UN-DESA

Department of Economic and Social Affairs (DESA)

Development Account Project 121C "ROA-207": Strengthening National Capacities to Manage Water Scarcity and Drought in West Asia and North Africa

Technical Report on

Progress for the Implementation of the National Drought Management Plan for Palestine

National Consultancy Assignment

Technical Advisory Service for developing and implementing mitigation and preparedness drought management plans in pilot project countries

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Palestine

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Abbreviations and Acronyms:

ANU: An-Najah National University

ARIJ: Applied Research Institute-Jerusalem

BZU: Birzeit University

EQA: Environment Quality Authority

FAO: Food and Agriculture Organization of the United Nations

IAMZ: Mediterranean Agronomic Institute of Zaragoza

IDfA: International Decade for Action

IPCC: International Panel on Climate Change

LRC: Land Research Center

MEDROPLAN: Mediterranean Drought Preparedness and Mitigation Planning Guidelines

MoA: Ministry of Agriculture

MoLG: Ministry of Local Government

MOP: Ministry of Planning

NC: National Committee

NDMPs: National Drought Management Plans

NGOs: Non-Governmental Organizations

NDMC: National Drought Mitigation Centre

PARC: Palestinian Agricultural Relief Committees

PHG: Palestinian Hydrology Group

PENGON: Palestinian Environmental Non-Governmental Organizations Network

PMD: Palestinian Meteorological Department

PTU: Palestine Technical University

PWA: Palestinian Water Authority

UN-DESA: The United Nations Department of Economic and Social Affairs

UNRWA: UN Relief and Works Agency

UAWC: Union of Agricultural Work Committee

UNICEF: United Nations Children's Fund

WFP: World Food Programme

WS&D: Water Scarcity and Drought

WSRC: Water Sector Regulatory Council

WUA: Water Users Associations

National Drought Management Plan for Palestine

1. Introduction

In vast semiarid regions such as Palestine, years of below-average precipitation are more frequent than years of normal or excess precipitation. The most significant environmental effects of climate change in Palestine are a decrease in precipitation (with a significant seasonal variation) and significant temperature increases. In its Fourth Assessment Report, the International Panel on Climate Change (IPCC) predicted that for the southern and eastern Mediterranean, warming over the 21st century will be larger than global annual mean warming – between 2.2-5.1ºC. Annual precipitation rates are deemed likely to fall in the eastern Mediterranean – decreasing 10% by 2020 and 20% by 2050 – with an increased risk of summer drought[1].

According to a research conducted by Dayan, it is expected that climate change will lead to less precipitation in winter and higher temperatures in summer. [2] Temperatures are expected to rise by 2-4 degrees Celsius by the year 2100; this increase will lead to less snow in the area of Jerusalem and the mountains. The risk of rainfall reduction is higher in the south, mainly in areas where the annual rainfall is less than 250 mm. There is a risk that these areas will expand to the north to reach Jerusalem and possibly even further. In the last few years, there has been a marked increase in the number of droughts in Palestine, particularly in the southern and eastern slopes of the West Bank.

A comprehensive drought management strategy is needed for Palestine because drought directly impacts a great number of humans and animals and a significant portion the environment. Therefore, there is a great need to develop and implement drought management strategies and action plans in the countries affected by drought in order to increase societal and environmental resiliency and enhance drought response and recovery capabilities. Drought action plans can help decision makers to identify sectors that are vulnerable to drought, investigate management options before a crisis, and increase

[1]Applied Research Institute-Jerusalem and World Food Programme (2010) Socio-Economic and Food Security Atlas in the Bethlehem, occupied Palestinian territory.

[2]Dayan, B. (2014) Is Israel Getting Warmer as a result of the Greenhouse effect. Israel Weather. Available at: http://www.israelweather.co.il/english/page2.asp?topic_id=72&topic2_id=125&sub_topic_id=1 (June 2014)

readiness for the implementation of the most appropriate and cost-effective strategies available. This will foster a more informed decision-making process and the development of an efficient drought management program. In addition, drought management strategies and action plans can create opportunities for a broad range of stakeholders to participate in the decision-making process.

