The level of farmers Application of scientific Recommendation Related to the use of wells in Al-baaj District/Nineveh governorate –Iraq

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Abstract

This study aimed to determine the level of farmer application of scientific recommendation related to the use, design ,Protection and follow-up of wells and Its relationship with some factors in Al-baaj district, the questioner form was used to collected data, the research sample included 124 farmers were chosen in a relatively random method , then data collection tools were prepared to achieve the research objectives which consisted of two parts: the first was related the personal factors as well as the second part included two fields : the design, protection from pollution and follow-up of the use of wells aspected in the study area, , the results showed 78% of the farmers had a medium degree of application of scientific suggestions related to the use of wells generally and tends to decrease. Also showed that 80% of farmers had medium level of application of recommendations in the field of well design and tended to be partially, and was clear that the percentage of farmers committed to the application of scientific recommendations related to the protection from pollution and follow-up of wells reached 76% at a medium level and tends to seriously apply of the instructions. the results showed a correlation for (level of education, time period of agricultural working, financial cost of drilling a well) with the general application, and it was also found that there is no correlation for the rest of the factors and the dependent variable.

Keywords: design, protection of pollution, follow-up, wells.
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Introduction

Water is life, health is wealth, and waste of wealth is "tampering and neglecting the water resources around us, which can be destructive to life, health and wealth, the provision of water suitable for human use has become one of the difficult problems facing the world in many regions, especially in third world countries [1].

Water resources represent an essential component of agriculture, and in light of the global decline of these resources, it has become necessary to direct studies and research activities towards studying various details, climatic aspects and ground factors that affect the rate of consumption in order to achieve the highest level of efficiency and rational use of them. [2] As water is one of the important natural resources that contribute to the formation and development of civilizations, and water sources have varied, including surface water and there that are underground under the surface of the earth. [3]

The Arab region is considered one of the most arid to arid regions of the world, characterized by scarcity and variability of rainfall, and high evaporation rates, making the region one of the most water-stressed regions in the world and Iraq. Most groundwater resources in Arab countries are mainly used by the irrigation sector, followed by the municipal and industrial sectors. [4]. This type of water can be defined as (water that has filtered through fragile soil layers into the formations of the earth's crust, which later becomes large reservoirs for that water, and rainwater is the main source of groundwater. [5].

In Iraq, groundwater is the third main source of water in addition to being the top water resource in the Jazira region in western Iraq [6] As it is an important water source in remote areas where surface water sources are not available from rivers and irrigation projects [7]. It is also a fundamental pillar of life in multiple regions and the uses of this water enter into agricultural consumption and livestock breeding, in addition to being one of the inputs in industrial development and with the passage of time this water has become one of the resources that have become close to topping the list of water resources that provide human needs, especially with the continuous increase in population density and the accompanying decrease in the level of surface water from its natural levels in addition to the succession of years of drought [8].The limited availability of water suitable for irrigation and the need to expand agriculture and fill food shortages have given groundwater global importance [9]. Accordingly, groundwater in Iraq can play an important role in the development of agricultural areas, as the dependence on surface water has decreased to only (25%) of agricultural land, where studies indicate that groundwater can be relied on by 75% in agricultural production uses [10]

Iraq is considered one of the countries that fall within the scope of arid and semi-arid regions, as water sources suitable for use in the fields of agriculture and irrigation are scarce, and the rainfall fluctuates, so water becomes a great challenge to the management of natural resources to achieve economic productivity for field crops, especially since the northern region is considered one of the most important regions of Iraq for the production of wheat and barley, which depends largely on rain (demi-agriculture) [11]

In recent years, fluctuation or lack of rainfall has had a negative impact due to the lack of water storage in the Mosul dam lake, forcing people to rely on groundwater in many areas for use in full or supplementary irrigation [12] Especially with the exacerbation of the phenomenon of desertification and its expansion to agricultural areas that performed productive functions in support of the agricultural sector in previous times [13]

