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NCARTT POLICY IN WATER SAVING

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INTRODUCTION

A National Center for Agricultural Research and Technology Transfer (NCARTT) is a research and technology transfer organizations work for agriculture development and optimizing water resources utilization in Jordan. NCARTT was established in 1994 to supervise, coordinate and implement applied agricultural research and technology transfer across the Kingdom. In 1996, a National Strategy for Agricultural Research and Technology Transfer was adopted.

In consistent with the national agricultural development goals and policies, a realistic national agricultural research strategy for Jordan's national agricultural research and technology transfer system was developed. This strategy for NCARTT was developed with the support of ISNAR, and ICARDA. Additional advisory support was also provided by USAID. The methodology utilized in developing and formulating the national agricultural research strategy for Jordan was based upon the approach used by ISNAR. This approach included a review and analysis the agricultural sector, and analysis of the constraints to agricultural development, an assessment of the national agricultural research and technology transfer system, and appraisal of the future environment in which agriculture will have to operate, and the formulation of an agricultural strategy.

NCARTT consists of a main headquarter and six regional centers. The center operates 12 Research Stations (Map 1) representing different agro-ecological conditions in Jordan. Water and irrigation activities are carried out under the Water Management and Environment Program and cover the following area of interest:

- Optimal utilization and management of traditional available water resources;
- Optimal utilization of non-conventional water resources (treated wastewater and saline water);
- Study the effect of supplementary irrigation on improvement and sustainability of agricultural production under rainfed conditions.
- Introduction of appropriate water harvesting and spreading techniques (s) in areas of 100-300mm annual rainfall.
- Minimize the environmental degradation through conducting the following research activities:
 - Impact of using treated wastewater and saline water for irrigation on soils, plants and water resources.
 - Impact of using fertilizers and pesticides on the environment.
 - Effect of using plastic sheets and Poly-ethylene pipes on the environment.