The United Nations Department of Economic and Social Affairs (UN-DESA) is implementing a regional capacity development Project ROA-207 entitled "Strengthening National Capacities to Manage Water Scarcity and Drought in West Asia and North Africa". The project includes five countries Palestine, Jordan, Morocco, Tunisia and Yemen. The project's main objective is to strengthen the capacities of national planners, policy makers and stakeholders in water-scarce and in transition settings countries in West Asia and North Africa, and to enhance their effectiveness in the formulation, implementation and monitoring of mitigation and preparedness drought management strategies. This report will describe progress of the preparation of the national drought management for Palestine within the framework of the project.

2. Project activities during 2014

2.1 Research and Studies

The National Consultant reviewed the existing institutional framework, the existing legal and regulatory framework and the relevant existing policies and strategies for Palestine. The following presents the headings of the main reviewed topics which will be presented in more details in the final plan:

A. Existing Institutional framework

1. Public institutions

2. NGOs and Local Organizations

B. Existing Legal and Regulatory Framework

1. Agriculture Law No. 2, 2003

2. Palestinian Environment Law No. 7, 1999

3. Palestinian Water Law

4. Cities, Villages and Building Law No. 79, 1966

C. Review of Relevant National Policies and Strategies

1. Environmental Sector Strategy
2. The Agricultural Sector Strategy
3. Water Strategy in Palestine
4. Social Protection Strategy
5. The Climate Change Adaptation Strategy and Programme of Action for the Palestinian Authority (2009)
6. The National Strategy, Action Programme and Integrated Financing Strategy to Combat Desertification in the Occupied Palestinian Territory (2012)

2.2 National Committee

Within the framework of the project, a workshop was organized by UN-DESA in partnership with the Palestinian Water Authority (PWA) on 17 December 2013 in Ramallah- Palestine. The PWA invited different stakeholders including ministries, universities, research institutions, NGO's and funding agencies. The attendance agreed to form a National Committee (NC) from four key institutions who are directly working on drought and related aspects. The institutions are the Palestinian Water Authority which is the responsible ministry under the UN-DESA project who will coordinate with other ministries and stakeholders in implementing the project, Ministry of Agriculture, Environmental Quality Authority and Metrological Department. The NC was responsible to implement the various activities of the project, including preparing the drought management plan for Palestine with the help of a national consultant.

2.3 National Capacity Development Training of Trainers

The NC and the National Consultant for Palestine were invited by UN-DESA within the framework of the Project to attend a National Capacity Development Training of Trainers (TOTs) Workshop on Developing and Implementing Mitigation and Preparedness Water Scarcity and Drought (WS&D) Management Plans at Zaragoza - Madrid, Spain on May 6-9, 2014. The workshop and field visits were organized by UN-DESA in partnership with the Mediterranean Agronomic Institute of Zaragoza (IAMZ-CIHEAM) and United Nations Office to Support the International Decade for Action (IDfA): "Water for Life" 2005-2015.

The TOTs Workshop and field visits aimed at training key national drought management officials in the pilot countries in order to strengthen their knowledge of the latest WS&D management guidelines, methodologies, tools and best management practices, in particular, the Mediterranean Drought Preparedness and Mitigation Planning Guidelines (MEDROPLAN).[3] The objectives were:

- To assess the WS&D management plans in West Asia and North Africa region;
- To review the latest development and the challenges of the pilot countries in the WS&D area;
- To adapt the MEDROPLAN guidelines, methodologies and approaches to each pilot country;
- To provide direction pilot countries efforts in developing and implementing Water Scarcity and Drought Management plans.

The advantages for the participants of the 3-day TOTs Workshop and field visits in Zaragoza and one-day field visits to Madrid were:

- The training was conducted by the most active scientists who wrote the MEDROPLAN Guidelines.
- The training demonstrated real case studies of drought management and how it is linked to other areas, such as IWRM, water reuse, economic development, etc.
- The country presentations showed the statuses of drought management in each country.
- The field training in Zaragoza provided the opportunity to have a complete and comprehensive view of how water scarcity and drought planning was designed and carried out in Spain.
- The field visit in Madrid to the Ministry of Agriculture, Food and Environment allowed the participants in the training session to meet and interact with the highest level Spanish decision makers in the area of water and drought management, and understand the global state organization and planning in this field.

In summary, the four-day workshop was useful to the participants from Palestine. The meetings, discussion, exchange of information, and the sharing of experience on drought management between the participants is a great achievement. The learned lessons and outcomes from the presentations provided the participants with the basic knowledge for development of drought management and mitigation plans.

