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Building Resilience for Drinking Water Shortages through Reverse Osmosis Technology in Coastal Areas of Bangladesh

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Abstract

Reverse osmosis (RO) is a newly applied feasible technology of fresh water source in the coastal areas of Bangladesh. The research has been undertaken to know the present water security related resilience status at Patharghata upazila of Barguna district in Bangladesh. The study also focuses to strengthen resilience in water security for the coastal households by using reverse osmosis technology. The people of the study area face safe drinking water shortages problem all year round but during dry season the problem becomes more acute. The study was conducted using questionnaire survey method, focus group discussion (FGD), water sample collection and testing to find out the water security status of the study area. During questionnaire survey, mainly the head of the households were interviewed. Drinking water samples were collected from the randomly selected households of the study area for laboratory testing. The present status of drinking water sources, respondent's perception of drinking water facilities, distance of water sources, general information of the pond, water collection system, water samples test result and health risk problems were assessed to measure the water security status of the area. From the survey and test results, it reveals that the people of the area facing severe fresh drinking water crisis. It is found that about 62% households of the study area are in water insecurity problem. A generalized feasibility test of a reverse osmosis plant was done which indicates that the reverse osmosis system is more technical and economically feasible drinking water source among other technologies of the study area. The system can also play a great role as a disaster risk reduction (DRR) based solution of drinking water shortages for building water security related resilience at coastal household level in Bangladesh.

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Keywords: Drinking Water Shortages; Reverse Osmosis; Coastal Areas

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Nomenclature

DPHE	Department of Public Health Engineering
NGO	Non-governmental Organization
PSF	Pond Sand Filter
RO	Reverse Osmosis
RWH	Rainwater Harvesting
TDS	Total Dissolved Solids
WHO	World Health Organization

1. Introduction

Freshwater is the key of life that boosts the quality of living organisms. Adequate, safe and accessible supply of freshwater is very important to carry on sustainable life and healthy community [1]. The quantity and availability of freshwater is one of the imperative issues that the globe is facing nowadays. The right to use to clean water is rapidly grown to be a major global crisis [2]. Water scarcity and unreliable water quality are considered as foremost barriers to attain sustainable development and progress in the eminence of life [3].

Many areas of the world are suffering from severe water shortages problem. Due to frequent natural calamities, sea level rise and man-made amendment of natural resources, the situation is becoming more susceptible gradually [4]. Many coastal areas of Bangladesh are facing potable drinking water shortages problem now a days. Water salinity and lack of fresh water are typical hazards in many coastal parts of Bangladesh. It is upsetting different uses of water including drinking, irrigation, household purposes, fisheries production and maintenance of the ecosystem [5]. Lack of safe drinking water has been recognized a key concern in the daily life of the coastal households. Water supply from the ground water is the main source of drinking water in many coastal parts of Bangladesh [6]. In recent time, ground water based water supply in coastal areas of Bangladesh is suffering from a number of major troubles, mainly arsenic contamination, lowering of fresh water table, salinity intrusion and non-availability of proper aquifers [7]. As a result, there are significant needs to improve and protect fresh water supplies and developing water security of the coastal region of Bangladesh.

Reverse osmosis (RO) technology is a possible solution for that region where fresh water shortages problem is severe. Reverse osmosis is a membrane based technology to decontaminate water by unraveling the dissolved solids, controlling pH, eradicating bacterial contamination from feed stream [8]. Reverse osmosis is gradually more being used to provide fresh drinking water under condition of freshwater scarcity in many parts of Bangladesh. It is a new source of freshwater that will not diminish during the times of drought, thus serving to ensure sufficient pure water supplies all year round. RO technology is used to eradicate dissolved solids, color, organic contaminants and pollution from raw water. Hence, RO technology can be a blessing substitute source of freshwater for those areas of Bangladesh.

Problem Statement: Chardoani union of Patharghata upazila under Barguna district is a coastal part of Bangladesh. Access to adequate clean water is one of the critical concerns of this area. The quality of ground water of this area is very poor because of salinity intrusion of the potable ground water aquifer. Ponds are the main source of drinking water of this area. Also, they use this source for domestic purposes such as cooking, bathing, washing etc. Some few people of this area are practicing rainwater harvesting system and Pond Sand Filter (PSF) technology for their drinking purpose. But due to some procedural problems many of the PSF technologies are not operating for some quite a few years. In case of Rainwater Harvesting method, it is very much expensive for the donor agencies to cover all the households of the area and they do not supply large tank for storing rain water. For this reason, this system can't supply safe drinking water throughout the whole year for those households. So, the water security status of this area must be enhanced through a new alternative technology. Reverse osmosis technology can be a possible option and will be blessing for this coastal region.

Research Objectives: This research has two foremost objectives. First, it aims to know the present water security status of the study area. The second objective is to strengthen water security for the coastal households by using reverse osmosis technology.

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