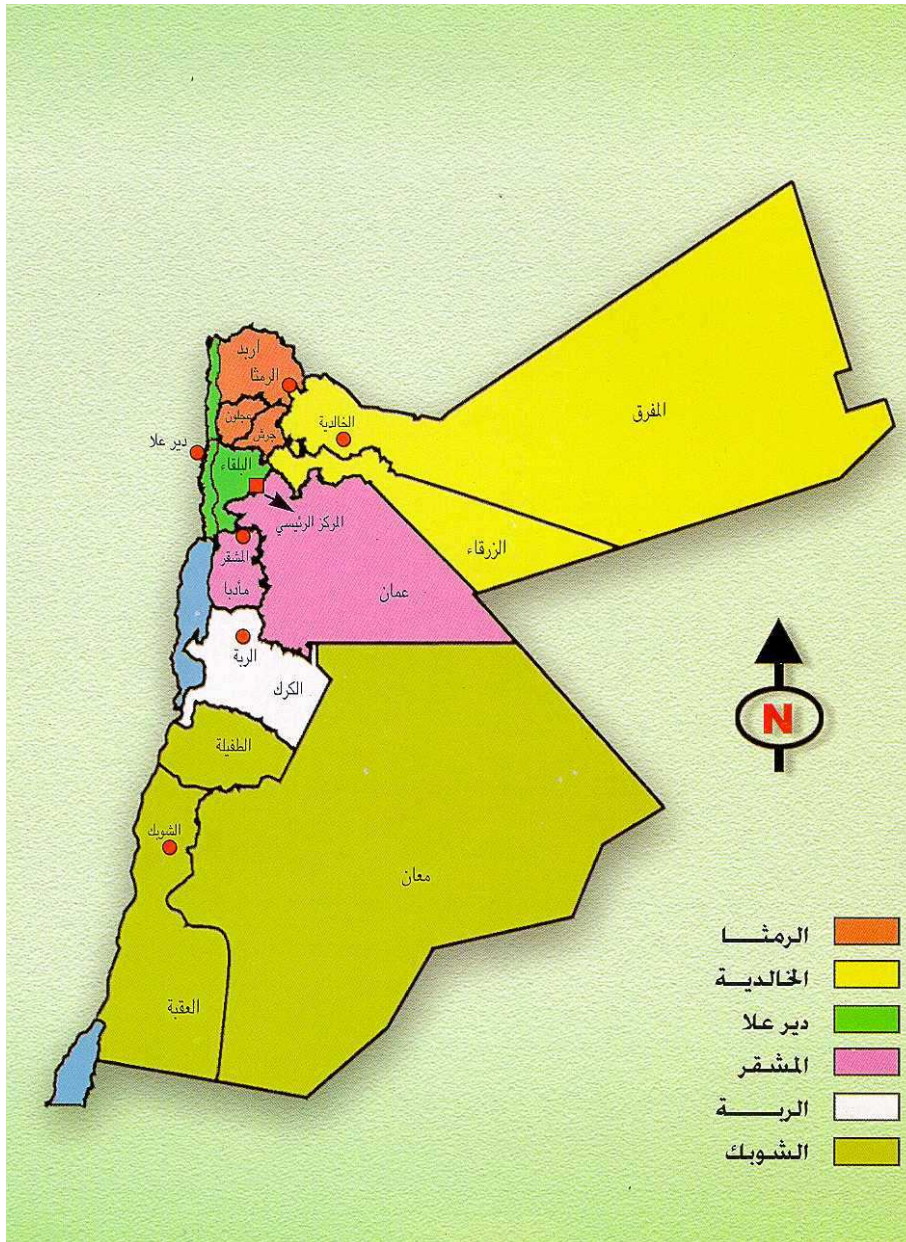


Fig. 1: NCARTT regional centers distributed in Jordan

NCARTT RESPONSIBILITIES

The main responsibilities include (but not limited to):

1. Organize agricultural research plans for the purpose of achieving agricultural development.
2. Adopt the latest agricultural techniques suitable for local conditions.
3. Disseminate such technologies to farmers through extension personal.
4. Increase knowledge, improve skills of researches, and enhance abilities of extension staff through educational and training activities.
5. Conduct economic studies for the purpose of improving farmers' organization.
6. Evaluate the effect of various social and economic factors on agricultural production.
7. Coordinate and support national agricultural research and technology transfer activities for sustainable agriculture.

NCARTTs' PROGRAMS

NCARTT contains the following programs and objectives covering all water research activities:

- Irrigated Agricultural Research Program: The largest program at NCARTT, responsible for achieving the optimization of water use efficiency for vegetables and fruit trees, economic utilization of irrigated crops, introducing new crops economic use of fertilizers, improve yields and quality, minimize negative environmental impact and reduce post-harvest losses and improve marketing.
- Rainfed Agriculture Research Program: Increase yields and improve the quality of local varieties, determine the optimal timing, land preparation and seeding practices for crop production, evaluate new crops for drought tolerance and develop appropriate technology to reduce post-harvest losses.
- Low-Rainfall Agriculture Program: Develop and maximize rangeland potentials, improve management and increase productivity of rangeland, implementing soil conservation practices, restoration rangelands vegetation covers as well as using water harvesting techniques to restore vegetation.
- Water Management and Environment Research Program: Improve irrigation systems and better management and utilization of water resources, increase fertilizers' efficiency, minimize the environmental degradation, develop and transfer irrigation technologies to farmers to maintain and improve farm productivity.
- Department of Technology Transfer: Responsible for dissemination of tested technologies to farmers, extension agents, and subject matter specialists, through special education and training activities and prepare materials.

Formulation of Strategies and Prioritization of Programs

In order to ensure the most efficient use of the limited resources available for research and technology transfer activities:

- Programs will be multi-disciplinary in their approach and continue the process from the generation of technologies through on-farm demonstrations and the publication of results and recommendations.
- Include all the necessary disciplines to ensure the economic basis and social acceptance of research results and recommendations.
- Programs are to be oriented towards finding and adopting technologies, management practices and policies which address the problems and needs of the agricultural sector.

