

Impact of Water Resource Auditing - Intergrated Development Approach - to Mitigate Water Related Disasters in the Vavuniya Divisional Secretariat's Division in Northern Sri Lanka

Thileepan, K., Sivakumar, S.S.

Abstract— Sri Lanka is a tropical nation, is highly vulnerable to impacts of climate change. As a small in the Indian Ocean, the coastal region of the Sri Lanka is susceptible to change in sea level. The impact of climate change are widespread and they are likely to create negative socio economic outcomes on many sectors in Srilanka. Traditionally Srilanka has been generalized into three climate zones, namely wet zone, dry zone and intermediate zone. The research area Vavuniya is comes under the dry zone. The dry zone receives a mean annual rainfall of less than 1750 mm with a distinct dry season from may to september. Even though, the established patterns of rainfall have changed in the area. Almost the district is annually affected by the water related disasters. There were lot of polices and stratergic plans carried out by the government to reduce the water related disasters. The water related disasters in this area can be mitigate by proper water resource auditing and intergrated development approaches. This research aims finally to spell out to predict the real sitivuation of the area by collecting the data from the relavent departments and proposes the assessment to improve the current practices in this region.

Keywords— Water resource development, Climate change, Water resource auditing, Intergrated development appriach, Vulneable water resources,

1 INTRODUCTION

Vavuniya district is in the northern part of srilanka which is covering four divisional secretariat divisions, namely Vavuniya Town, Vavuniya North, Vengalcheddikulam and Vavuniya south. District covers of an area about 1967 sqkm. Vavuniya town divisional secretariat is the proposed area for the research which is located in the middle of part of the district and bounded by Vavuniya north, vavuniya south, vengalcheddikulam and Mannar district. The study area covers 590.30km belongs 30.01% of the total area of the district (Statistical Hand Book District Secretariat Vavuniya, 2016.) Study area is mostly undulation land.

The main economic of the district is agriculture and livestock. Most of the famers are involving paddy cultivation in both seasons such as Maha and Yala. There are no perennial rivers and very limited seasonal streams and rivers. Only the surface water bodies have been fulfilled during rainy season. Meantime ground waters also not enough to complete those activities due to the inadequate surface water recharge. Although,

Water scarcity is a main predicament in the district even for the domestic use and drinking as well.

The climate change increases the frequency and intensity of extreme weather, water related disasters will pose on ever increasing threat to vulnerable communities and sustainable development. Due to the natural pressure, management pressure inappropriate land management water related disasters are increasing which led to the loss of lives asserts in the countries.

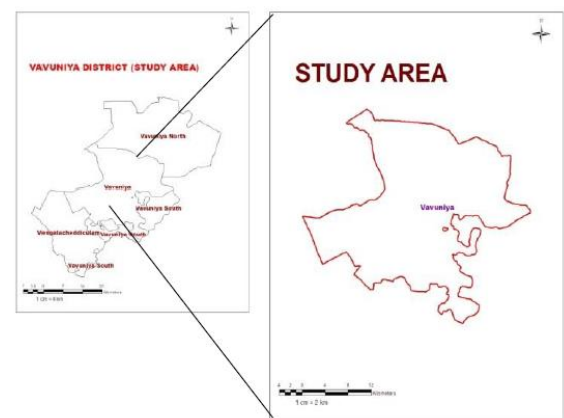


Fig.1:- Location of the study area

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1.1 Water Related Disasters

Water is the ultimate renewable resources, but the available quantitative of freshwater will be determined by the climatically controlled global hydrological cycle. Climate change is expected to accelerate water cycles and thereby increase the recoverable fresh water resources, thus reducing the numbers in water stressed area.

There are few primary hazards - Flood, Drought, Storms which may lead to water related disasters when there are people or economic goods exposed to the hazard and when there are insufficient preparedness. WRD pose both direct impacts and indirect impacts. Like crop and infrastructure damage, losses of life and property, health impacts and livelihood and productivity losses. Flood and drought are expected to increase due to global warming.

However changing seasonal patterns and increasing livelihoods of extreme events such flood and drought. Integrated water resource management, which is essential for future water security. Now a days this is a challenging task for the governments and policy makers.