Due to the exposure of the Baaj area in western Mosul to a decrease in the rate of rainfall during the last decade, in addition to the distance of the study area from the course of the Tigris River, many farmers in it dug wells in order to compensate for the shortage they have in water and given the importance of the farmer being qualified to deal technically and scientifically with the well and its uses, the researchers investigated the

level of application of farmers to the scientific recommendations related to the use of wells in order to form a general perception of the reality of the use of groundwater by Farmers and try to provide recommendations to the relevant authorities in order to address the gaps and weaknesses in the use and try to promote positive practices that farmers may carry out during the use of wells and try to highlight and circulate them to other areas in order to accelerate and increase the rates of adoption of the rural public in dry areas of techniques for dealing with the correct technical groundwater issue

and expressing it quantitatively and qualitatively with the use of analysis, linking and interpretation to reach conclusions on which to build the proposed perception [14]

Research Objectives

1-Determine the level of Application of scientific suggestions for farmers Related to the, design, Protection and follow-up of wells in general

2- Determine the level of application of farmers to scientific suggestions related to the design of the well

3 – Determine the level of application of farmers to scientific suggestions related to the protection from pollution and follow-up of the use of wells

4- Determine a correlation between some personal variables of farmers and the level of their application of scientific instructions related to the use, Protection and follow-up of wells in general

Operational definitions

1-Level of application of scientific recommendations related to the design of the well: the extent to which the farmer implements the instructions related to the selection of the location of the well, taking into account the quality of pipes suitable for soil topography and the installation of meters related to water drainage

2-The level of application of scientific recommendations related to the protection of the well from pollution and follow - up: It means the extent to which the farmer implements proactive measures related to placing concrete castings around the well, choosing the appropriate distances between it and the operating electrical sources such as solar energy systems or fuel tanks, and keeping pollution from animal, human and chemical waste away from the place of the well.

Research tool

The descriptive approach was used, which depends on studying the phenomenon as it exists in reality and describing it accurately

Research Area

The study area included Al-baaj district, located in the west of Nineveh Governorate, which is characterized by large agricultural areas for the cultivation of strategic crops.

community and sample of research

The research community consisted of 496 farmers, simple random sample was taken from the community by 25% and the final number of the research sample was 124 farmers

Preparation research tool, Validity and Reliability

The paragraphs of the research tool have been prepared by reviewing scientific sources related to groundwater and the establishment of wells. In addition to reviewing the laws of drilling wells in many countries in the Middle East, and with regard to the use of wells, researchers have faced difficulty in finding studies close to the title, which confirms the novelty of the subject of the study. face validity and content validity of the questionnaire was found by presenting the research tool to a number of experts in the department of Agricultural Extension and Technology Transfer in addition to the department of Soil and Water Resources and then the questionnaire was distributed to 20 farmers in order to find reliability and Alpha Cronbach method was used and its value was (0.88) This calculated value is acceptable according to many statistical sources [15], and farmers who participated in the survey sample were excluded from the final sample

Measurement of personal factors

Age:

It was determined by asking the farmer about the number of years of his age

Level of Education:

Measured by allocating 7 alternatives, following alternative: Illiterate, reads and writes, primary school, Intermediate, higher School or agricultural preparatory, institute and Bachelor's degree and above, this factor is measured by numbering of each alternatives (1,2,3,4,5,6,7).

Time period of agricultural working:

It was determined by asking the farmer about the number of years in which he worked in agriculture until the time of distribution of the questionnaire.

The financial cost of drilling the well:

This factor was measured by 3 alternatives to which numbering by) expensive financial cost 3, medium financial cost 2, cheap material cost 1)

Exposure of farmers to sources of information related to the use of wells:

This factor was measured through 9 sources allocated the following alternatives (often 3, sometimes 2, non-exposed1)

Independent Variable Measurement:

This variable related to determine the level of Application of scientific instructions for farmers related to the, design, Protection and follow-up of wells in general, and it was measured by collecting the scores obtained by each farmer in each of the field of implementation of scientific recommendations related to the field of design, and the protection of the well from pollution and follow-up.

