07[a] (±1.90)
Number of children per family (age < 14 years)	3.14[a] (±1.30)	2.83[a] (±1.97)
Number of old people per family (age > 60 years)	0.60[a] (±0.38)	1.75[a] (±0.38)
Family labor resources		
Family labor capacity in man equivalent	10.94[a] (±3.46)	9.17[a] (±2.79)
Land and animal resources		
Total cultivated land	17.37[a] (±4.58)	13.94[a] (±5.04)
Major crops	Barley, Apple, Peach	Barley, Apple, Peach
Main livestock	Sheep, cattle, chicken	Sheep, cattle, chicken

Table 2: Family income and its sources

Location (D.L / year)	Non-polluted n=30	Polluted n=30
Farm income -Per family -% of family income	116286.59[a] (±29801.98) 93.80	70871.17[b] (±9890.51) 83.89
Off-farm income -Per family -% of family income	7686.67[a] (±1653.21) 6.20	13611.88[b] (±1832.09) 16.11
Family income	123973.26[a] (±11446.03)	84483.05[b] (±1299.34)

Figures in parentheses are 95% confidence interval of the mean

[a],[b] Similar letters show no significant difference at 95% and different letters show significant difference using Mann-Whitney test

The pollution impacts on the farmers in the study area go beyond the farm income as there were apparent effects on their health. This was evident in the disease patterns (Figure 1). The families in the polluted area experienced higher incidences of water-related diseases. This was also reflected in the healthcare costs, which were much higher for the families living along the polluted branch.

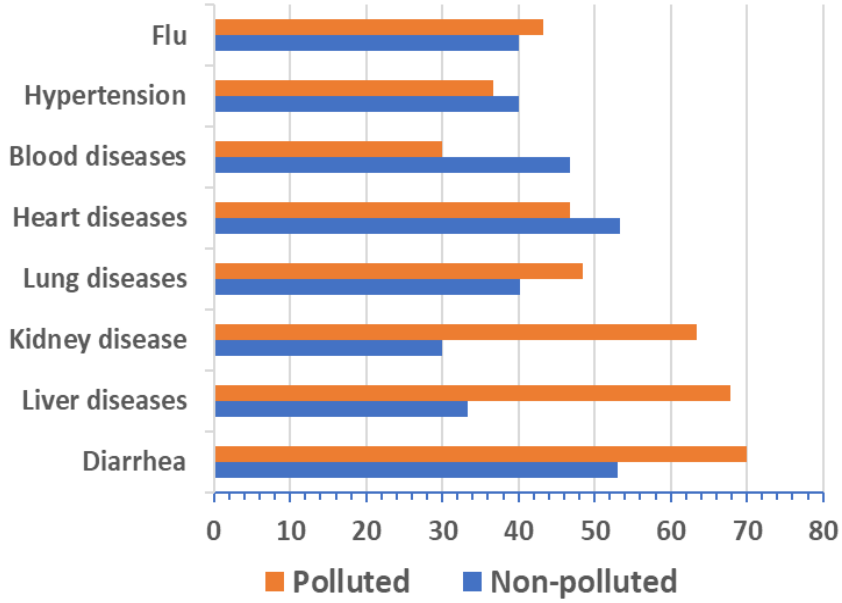

Figure 1: Most common diseases

4. Conclusions

The pollution of wastewater drainage has substantial negative impacts on the farming populations in Wadi El-Shees as indicated by the reduced farm income, increased cultivation costs and disease patterns. The results of this study provide clear evidence of the urgent need to establish a wastewater treatment system in Wadi El-Shees. It is crucial to eliminate the negative impacts of pollution on the farming activities which is the main source of livelihood of the populations living in Wadi El-Shees. It is also needed to protect their health.

Conflicts of Interest: The authors declare that they have no competing interests.

5. References

Awad, M. A. (2006). Environmental and socio-economic assessment of arid land farming: A case from Lake Nasser region in Egypt. In W. Doppler & S. Bauer (Eds.), *Farming and rural systems economics* (Vol. 79). Margraf Verlag.

El-Barasi, Y. M., & Saaed, M. W. (2013). Threats to plant diversity in the north eastern part of Libya (El-Jabal El-Akhdar and Marmarica Plateau). *Journal of Environmental Science and Engineering A, 2*, 41–58.

Hamad, S. M. (2012). Current and proposed future of management practices for the water resources of Al-Jabal Al-Akhdar region, Northeast Libya. *Libyan Agriculture Research Center Journal International, 3*(6), 279–285.

Karki, L. B. (2004). Impact of project intervention on rural households in Nepal: Assessment of socio-economic and environmental implications. In W. Doppler & S. Bauer (Eds.), *Farming and rural systems economics* (Vol. 60). Margraf Verlag.

Mutengu, S., Hoko, Z., & Makoni, F. (2007). An assessment of the public health hazard potential of wastewater reuse for crop production. A case of Bulawayo city, Zimbabwe. *Physics and Chemistry of the Earth, 32*, 1195–1203.