1.2 Water resources

Availability, supply, distribution, use and conservation of the water resources are directly dependent on climate conditions. Water resources sector in srilanka has to cater to the domestic, agriculture and industrial needs of water. Srilanka has invested heavily on agricultural water supply. A growing number of industrial facilities also create demand for water resources and this has led to high level of extraction of groundwater as well as increased pollution of water resources.

Irrigation tanks are the only surface water resources in Vavuniya district. There are one major tank 21 medium tanks and 674 minor tanks in district among that around 202 tanks are abandoned stage and to be renovated. There are no perennial rivers. All the surface water reservoirs are getting water during the rainy season only.

In the research area there are eleven medium and 212 minor tanks are working conditions. 72 tanks to be renovated and 15 tanks are abandoned. There are two rivers namely Parankiyaru and Paliyaru those catchment area is 832 sq.km, and 896 sq.km and 6 anicuts also available in this area.

Vavuniya district mainly depend on agriculture where farmers use surface water for their cultivation. Normally ground water use for domestic and industrial purpose. But recently the district is facing water related disaster especially drought and water contamination. For these problems most of the farmers extract huge amount of ground water for their paddy cultivation through tube well installation.

2 OBJECTIVE OF THE RESEARCH

The objectives of the proposed study are

- Accounting of available water resources through the GIS and remote sensing.
- Analyze the existing institutional arrangement to the management of water resources.
- Identify the water related disasters risk in the research area.

Specific objective

- To reduce the water related disasters through integrated water management approaches

3 RESEARCH GAPS IN THE STUDY AREA

Srilanka is heavily dependent on agriculture and both rain fed and irrigated agriculture form the backbone of rural livelihood. Scientists have suggested that the overall rainfall received by Srilanka has decreased in many areas of the country. The established pattern and rainfall have changed and distribution of rainfall in different parts of the country.

The population in the research area is 117,153 of the divisional population but only 6.9% of the area covers available surface water resources. The district is annually affected by the water related disasters. The economy of the area mostly depends on agriculture. 15.36% of the land used for paddy cultivation. 0.15% of the land used for highland agriculture cultivation 9.75% of the land used as rain fed, Hence the productivity is mainly depend on the surface water resources. (Statistical Handbook- District Secretariat Vavuniya, 2016.)

Due to the internal conflict most of the agriculture lands and reservoirs had been abandoned. The natural way of the water also disturbed. Currently the global climate change is significantly influences on Srilankan

moon soon pattern. But annual rainfall of the dry zone does not change. The duration of the rainfall is very short when compare with the past decades. Although the intercity of the rainfall is high. Changing the seasonal pattern offset the water related disasters which pose both direct and indirect impacts. Such as, damage the buildings, crops, infrastructure, lost of the life & human health impacts. Integrated water resource management is essential for future water needs. It can be reduce the water related vulnerability of the community.

During the drought conditions famers simply extract huge amount of groundwater for their paddy cultivation. There is an absent of consensus, cooperation, reciprocity and much selfishness. When it becomes to sharing water for the benefit of the entire community. Still a doubt going on between that the extracted volume is recharged by rainfall. Whatever the policies of the groundwater management are made by the water resource board. There is no regulations no statistics on who own pump and how many bore holes are in the operations.

There are numbers of cascades catchments available in the research area. Through the rehabilitations and development of the reservoirs under the above cascade and construct the abandoned tanks can increase the storage of the surface water.

Finally this survey will give some result to maintain the integrated development through identifying the gaps between the water resource management of the community institutions and the current polices.

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5 REVIEW OF LITERATURE

Water is the least regulated natural resources in the world. At the heart of water related disaster risk management in any country is the issue of water security. International experiences shows that water security can be addressed on a river basin basis. Through a strong and properly enforced water regulatory system combined with a strategic water resource plan.

Asian Development Bank (ADP) flood and drought studies (2015) recommended a risk approach to disaster management. This approach is equal water security. This was well described in ADB's strategy for drought management. It is equally applicable for flood risk management. The differences between drought management and drought disaster management are the management time frame. Risk management is practical approach and is focused on the design of measures in advance of a drought that are intended to be put in place to prevent or mitigate the level of risk exposure and tence vulnerability to impacts. This approach seeks to build resilience in the systems to cope better in the future through structural and non structural measures on an ongoing basic. Disaster management is a reaction approach based on the implementation of measures and actions after a drought management is recognized.