2.4 National Workshop

[3] MEDROPLAN (2014) Mediterranean Drought Preparedness and Mitigation Planning: Drought Management Guidelines, http://www.iamz.ciheam.org/medroplan/, visited July 2014.

Within the framework of the project, a national workshop was organized by UN-DESA in partnership with the NC on 23 & 24 September 2014 in Amman - Jordan. The following stakeholders attended the workshop: Palestinian Water Authority, Environment Quality Authority, Ministry of Agriculture, Palestinian Energy Authority, Ministry of Planning, Meteorological Department, Applied Research Institute Jerusalem, Birzeit University, and An-Najah National University.

The national meeting aimed at bringing national stakeholders together to discuss and receive feedback on how to make Palestine well-prepared for facing drought conditions. The meeting additionally discussed Palestine's drought management capacity needs and the actions to be taken in this regard. The workshop has the following objectives:

1. Understand drought, its impacts, and areas of vulnerability in Palestine
2. Assessment of current drought management activities and critical gaps in Palestine
3. Apply best practices and methodologies to drought management activities in Palestine
4. Strengthen coordination and information-sharing among stakeholders
5. Involve all stakeholders in planning for drought management activities and mitigation plans

The primary goal of the workshop was to focus on the processes of effective drought management, which includes an emphasis on information-sharing, coordination, and inclusion of stakeholders. With this in mind, the workshop focused on two key areas:

1. Formulating specific elements of a comprehensive drought management plan:

The focus of the workshop was to define specific steps in the implementation process. Two implementation tools were discussed: The MEDROPLAN and the tools developed by the National Drought Mitigation Center at the University of Nebraska – Lincoln. These two tools were used to review and update Palestine's drought management strategies.

2. Planning, coordination, information-sharing, and stakeholder involvement:

Due to the level of complexity of National Drought Management Plans (NDMPs), cooperation, coordination, and collaboration are required for success. NDMPs require political commitment, strong institutions, governance, and stakeholder participation. The organizational structure should enhance planning, coordination, and information-sharing within and between levels of government, institutions, and civil society. It also should include all levels of government, as well as other institutions, organizations, and members of civil society and consider information sharing in the region. For this purpose stakeholder involvement strategies should to consider the following;

- Stakeholder participation should emphasize on a bottom-up strategy
- Stakeholder consultation should be included at all levels of decision-making and planning
- Stakeholders include government, institutions, community groups (especially farmers and historically marginalized groups), non-governmental organizations (NGOs), and Civil Society

2.5 Adapting the MEDROPLAN and University of Nebraska Guidelines to Palestine

Many methods for designing drought plans have been developed around the world to assist countries in developing drought plans, and the variations among these methods are due to the complexity of drought impacts. The United Nations Convention to Combat Desertification, Food and Agriculture Organization of the United Nations, and World Meteorological Organization developed Best Practices on National Drought Management Policy. The National Oceanic and Atmospheric Administration and National Drought Mitigation Centre (NDMC) at the University of Nebraska – Lincoln developed The United States Drought Monitor. The NDMC identifies a 10-step drought planning process.

In addition, the Mediterranean Agronomic Institute of Zaragoza and Polytechnic University in Madrid, Spain coordinated (in collaboration with scientists and stakeholders from Cyprus, Greece, Italy, Morocco, Spain, and Tunisia) the creation of the MEDROPLAN to assist Mediterranean basin countries in developing drought plans. It was published in 2007 and was partially funded by the EuropeAid Co-operation Office-European Commission, under the MEDAWATER programme initiative. The purpose of the MEDROPLAN Guidelines was to provide Mediterranean countries with a framework for an effective and systematic approach to prevent and/or minimize the impacts of drought on people.

The Guidelines include five components, which are the planning framework, organizational component, methodological component, operational component, and public review component.

During the national workshop, the attendees agreed that certain guidelines (or combination of guidelines) will be identified from the two mentioned guidelines that suits Palestinian Case. The MEDROPLAN drought management guidelines will be the primary guidelines that could be used partially in Palestine as agreed by Participants of the workshop. However, some steps from Nebraska Guidelines will be also taken into consideration. Based on those guidelines, two initial activities were carried out by the NC and UN-DESA:

A. The main key stakeholders have been identified as will be discussed later

B. A national workshop was organized as discussed above

2.6 Stakeholder Identification

Within the framework of the project, the attendance of the national workshop (Section 2.4) identified the following related stakeholders for drought management for Palestine. The attendance analyzed the expectation and adaptive capacity for the stakeholders as shown in Table 1.