Long Term Strategy of NCARTT

NCARTT long term research strategy focuses on the following broad issues:

- Water and land use management.
- Optimizing the use of available conventional & non-conventional water resources.
- Developing and adapting different water harvesting techniques.
- Transfer research results and recommendations to the farmers.

In developing NCARTT strategy, research and technology transfer were organized into five dimensions:

Management of the Conventional Irrigation Water. This includes the following components:

- Water Requirements and irrigation scheduling.
- Management of Information Systems.
- Management of Irrigation Systems.

Efforts to encourage and enhance indigenous water research targeted at the improvement of resource management, enhancing the understanding resource economics, and adapting the research findings in other environments to local conditions, including but not limited to, crop water requirements, minimizing evaporation and controlling evapotranspiration and the like.

The main factor contributing to low irrigation management efficiencies was attributed to lack of knowledge by farmers concerning crop water requirements and scheduling of irrigation water.

Distribution uniformity of trickle system caused by emitters clogging problem as a result of unsuitable filtration system, and poor hydraulic design of the irrigation network. For the above mentioned factors, NCARTT had established Irrigation Management Information project (IMIS) to overcome these problems, and improve irrigation water management for saving water and improving agriculture production and quality, and minimize environmental hazardous.

The main objective of IMIS is to implement an irrigation system program for efficient water usage in Jordan and the Middle East region. The specific objectives are:

- Establish an IMIS based on real time meteorological data, soil characteristics, water quality, crop type, and current irrigation system efficiency.
- Develop infrastructure and information management tools for rapid and accurate dissemination of irrigation scheduling information.
- Adopt state-of-the-art models for predicting crop irrigation requirements.
- Establish irrigation scheduling criteria for major crops in the Jordan.
- Establish data network that can easily be used by other relevant national institutions through improved classification data entry and retrieval, and communications.

Management of the Unconventional Water and cropping system.

This includes the utilization of marginal water (treated waste water and saline) resources for irrigation. Wastewater Management Policy (Paper No. 4 "Management of Wastewater" of June 1998) focuses on the management of wastewater as a water resource and includes, amongst other, development, management, wastewater collection and treatment as well as the reuse of wastewater and sludge in the agriculture, pricing, selected priority issues, standards and regulations.

The Policy of NCARTT aims to:

- Develop a practical, environmentally safe and socially accepted method to use treated wastewater for agricultural production.
- Better utilization of available unconventional water resources by the agricultural sector to overcome water scarcity problems.
- Developing an energy-saving and resource-recycling system for improvement of treated wastewater quality.

Integrated Watershed Management in rainfed areas includes the following components:

In this regard, NCARTT policy is to demonstrate, in the pilot areas, successful and transferable technologies for combating desertification and mitigating the effects of drought through the integrated management of natural resources (land, water and vegetation) that supports the livelihoods of communities.

Improvement of the productivity of rain-fed lands could be achieved through an integrated agricultural development of watersheds. This approach provided a better integration frame for the management of available resources.

Efforts have recently started to utilize water-harvesting techniques in rain-fed farming, especially for growing fruit trees; these efforts are also aimed at protecting soil from erosion. Farmers could also plant more drought-resistant crop varieties or varieties that use water more efficiently. In addition, they could adapt better soil management and other conservation practices.

Geographic Information systems (GIS).

GIS laboratory was established in 2002. This lab aims at establishment of geographic databases, necessary for researchers as well as for decision makers for sustainable natural resources management and augmentation of water resources in order to conserve soil, land cover and to combat desertification.

In this context, the policy of NCARTT is to use the state of art tools in the implementation of many research activities such as:

- Hydrological studies using hydrological Modeling.
- Watershed management through identification of potential sites and suitable techniques for water harvesting.
- Prediction of the suitable locations for construction an earth dam, Hafaier, small dam etc.
- Derivation of mathematical modeling for rainfall prediction and surface runoff.

- Suitability of Land use.
- Cadastral map analysis.