Application of scientific instructions of wells design:

This category focused on discerning the extent to which farmers used scientific suggestions pertaining to the well's design and was measured through (10 paragraphs) and 3 alternatives were allocated to it, which are as follows (I often do this 3, I do it sometimes 2, I rarely do it) and thus the default range between (10-30).

Application of scientific instructions of protection of the well from pollution and follow-up:

This category was allocated to determine the level of application of farmers to scientific instructions related to the protection of the well from pollution and follow-up and included (14 paragraphs) and ranged so that default range it was between (14-42)

Data collection and analysis

Data were collected from May to September 2023, and the statistical tools that were used were frequencies, ratios, arithmetic averages, and Pearson and Spearman's correlation coefficient were used through the spss program.

Result and Discussion

First objective: Determine the level of Application of scientific suggestions for farmers Related to the, design, Protection from pollution and follow-up of wells in general

The scores obtained by each farmer in each of the two categories of recommendations related to the design of the well and its preservation from pollution were combined and it was found that the highest numerical value was (63) while the lowest numerical value was (32) and the arithmetic mean was (45.79) and the standard deviation (7.14)

Table No. (1) shows the distribution of application of recommendations for respondence related to the, design, Protection from pollution and follow-up of wells in general in Baaj district/ Nineveh governorate

Level of Application recommendation generally	Freq.	%	Mean	
Partially application (32-41)	34	27	41.853	
medium application (42-51)	63	51	45.413	
Serious application (52 and more)	27	22	51.76	
Total	124	%100		s.d=7.14

The results show that 78% of farmers had respondent their level is medium and tends to be partial in application of scientific suggestions related the, design, Protection from pollution and follow-up of wells generally, and this may be due to the novelty of the use of well technology by farmers in the study area, as they still need more experiments and expertise that help them to deal technically commensurate with scientific recommendations.

Second Objective: Identify the level of application of farmers to scientific recommendations related to the design of the well

It was clear from the results that the highest level of application of farmers to recommendations in this area was the numerical value (22) and the lowest value was (11) and the arithmetic mean (15.9) and standard deviation (3.01) and then the respondents were classified into three categories as in Table (2).

Table No. (2) shows the distribution of application of recommendations for respondence related to design of well in Baaj district / Nineveh governorate

Level of Application recommendation on well design	Freq.	%	Mean
Partially application (11 -14)	41	%33	12.63
medium application (15-18)	58	% 47	16.27
Serious application (19 –22)	25	% 20	20.56
Total Sum	124	%100	s.d = 3.01

In table 2 the result showed that 80% of respondent their level is medium and tends to be partial in the field of scientific recommendation related to the design of well , reason for this may be that the farmer may not be interested in the technical details related to the design of the well because most of them are related to the distance that is under the surface of the soil and are not visible in front of his eyes In addition, the process of drilling the well is not a simple and repetitive process for the farmer like other agricultural operations, but it is a complex process of steps and measurements and may have accurate technical details and difficult to understand by the farmer and therefore his application of the recommendations related to this aspect may not be at the required level.

Third objective: Identify the level of application of farmers to scientific recommendations related to the preservation of the well from pollution and follow-up

Through the results, it is clear that the highest level of application of recommendations in this area reached the numerical value (41), which is the highest value, while the lowest value for this axis was (18) and the arithmetic mean was (29.58) and standard deviation (6.1) and the respondents were classified into three categories as in Table (3)

Table No. (3) shows the distribution of application of recommendations for respondence related to the protection of the well from pollution and follow-up in baaj district / Nineveh governorate

Level of Application recommendation on protection of the well from pollution and follow-up	Freq.	%	Mean
Partially application (18- 25)	30	%24	22.06
Medium application (26-33)	61	% 49	29.45
Serious application (34-41)	33	% 27	37.45
Total	124	%100	s.d=6.1

In table (3) the result showed that that 76% of respondent their level is medium and tends to be high , and this may be due to the farmer's consideration of the importance of water being suitable for the health of individuals and avoiding poisoning cases and his interest in the need to appropriate water quality for crops in his field and ensure the availability of appropriate water needs in terms of chemical content for watering various types of livestock, especially if the farmer's well is the only source of water and any pollution of the well means economic losses Large costs for farms in addition to the fact that water is the main source of support for agricultural production since agricultural work is the common occupation among the local population in the study area.