Government Ministries and Authorities: Palestinian Water Authority, Environment Quality Authority, Ministry of Agriculture, Ministry of Local Government, Palestinian Energy Authority, Ministry of Planning, Meteorological Department and Water Sector Regulatory Council

Non-Governmental Organizations: Palestinian Agricultural Relief Committees, Palestine Academy for Science & Technology, Palestinian Hydrology Group, Catholic Relief Services, House of Water & Environment, Friends of the Earth Middle East, Palestinian Wastewater Engineers Group, Union of Agricultural Work Committee, Applied Research Institute Jerusalem and Land Research Center,

Universities and Research Centers: Birzeit University, Institute of Environmental & Water Studies at Birzeit University, An-Najah National University, Water & Environment Studies Institution at An-Najah National University, The Arab American University, Hebron University, Palestine Polytechnic University, Palestine Technical University, Al Quds University, Bethlehem University, Water & Soil Environmental research Unit at Bethlehem University and Al-Azhar University

Municipalities: Jenin municipality, Jericho Municipality and Ramallah Municipality

Other Related Organizations: Rainfed farmers, Irrigated area, Farmers Negotiation Support Unit, Palestinian Economic Council for Development & Reconstruction, Palestinian Farmer's Union, Palestinian Animal Breeders Union and Water Users Associations, EWASH,

International Organizations: UNDP, FAO, UNRWA, UNICEF, UNEP, GIZ, JICA, USAID and TIKA

Table 1: Stakeholder identification and participation in drought management for Palestine

Stakeholder	Expectations	Adaptive capacity
Rainfed farmers	Improve adaptation practices in livestock and crops to minimize or avoid drought effects	Low investment capacity for new technologies Insurance options

Irrigated area Farmers	Same as above. Maintain water supply guarantee	Same as above. Increasing experience in water efficiency technologies
Municipalities and Water Utilities	Implementation of mitigation policies Secure satisfactory quantities of water	Potential for improving water use efficiency and capacity to adopt prompt actions
PMD	Use of data to analyze risk	Capacity to develop early warning systems
PWA, EQA, MoA, MOP, and WSRC	Development of water policies based on risk analysis Implementation of mitigation policies	Coordinators of stakeholder dialogue Pro-active and reactive actions Coordination and capacity to revise legislation
Research and education Institutions	Develop adequate academic knowledge on risk analysis, adaptation and technology	Improvement of international academic knowledge
International Cooperation Organizations	Transfer of technology and Knowledge	Improvement of international knowledge and networks
NGO´s	Environmental and social improvements	High influence in public opinion

2.7 The Required Institutional Framework for Drought Management for Palestine

The participants of the national workshop discussed the best practices for the required framework for drought management for Palestine. They agreed that there is a need for establishing a specialized unit at the Ministry of Agriculture to be responsible for drought management for Palestine. The unit should form a Policy Team from the relevant ministries: MoA, PWA, EQA, MOP, MoLG, PMD and WSRC. The Policy Team should be responsible for developing, updating and implementing the drought management plan for Palestine. Moreover, the unit should form a Technical Team to help the Policy Team in its duties and responsibilities. The attendance of the workshop recommended the following institutions and groups to be members of the Technical Team: Palestinian Agricultural Relief Committees, Palestinian Hydrology Group, Union of Agricultural Work Committee, Applied Research Institute Jerusalem, Land Research Center, Birzeit University, An-Najah National University, Palestine Technical University, Water Users Associations, EWASH and FAO (See Fig. 1).

The specialized unit at the Ministry of Agriculture shall conduct an institutional analysis that provides:

- Explicit description of legislation, institutions and organizations with competence in water policy and administration, in planning, decision making, operation of water supply systems and in drought preparedness, and emergency action with particular emphasis in municipal and irrigation water supply.

- Explicit description of the linkages and hierarchical relations among the organizations and institutions.
- Information on existing drought preparedness and management plans.
- Information on the institutional experience on the application of the existing drought preparedness and management plans.
- Description of the data collection system in the country, specifying the institutions responsible, the type of reporting and accessibility, and the primary uses of the data.
- Evaluation of the strengths and weaknesses of the legal and institutional framework and potential improvements.

