Sub./ Ministry of Water Resources Success Story on Addressing the Phenomenon of Agricultural Land Salinity

1. Introduction

During the last two years, the Federal Board of Supreme Audit has started paying attention to Sustainable Development Goals related issues. The Board presented a number of reports that identify problems affecting, directly or indirectly, SDGs. These reports include all technical aspects (such as agriculture, health, environment, oil, electricity, and education…etc) through benefiting from its financial and technical expertise . The Board has a number of technical experts in these fields in addition to its financial expertise. This ,in turn ,facilitated the work and avoided the need to secondment of experts in those fields.

2. Problem

Phenomenon of salinity of agricultural lands is a very serious problem facing the agricultural sector given the damage occurs to arable lands i.e. accumulation of salts in soil. Therefore, agricultural lands turn into un cultivable arid lands. This negatively affects (agricultural production, economic agricultural crops the products of which are used as raw material in many industries, the utilization of water resources and ensuring, its sound use ,achieving SDG 2 Zero hunger, SDG 6: (Clean water and sanitation) and target (6-3) (improving water quality through preventing pollution, preventing dumping waste and hazardous chemicals into water ,reducing leakage to the minimum , significantly decreasing levels of untreated sewage water to 50% by 2030) and target 6-4 (significantly increasing efficiency of water use in all sectors and reducing the number of people suffering from water scarcity).

3. Audit Objective:

The performance audit included verifying the competence of Ministry of Water Resources in addressing the salinity of agricultural lands. By achieving this goal, we aim at making recommendations and propositions. Audit team classified the main goal into number of sub-goals and identified the related indicators. Thus (addressing the salinity of agricultural lands) was chosen to be the focus of audit. Interviews, data

collection, data and information analysis were used to identify the main problem.

4. Audit Scope:

Performance audit scope is Ministry of Water Resources and its formations. They are as follows:

- General commission for Irrigation and Reclamation Projects.
- General commission for Operating Irrigation and Drainage Projects.
- General Commission for Maintaining Irrigation Projects.
- Center of Studies and Engineering Designs.
- National center for water resources management.
- Ministry of Agriculture

5. Goals identified by the Ministries of Agriculture and Water Resources

The Ministries of Agriculture and Water Resources identified set of goals to achieve sustainable management. The two ministries seek to achieve these goals through their projects included in their investment plans, which are illustrated in the following table:

	Ministry	goal No.	Sustainable Development Goal	Examples of some projects that achieve the goal
1	**Ministry of Agriculture**	1	Zero poverty. Eradicating poverty in all its forms	Establishing modern villages
		2	Zero hunger. End hunger, achieve food security and improved nutrition and promote sustainable agriculture.	
		13	Climate action. Take urgent action to tackle climate change and its impacts	Establishing agricultural meteorological stations
		12	Responsible consumption and production. Ensuring sustainable consumption and production patterns	Modern irrigation and mechanization technologies
		14	Life below water. Conserve and sustainably use the oceans, seas and marine	

			resources for sustainable development	
		15	Life on land. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification according to land degradation and reverse its course according to biodiversity loss.	Sand dune stabilization
2	**Ministry of Water Resources**	6	Clean water and sanitation. Ensure availability of water and sanitation for all	Land reclamation

6. Obstacles to Implementing Sustainable Development Goals

The Ministry of Water Resources faced certain obstacles to implementing the sustainable development goals, which were taken into consideration when defining the audit sub-goals, as shown below:

a. The high rate of pollution in rivers resulting from the decrease of sewage treatment plants number.
b. Major infringements of the water system and water shares within the river and dyke sectors as well as the establishment of houses, etc…
c. Non-cooperation by local governments in implementing the Ministry's plans
d. Non-allocation of the necessary and scheduled amounts in conformity with the outputs of the strategic study on Iraq's water and land resources.

7. Audit standards

a. sustainable development goals
b. Objectives of the Ministry of Water Resources under its Act No.(50) of 2008 (as amended)
c. Ministry of Water Resources Strategies
d. Laws and regulations governing the management and operation of water resources
e. Revised Italian Strategic Study of 2014.

8. Matrix of audit findings and audit team recommendations

Results				Recommendations
detected case	**Standards**	**Reasons**	**Effects**	
Decreased percentage of reclaimed agricultural land in some governorates.	The lands to be reclaimed according to the strategic study of water resources and land, which was prepared by the Italian side during 2014	The reluctance of the contracting companies, the farmers' objections, the security situation and the lack of financial allocations.	Declining agricultural production.	The General Department for Irrigation and Reclamation Projects should overcome all obstacles and devote efforts and capabilities to increase the reclaimed agricultural lands.
The General Department for Irrigation and Reclamation Projects has not implemented the reclamation of some projects	Contract periods for reclamation projects	Failure to update the technical and economic feasibility studies for these projects	Degradation of some agricultural lands because the high percentage of salt in their soil.	The General Department for Irrigation and Reclamation Projects should update the technical and economic feasibility studies for its projects that require updating.
declined percentage of technical achievement of some projects related to the reclamation of agricultural lands	Planned technical achievement percentages	The lack of mechanisms owned by the contracting companies, the change of designs, the objections of people and the lack of financial allocations.	The freezing of agricultural lands in addition to the farmers bypassing the project facilities.	The General Department for Irrigation and Reclamation Projects should take all necessary measures to increase the rates of technical implementation of its projects.
The General Department	The Department's annual	Lack of financial liquidity	Inadequate use of	The Department should