Fourth Objective: establish a correlation between the independent variables of farmers and the degree to which they implement the suggestions for the utilization of wells generally.

Table No. (4)

variables	Freq.	%	Mean	r	rs
Age / year					
younger aged (24-34)	25	20	44.28		
middle aged (35-45)	63	51	44.22	0.172	
older aged (46-56)	36	29	48.41		
level of education					
illiterate	6	5	37.66		
reads and writes	25	20	45.2		
primary school	50	40	44.68		
intermediate study	24	19	43.91		0.183*
higher school	12	10	45.16		
diploma study certificate	5	4	52.66		
bachelor's degree and more	2	2	59.5		
Time of period of Agricultural working					
(25-14) Year	30	24	44.06		
(36-26) Year	54	44	44.66	0.177*	
(37 and more) Year	40	32	46.95		
Financial cost of drilling the well					
cheap financial cost	24	19	43.70		
medium financial cost	38	31	44.28		*0.194
expensive financial cost	62	50	47.11		
Exposure sources of information					
Non exposure (11-15)	18	15	43		
some exposure (16-20)	51	41	45.18	0.099	
Often exposure (21-25)	55	44	46.52		

Interpret the results of the correlation analysis between independent factors and dependent factors

Age:

Through the results, it was found that the middle age group was the most numerous, by 51%, and their average application was 44.22 .and Pearson correlation coefficient value obtained (0.172) indicates a lack of correlation between age and the level of application of farmers to scientific suggestions pertaining to the use of wells, and this may be due to the novelty of the phenomenon of drilling wells in the region, and therefore the age of the farmers was not related to the dependent factor, and this result differs with what he found [16].

Educational level:

The results of the analysis showed that most of the respondents were those who completed primary school and their percentage was 40% and their average application of scientific instructions was 44.68, The value of the Spearman correlation coefficient (*0.183), which is significant at the level of (0.05) and we can explain that farmers who have completed the study and have relatively acceptable educational levels have thinking skills based on scientific and technical and this is what makes the correlation between the educational level and the dependent factor in this way and this result is consistent with what he reached [16].

Time of period of Agricultural working:

The number of farmers with the most in this factor in the middle category for the number of years of work in agriculture was 44% and the average application of the recommendations in general was 44.66 , and value of Pearson's correlation coefficient (*0.177), which is significant at the 0.05 level, indicates that there is a significant correlation between this variable and the extent to which farmers implement scientific suggestions regarding the use of wells., and this may be due to the fact that work in agriculture earns the farmer a sense of the importance of having water suitable for irrigating crops and livestock to improve his agricultural production, so the farmer who has a large number of years in agriculture tends to apply scientific recommendations related to the use of wells

Financial cost of drilling the well:

The results showed that the most numerous group of farmers stated that the financial cost was high, reaching 50% and their average application was 47.11 , and value of the Spearman correlation coefficient (* 0.194) which is significant at the level of 0.05 and it is clear from this that there is a correlation between the economic cost of drilling the well and farmers' level of application to the scientific suggestions related to use of wells and this may be explained that the farmer who faces a high economic cost in drilling the well tends to pay attention to scientific recommendations and apply them well in order to be well with a relatively long shelf life of the well with few needs for the maintenance of its components in addition to that he cares about maintaining on the water well from pollution in order to improve agricultural production levels that will help it reduce the material cost of drilling the well, and this result varies with what found [16].

The level of exposure to sources of information on the use of wells:

It was found that the most category of farmers was in the category with high exposure to information sources, and their percentage reached 44%, and their average implementation of scientific instructions was 46.52 , and Pearson's correlation coefficient (0.099) is insignificant, meaning there is no correlation between this variable and the dependent factor, this may be due to the inefficiency of information sources and their inability to provide the necessary information for the use of wells, this result varies with what found [16].

Conclusions

Low interest of the majority of farmers in observing the technical specifications of the design of the well.

There is awareness and interest among the majority of respondents regarding the importance of preserving the underground reservoir of water from pollution.