According to the results of the analysis, the specialized unit may be necessary to propose the required updates of the existing legislations and laws and the modifications on the existing related framework institutions.

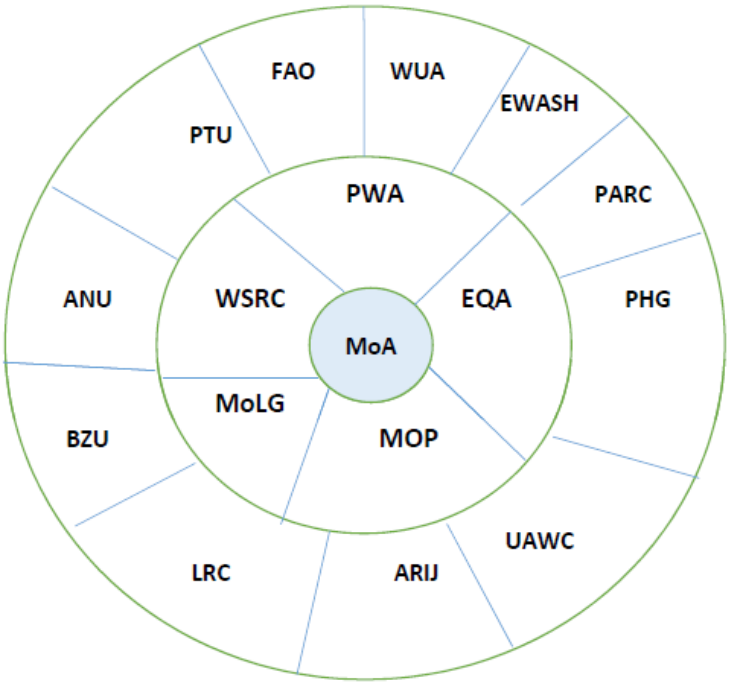

Fig. 1 Required Institutional Framework for Drought Management for Palestine

2.8 Drought Characterization and Monitoring

Drought indices can be used to describe all types of droughts (that is, meteorological drought: deviation from the normal meteorological conditions; hydrological drought: deviation from the normal hydrological conditions; agricultural drought: deviation from the normal soil moisture conditions for

crop growth; and socioeconomic drought: deviation from the normal level of availability of water for fulfilling societal needs).

The indices for drought characterization have to comply with the following requirements: (a) that they can be calculated from data available from actual data collection systems; (b) that they have an a priori and direct relation with vulnerable social, economic and environmental systems; and (c) that they can be used for predictions and early monitoring systems[4].

The participants of the national workshop agreed on the indices that can be applied for Palestine. Table 2 presents a summary of some of the main indices that can be applied to drought characterization and monitoring for Palestine.

Table 2: Drought indices for Palestine

Type of drought	Drought Indices
Meteorological drought	Standardized Precipitation Index (SPI)
	Effective Drought Index (EDI)
Hydrological drought	Groundwater Resource Index (GRI)
Agricultural drought	Normalized Difference Vegetation Index (NDVI)
	Soil Moisture Anomaly Index (SMAI)
Socioeconomic drought	Water Poverty Index (WPI)

2.9 Impact of Drought on Palestine

Although the complete definition of drought impacts is rather complicated, the main impacts can be broadly classified into three categories: economic, environmental and social. Each category comprises several impacts, according to the affected sector. In Table 3 a list of main drought impacts was reported during the National Workshop.

Table 3: Summary of the main impacts to be considered in each sector[5]

Sector	Impact
ECONOMIC	Decreased production in agriculture Unemployment caused by production decrease Pressure on financial institutions (more risks in lending, capitals decrease etc.)

[4] MEDROPLAN (2014) Mediterranean Drought Preparedness and Mitigation Planning: Drought Management Guidelines, http://www.iamz.ciheam.org/medroplan/, visited July 2014.