for Irrigation and Reclamation Projects has divided the reclamation works for agricultural lands	plans.		agricultural land.	implement the reclamation works in an integrated manner for agricultural lands.
Decrease some cleaning work for the drains	Annual plans for the General Department for maintaining irrigation and drainage Projects	The lack of financial liquidity and the lack of mechanisms numbers working in the cleaning field	Increasing the percentage of salt in the soil.	Providing the necessary mechanisms for the cleaning work of drains and coordinating with the relevant authorities to provide the necessary financial allocations for implementing annual plans.
The General Department for the maintenance of irrigation and drainage projects was not able to use (50) new (flushing machine) despite its importance in cleaning and washing closed drains after its use by farmers.	Department technical reports	Failure to activate Law No. (11) of 2012, the fourth amendment of the Law on Maintenance of Irrigation and Drainage Networks No. (12) of 1995 (amended), which refers to the responsibility of the Ministry of Water Resources in conducting periodic maintenance work for private closed drains (belong to farmers)	Clogging closed field drains due to sedimentation accumulation.	The Ministry of Water Resources should coordinate with the relevant authorities to activate Law No. (11) of 2012, the fourth amendment to the Law on Maintenance of Irrigation and drains Networks No. (12) of 1995 (amended).
The General Department for the Operation of	The pumping stations stopped working and the	Lack of financial	Technical reports of Water Resources	The General Department for the Operation of

Irrigation and Drainage Projects needs to maintain and rehabilitate drain pumping stations once necessary financial allocations are available	drainage water overflowed on the agricultural lands, thus leading to an increase in the percentage of salinity in the agricultural lands	allocations	Directorates in the governorates	Irrigation and Drainage Projects has not maintained and rehabilitated many of the drain pumping stations
The need for the Ministry of Water Resources to coordinate with the relevant authorities to provide adequate treatment plants to treat sewage before dumping it into the river water	Water quality deterioration, soil degradation, low agricultural land productivity	The small number and outdated of heavy water treatment and industrial sewage plants, in addition to the failure to complete the implementation of large drains	Environmental Protection and Improvement Law No. (3) of 1997 amended and Water Resources Conservation Law No. (2) of 2001	Several sectors contribute to pollution of river water and deterioration its quality (drain water that is discharged into rivers, sewage water of hospitals, sewage stations and factories swages dumped in rivers untreated)
the Ministry of Water Resources needs to coordinate with the relevant authorities to remove encroachments like (fish cages, fish lakes, encroachments on river basin and the like)	Negatively affecting the amount of water in the irrigation canals. Consequently, depriving some agricultural lands of water .Thus , these lands suffer deterioration, high salinity and low productivity.	no deterrent legal measures against violators are in place	Annual reports	The presence of several types of encroachments on the irrigation network (fish cages, fish lakes, encroachments on river basin and the like)

9. Cause and effect

The response of the Ministry of Water Resources to achieve the goals was as follows:

a. Strategic studies and plans

First- The Ministry has completed 2015-2035 strategic study of water and land resources by analyzing the information related to water and lands, the impact of climate change, and developing the necessary plans for the operation and investment of water resources.

Second -The five-year plan starts from 2017 to 2022 that is prepared by the Ministry of Water Resources.

b. Support researches, development and innovation

First – Researches

1- Using Al-masab Alam water in Agriculture
2- Study of salinity-resistant wheat evaluation by using different levels of irrigation water salinity
3- Studying the effect of using water magnetization on the efficiency of land reclamation and its effect on the productivity of a crop by using saline water.
4- Studying the possibility of benefiting from the effect of magnetic water technology on soil and water properties.
5- Study the effect of plant hormones in reducing the effects of salinity.

Second- training and development

The Ministry of Water Resources has held several courses related to the treatment of salinization of agricultural lands. The table below includes some examples.

No.	**Course title**
1	Designing field drains and open drains net
2	Preparing designs for irrigation and drainage facilities
3	Modern irrigation technologies
4	Engineering calculations for cleaning irrigation canals

5	Preparation of lined channel designs
6	The relationship of soil to water
7	Improve water use efficiency

c. Providing the current water needs for municipal, industrial and agricultural uses, allocating a water share to the marshes annually, and providing water for fish and livestock farms.
d. Building renewable groundwater tanks for various purposes, on top of which is increasing the agricultural area and meeting the immediate needs of the population centers.
e. Increasing the irrigation efficiency by modernizing the old irrigation projects, introducing modern irrigation methods, and lining the canals up to the field outlets.