

Stakeholder Participation in Prioritization of Water Supply and Demand in Jordan

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Abstract

Stakeholder participation in prioritization of water supply and demand was developed to assist water resource entities and water users on decision making when coping with water scarcity, climate change and contaminated water in Zarqa River Basin, Jordan. The basin was selected for CrITERIA project to represent a case study of semi-arid area in the Mediterranean. The paper demonstrates a participatory approach of integrating stakeholders' experience and their active involvement in water management. Issues related to prioritization of water demand were identified, and the opinions of stakeholder were ranked according to their role in securing supply and improving supply reliability. The most important issues were ranked according to number of opinions out of the total. Findings showed that water management issues was the major issue in the basin and represents 86% of the stakeholders opinions, followed by water supply as 82% to less extent by water demand as 77% and quality as 68%. Most of the stakeholders agreed that management issues are the major cause of water scarcity. Like expected, water problems in Jordan are 50% associated with poor management and 50% due to water scarcity.

Keywords: stakeholder participation, water management, water scarcity, Zarqa Basin

1. Introduction

Stakeholders' participation refers to the direct institutional participation where the public participation is initiated by public or private agencies and can be defined as the process by which public concerns, needs and values are incorporated into governmental decision making (Shammout et al. 2013). Increasingly, however, there is a wide recognition that there is much to be gained by engaging the local community in the process of managing water resources. This enhances links between research and policy-making through Integrated Water Resources Management (IWRM), engaging scientists, policymakers and the public into participatory scenario-building (Pahl-Wostl 2002). Moreover, stakeholder participation approach will fulfill many functions, including acquisition of information and expertise of direct use for the water supply and demand analysis. The proposed solutions by stakeholders based on existing issues will describe a

possible future state. This requires design and implementation of stakeholder participatory network, workshops and evaluation of interventions for water supply and uses. The participatory approach is applicable to Jordan, where stakeholders can contribute to problem solving.

The critical status of the Zarqa River Basin (ZRB) through inappropriate land uses, water scarcity and water conflict among different sectors has resulted in water resources shortages and degradation (Shatanawi and Shammout, 2011). ZRB was selected as a case study for CrITERIA project, entitled by "Cr(VI) Impacted water bodies in the Mediterranean: Transposing management options for efficient water resources use through interdisciplinary approach". The main objective of the project is to deliver an optimization tool, including documentation and a data base, to assist water resource management organizations and water users on decision making in coping with water scarcity, climate change and contaminated water. Contamination by Cr(VI) as the central theme of the project will be used as an example of a specific water pressure problem that has to be tackled through IWRM. Therefore, this paper describes the steps for stakeholders' involvement in water supply and demand prioritization. The participation of stakeholder enhances dialogue between stakeholders and decision makers guided by the (WFD) Water Framework Directive (European Communities 2003). The participatory approach in water prioritization has been utilized and adapted in CrITERIA as a project output.

2. Methodology

The methodology used in the Stakeholders' Participatory approach and their role in prioritization of water management is similar to the procedure followed by OPTIMA (ESS-GmbH. 2017) and consists of the following steps: **Step 1** Establish and identify inventory of related stakeholder's entities representing stakeholders. They were consulted through e-mails and visits. **Step 2** A document was prepared and distributed among stakeholders on the current status related to the water supply, demand surface and gap. **Step 3** Water issues questionnaire was prepared. These issues are a- Water management issues, b- Water demand issues, c- Water supply issues, and d- Water quality issues. They

were analyzed and presented to the stakeholders workshop. **Step 4:** The workshop was organized and used a tool to facilitate dialogue and to integrate their input, know-how and experience to facilitate their active involvement and their role in results dissemination.

The workshop was held at the University of Jordan on the 7th of May, 2018. A total of 30 of stakeholders participating in the workshop representing: research and academic institutions, government agencies, industries, farmers and civil societies. The aim of this workshop was to present and identify major water issues, problems, and actions. In addition input from the stakeholder was anticipated regarding the Cr(VI) sources, contamination, and suggested alternative.

3. Results and Discussion

The results (issues, objectives and actions) which were agreed upon during the discussion were analyzed. The issues are: a- Water production such as exploitation of the groundwater and wastewater treatment, b- Water distribution for irrigation and domestic supply, c- Water quality such as monitoring and standards d- Water conservation such as groundwater protection, Water users such as industry, agriculture and tourism, f- Regional pollution control such as water resources.

The Water Issues Questionnaires were filled and discussed. Most important problems under each issue were identified. Table 1 summarizes the participation activity with regards to gender involvement. Table 2 shows the opinion of stakeholder to the most important problems. Table 3 shows the most important objectives and actions.

Table 1. Participation activity with regards to gender

Item	Total number	Women
Invited group	24	7
Staff group	6	2
Total	30	9
Filled questionnaire	22	5

The participants identified the main objectives related to prioritization of water supply and demand which are: minimizing over pumping, monitoring, improving efficiency reducing gap and reaching quality standards. Moreover, they have suggested some actions to meet the objectives like enforcement of law regarding groundwater protection using modern technology in irrigation and agriculture, invest in mega project to enhance supply, improving public awareness and extension programs and limiting the use of ground water to domestic use. Most of the stakeholders agreed that management issues are the major cause of water scarcity. Like expected, water problems in Jordan are 50% associated with poor management and 50% due to water scarcity.

Table 2. The opinion of stakeholder to the most important problems

Issue-Opinio:	Important problem
Water managemet-19/22	Lack of enforcement of water quality standards (8/19), conflict among sectors (7/19), & lack of public awareness (4/19).
Water demand-17/22	High demand on groundwater for domestic uses (6/17), pressure on surface and groundwater by the agricultural sector (6/17), & impact of industrial activities on surface and ground water quality (5/17).
Water supply-18/22	Conflicts from the limitation of ground water (7/18), conflicts from limitation on water supply (7/18), and future dependence on water imported from outside (4/18).
Water supply versus water-15/22	Groundwater deterioration (6/15), limit to domestic use of water, as a consequences of quality degradation (5/15), and limit to agricultural use, as a consequences of quality degradation (4/15).

Table 3. The most important objectives and actions

Objective	Action
Minimization over pumping	Reduction in groundwater extraction by law.
Law enforcement	Concerned entities involvement.
Monitor industries impacts	Enforce the laws of environment.
Reaching quality standards	Applying Jordanian water quality standards.
Management of water use for farmers	Improve farm water management as: irrigation scheduling, and use of modern irrigation systems.
Minimize supply-demand gap	Invest in Mega project.

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