GIS proved to be a powerful tool for water-harvesting site selection studies due to its excellent capabilities in storing, analyzing and displaying spatially distributed data. The application of GIS was effective for identifying appropriate water harvesting techniques, including micro-catchments, contour ridges, collection and storage of rainfall water in cisterns, pits and others Figure 2.:

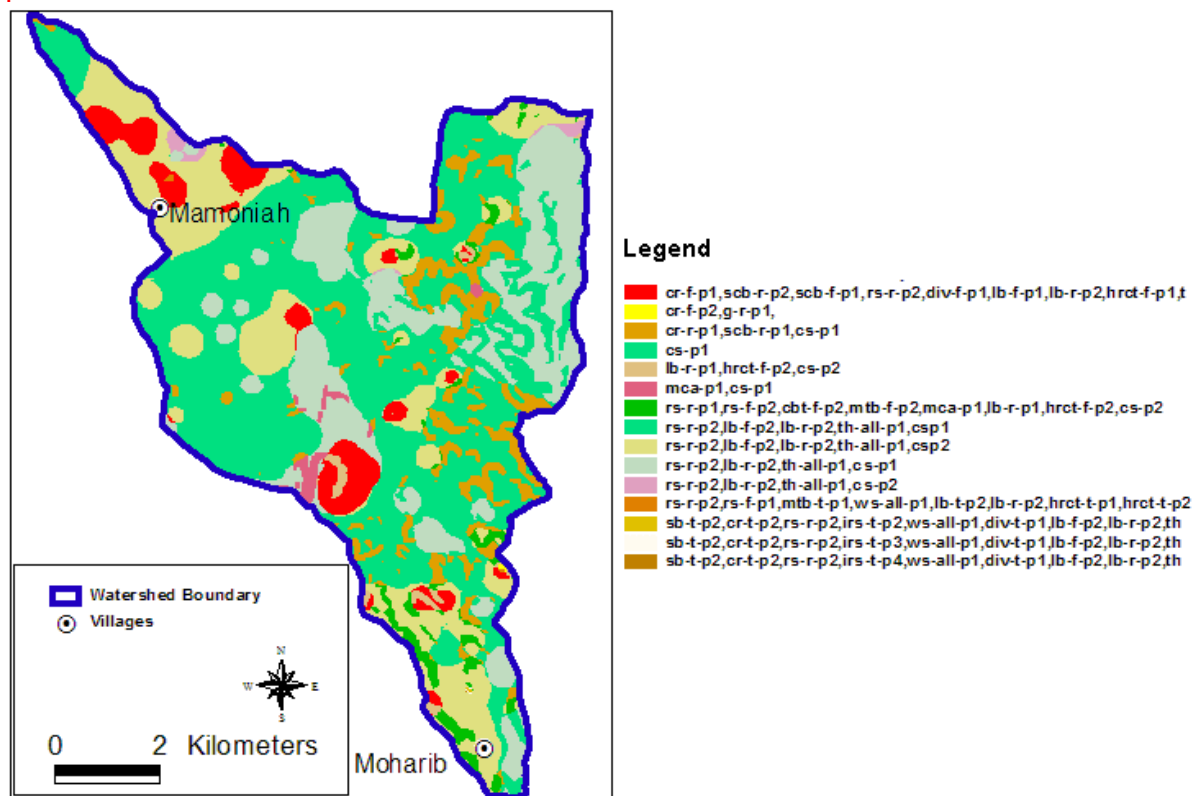


Fig. 2. Potential water harvesting option(s) suitable for each mapping unit.

Drought Prediction

Finally the long term vision for NCARTT strategy is to establish the “Drought early warning system” which aims at building the capacity of researchers for Drought Monitoring in Jordan.

The main objective is to support a Jordanian institution by building up their drought early warning and monitoring capacity. The unit has two main components:

- An applied research component designed to test and validate the utility of satellite imagery for drought early warning agricultural seasonal monitoring, production forecasts.
- An information dissemination component designed to maximize the utility of resulting project outputs, such as agricultural seasonal monitoring maps and early warning bulletins.

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