[5] Adapted from various sources and modified at the national workshop by the participants

	Income reduction for water utilities due to reduced water delivery Costs in emergency measures to improve resources and decrease demands
ENVIRONMENTAL	Decrease water supply and quality of surface water and groundwater Increase land degradation Decline soil fertility Increase crop pest and diseases Increase energy demand Increase risk to crops Damage to ecosystems and wetlands, biodiversity and diseases (soil erosion, dust, reduced vegetation coverage etc) Lack of feed and drinking water Increase of salt concentration (in streams, underground layers, irrigated areas) Damages to river and wetlands life (flora, fauna) Damage to air quality (for example polluting dust)
SOCIAL	Affect food security Damage to public health and safety, by affecting air and water quality Increase in social inequality, by affecting different socio-economic groups Tensions between public administrations and affected groups Inconveniences due to water rationing Impacts on way of life (unemployment, reduced saving capability, difficulty in personal care) Inequity in drought impacts and mitigation measures distribution

2.10 Preparedness, Early Warning, Monitoring Systems for Palestine

Preparedness and early warning are the key factors for later operational management and determine the success of the overall drought management plan. The main objective of a monitoring system is to help decision-makers identify the drought warning conditions and to provide useful information for identifying the best drought mitigation measures on the basis of a continuous monitoring of the drought evolution in terms of meteorological and hydrological variables and water resource availability.

The current metrological situation at Palestine is characterized by a) limited number of meteorological stations, b) inefficient distribution of low technology stations and rain gauges in the semi-coastal and central highland agro-ecological zones, c) absence of meteorological stations in the eastern slop and Jordan valley zones and d) lack of data and information for historic records.

Moreover, some of the existing meteorological stations in Palestine must be upgraded. New sensors and accompanying equipment need to be added to the existing stations, while some stations should be replaced altogether with Campbell stations if they are irreparable or new sensors accompanying equipments cannot be added to them. In addition, new sensors need to be added to the existing Campbell stations to measure the missing parameters and indicators that are essential for establishing

an early drought monitoring system. Palestinian Meteorological Department is poorly prepared for drought early warning systems. The reasons result from inadequate analytical tools for drought monitoring, unsuitable information products and insufficient data sharing[6].

There are still some points to make clear before achieving a practical drought monitoring and early warning system in Palestine. The key questions include, but not limited to which indicator(s) are best for monitoring drought, and what the threshold is for taking actions. To answer these questions, some studies should be conducted.

In order to build a monitoring and early warning system which will provide timely, accurate, and succinct information on drought conditions in the occupied Palestinian Territory, a comprehensive approach needs to be adopted. The following steps provide a set of recommendations towards building an integrated system[7]:

1. Due to the disconnected, incomprehensive and irregular state of the climate and drought information system in Palestine, it is recommended that there be a transfer of overall responsibility to a single authoritative body like the proposed specialized unit mentioned in section 4.5. This unit would be responsible for data collection from other agencies working in the field, analyzing and disseminating the final climatic data calculations that would support drought assessment and mitigation decision making at national and local level.

2. The existing database related to the Palestinian's climate conditions and water resources is fragmented and limited and does not support comprehensive data sharing and analysis necessary for an effective monitoring and early warning system. Developing a data collection tool to facilitate data gathering and archiving is a first step toward creating an effective early warning system.

3. Upgrading the existing meteorological satiations in Palestine in order to meet the objective of implementing the drought monitoring system needs to occur.

[6] ARIJ (2011) Conducting a Survey and Needs Assessment for a National Meteorological Station and the implementation of an Early Drought Monitoring System

[7] ARIJ (2011) Conducting a Survey and Needs Assessment for a National Meteorological Station and the implementation of an Early Drought Monitoring System

4. Installing new meteorological stations to cover the geographic areas and climatic zones that are not already served should also be a priority especially for the eastern slop and Jordan valley where condensed irrigated agriculture is practiced.

2.11 Defining the Actions

The general objective of every operational action is to minimize impacts of drought and water scarcity while maintaining social and ecological services of water.

The operational actions can be classified based on the type of response to drought events to two categories: reactive and a proactive approach. Measures that are taken before the initiation of a drought event aim to reduce the vulnerability to drought or improve drought preparedness. They are long-term measures oriented to increase the reliability of water supply systems to meet future demands under drought conditions through a set of appropriate structural and institutional measures. The measures taken after the start of a drought are short-term measures which attempt to mitigate the impacts of the particular drought event within the existing framework of infrastructures and management policies, on the basis of a plan developed in advance and adapted to the ongoing drought, if necessary.