Farmers with academic degrees have a relatively better application of the recommendations compared to illiterate farmers who do not know how to read and write.

The need of the majority of respondents to training and guidance courses to raise their awareness levels and increase the level of their application to deal based on scientific recommendations for the use of wells.

Factors of educational level and the time period of work in agriculture and the financial cost of drilling the well are factors that should be paid attention to by the specialized authorities when dealing with farmers who have high levels of them because the results of the study showed that there is a positive correlation between their application of

recommendations and interest in wells and between these factors

The competent authorities should pay attention to the sources of information from which farmers derive their information because the results did not show that relationship, which is supposed to affect the improvement of farmers' dealings with groundwater issue

Recommendations

1- It is very necessary for the agricultural extension system and the officials of the water issue in the study area to exert more awareness extension efforts in order to improve farmers' dealing with groundwater sources

2- The need for drilling operations to be videotaped by the competent authorities in order to pay attention to all the technical details related to the design of the well and try to identify the mistakes made by the technician in charge of the drilling process in order to present this in workshops and seminars extension and training

3- The competent authorities should pay attention to farmers who have educational certificates as they tend to apply scientific recommendations more than of laggard farmers, and this is through the work of press interviews with them and publishing their successful experiences in the field of using wells, maintaining them and preserving them from pollution through social media and giving them incentive awards in order to encourage farmers who are slow to apply scientific recommendations related to the use of wells..

4- The authorities should follow up on the drilling of wells and impose restrictions on the random drilling of wells in order to avoid waste and preserve groundwater levels as they are a national wealth for future generations

5- The need to install water meters on each well and determine a standard for the quantities extracted to suit the water needs of each crop and the area planted in addition to the need to match the standard with the number of livestock owned by the farmer and all of this is necessary to avoid water waste and preserve the right of subsequent generations to obtain water in the study area

6- The necessity of obliging farmers to farm according to the areas prescribed in the seasonal plans in the agricultural branches

7-The need to issue laws and instructions imposing the use of drip irrigation techniques in areas where wells are drilled in order to avoid water waste in the use of wells and conservation of strategic water storage

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مستوى تطبيق الزراع للتوصيات العلمية المتعلقة باستخدام الابار في قضاء البعاج / محافظة نينوى / العراق

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- تاريخ استلام البحث2023/10/26 وتاريخ قبول البحث 2023/11/28

الملخص

هدفت هذه الدراسة الى تحديد مستوى تطبيق الزراع في قضاء البعاج للتوصيات العلمية المتعلقة باستخدام وتصميم وحمايه الابار من التلوث ومتابعتها وتكونت اداه البحث من استمارة استبيان تم توزيعها عشوائيا على 124 مزارعا وتكونت من جزئين، الجزء الاول اشتمل على بعض العوامل الشخصية في حين تضمن الجزء الثاني مجالين هما مجال التصميم ومجال حمايه الابار من التلوث ومتابعتها، وبينت النتائج ان 78% من المبحوثين كان مستوى تطبيقهم للتوصيات بشكل عام متوسطا ويميل الى الانخفاض وبينت النتائج كذلك ان 80% من الزراع كان مستوى تطبيقهم للتوصيات العلمية في مجال تصميم البئر متوسطا ويميل الى الانخفاض في حين كان تطبيق الزراع للتوصيات العلمية الخاصة بحمايه البئر من التلوث ومتابعته متوسطا ويميل الى الارتفاع بنسبه 76% من المزارعين وفيما يتعلق بعلاقه الارتباط بين العوامل المستقلة وتطبيق التوصيات بشكل عام تبين وجود علاقه ارتباط معنويه بين كل من المستوى التعليمي ومده العمل في الزراعة والتكلفة المالية لحفر البئر مع المتغير التابع وتبين ايضا عدم وجود علاقه ارتباط بين عاملي العمر ومستوى التعرض لمصادر المعلومات مع تطبيق التوصيات العلمية بشكل عام

الكلمات المفتاحية: التصميم ، الحماية من التلوث ، المتابعة ، الابار.