Planners should be very careful in formulating the proper mitigation measures to minimize the impact of drought episodes because some measures may create economic and social externalities. Reallocating water shares from one economic sector to another which is more prioritized may create social conflicts and economic complications. Changing crop pattern in agricultural can be a solution to reduce agricultural water demand but the consequences of food insecurity, unemployment, and abandonment of land (depopulation) will have substantial impacts on Palestinian livelihood.

Table 4 presents long-term and short-term actions which were discussed during the National Workshop, subdivided into the three categories of water supply increase, water demand reduction and drought impact minimization.

Table 4: Long and short term drought mitigation measures[8]

Category	
Long term Action	
Demand Management	Adoption of techniques oriented to water saving Improving distribution system Using techniques to control point-source and diffuse pollution and able to Protection of water related ecosystems Enhance economic incentives for water savings Adoption of agronomic techniques for reducing water consumption Planting dry crops in place of irrigated crops Adoption of water recycling in industries Adoption of resilient agricultural practice Promoting of renewable energy projects
Water Supply Increase	Adoption of reuse of treated wastewater Adoption of inter-basin and within basin water transfers Increase storage capacity Utilization of Aquifers Implementation of desalination of brackish or sea waters Control of seepage and evaporation losses Implementation of sealing of canals for irrigation projects Improving rainwater harvesting Import of water Implementation of rehabilitation of wells projects Implementation of artificial recharge projects
Impacts minimization	Development of policies, regulations and enforcement mechanisms for improving drought preparedness Education and training activities for reducing negative impacts of drought Reallocation of water resources based on water quality requirements Development of early warning systems Implementation of drought management plan Adoption of insurance programmes Restoration of degraded natural resources Adoption of stakeholder participation in the implementation of drought management plan
Short term Actions	
Demand Management	Adoption of techniques oriented to water saving Restriction in some urban water users Implementation of public information campaign for water saving Implementation of water conservation in tourism sector Increase of efficiency of water distribution methods for agriculture Restriction of irrigation of annual crops Adoption of effective pricing system
Water supply	Improvement of existing water systems efficiency Use of additional sources of low quality or high exploitation cost

[8]Adapted from various sources and modified at the national workshop by the participants

increase	Over-exploitation of aquifers or use groundwater reserves Improvement of water harvesting systems Rehabilitation of water resources wells, canals and springs Provide tanks for farmers
Impact minimization	Temporary reallocation of water resources Public aids to compensate income losses Public aids for crop insurance

3. Recommended activities under UN-DESA project during 2015

The National Consultant has drafted the national drought management plant for Palestine on November 2015 based on the national workshop which was organized at Jordan on September 2014. The National Consultant distributed the zero draft plan to all stakeholders who participated in the workshop for feedback and comments. The National Consultant has received some comments from four participants so far and expected to receive more comments by the end of December 2014.

The National Committee with the help from the National Consultant is planning to organize the second national workshop within the first quarter of 2015. The draft plan will be presented for all stakeholders in order to finalize the drought plan for Palestine.

It is worth mentioning here that there is a need to take into considerations the following issue during year 2015 in finalizing the plan and during the consultation of all stakeholders:

- The operational component of the drought plan should be completed. The operational component has the following six aspects that need continuous feedback between them:

  - ✓ Preparedness, early warning, monitoring systems
  - ✓ Establishing priorities of water use
  - ✓ Defining the conditions and the thresholds to declare drought levels
  - ✓ Establishing the management objectives in each drought level
  - ✓ Defining the actions
  - ✓ Implementing actions

- More human and financial resources should be invested in the research on the drought forecasting methods and geospatial technologies, to improve drought preparedness and mitigation.

- The awareness should exist since the capacity of water management depends largely on the educated and trained water professionals.

- The success of the early warning systems relies on the free flow of information. Drought monitoring unit might be set up to compile and interpret all data sources for monitoring drought extent and impact and report through regular or special bulletins to the central drought management unit.

- Drought information should also be delivered to end users in a timely manner and in an understandable format to be effectively used in the decision making process and as part of a drought preparedness plan with the ultimate goal of creating a more drought resilient society.

- Organizing and preparing risk and vulnerability profiles and maps, as well as stimulating efforts to combat the negative effects of drought and climate change (Mitigating and managing drought).

- Supporting and developing technical, human and institutional capabilities at the national level in order to combat drought and the effects of drought in rural areas; enhancing coordination and cooperation in planning and implementing drought mitigation programs at the national and regional level.