Sivakumar.S.S,(2003) conducted a study regarding water resources and agriculture development strategy North and East. This study covered the area of north and east province namely Jaffna,Kilinochch, Mullaitivu,Mannar, Vavuniya, Trincomalee, Batticalo and Ampara. In this survey the researcher tried to address water resources. The future of the North and East province is related to the best use of the land and water resources. Therefore author proposed water resources and agricultural development strategy to the government.

Water security and related issue in Srilanka expose the need for integrated water management (IWRM). Almost 96% of available water from the hydrological cycle is used up in agriculture and food production contributing just 13% to the gross domestic product (GDP, 2007). The physical protection of all water related infrastructure from potential distributions, effective allocation and utilization of our limited water resources

in all sectors of the economy, with a well executed programme of integrated water resource management (IWRM) backed by quantitative hydrological modeling (Anantha Gunathilaka, 2007).

Falkenmark & Rostrum, (2004) defined water withdrawn from the rivers (underground water) is called "blue" water and water evapotranspiration from non irrigated cropland is called "green" water. Only 10% of blue water 30% green water resources are used globally is the high variability of its availability in time and space. Thus, all of the available Recharge Fresh Water Resources (RFWR) are not available to society. Flow during floods and wet seasons cannot be used during dry phase if not for the millions of storage systems. (Reservoirs, Lakes, etc..) in place by regulating the flow of major rivers. This store water is estimated to be about 7200 km globally (Postel, Daily & Ebrlich, 1996). Pioneering country studied of water withdrawals & global water balance estimations with future projections have been carried out, which are aim in valuable complication for water scientist of water economists. (Shiklomanov, 1997).

Sendai frame work (2015), to support the assessment of global progress in achieving the outcomes and goal of the present framework seven global targets has been agreed. Focused on reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030 is also of the goal.

Jessika Roccard, (2014) reveled from the case study on the challenge of Disaster Risk Management (DRM) and integrated water resources management (IWRM) in low income urban areas at Cameroon ,thesis based on assumption that the DRM framework is not a sufficient response to climate change regarding water management and that the joint development of the IWRM and DRM framework would improve the response to climate change impacts on water resources.

Inter Governmental Panel Climate change (IPCC), (2007) stated that the urban areas in developing countries are particular interested because climate change impact predicated to be more serve in nations with limited capacity of cope and concentration of the people most vulnerable to climate change due to fragility of their physical and financial , social and human assets. The water related vulnerability of the population leads

them to experiences a variety of direct and indirect impacts (Dodman & Satterhwaite, 2008).

Amarasinge, Muttuutte & Shakthivadivl, (2000) expressed In Srilanka $2500\text{m}^3\text{yr}^{-1}$, there is no greater water inadequacy in the current at present. However the total available water resources at district levels are cause for concern in the coming years. In the districts of Colombo, Puttalam and Jaffna the average drops below 1000m^3 which is significantly below the recommended levels for human healthy and quality of life. The defined that the projected levels of population will be increase by 2025 and the national average will drop 1900. The per capita water availability in Srilanka is highly variable at district level, with effective steps needed for water conservation and management, if severe scarcities are to be avoided in many parts of the country.

Water utility and management policy for effective sharing of natural water resources in the coastal dry zone of Srilanka in the north east region was searched (Sivakumar.S.S, 2014). The objective of the study was improve the stranded of living of the people in north coast region of Srilanka by implementing the proposed water utility and management policy of north east region. Main three areas emphasized management policies, salinitary control polices and recharge polices. The research stressed that these policies are necessary in order to halt the damage resulting from the indiscriminate destruction of the forest and environmental degradation

6 METHODOLOGY

Water is the ultimate renewable resources. But available quantities of freshwater will be determined by the climatically controlled global hydrological cycle and its spatial temporal variation. Climate change is expected to accelerate water cycle and thereby increase the recoverable freshwater resources, however changing seasonal pattern increasing livelihood of extreme event such as flood and drought may affected this effect.

IWRM which is essential to future water security to mitigate the water related disasters in Vavuniya divisional secretariat area. Water resource and integrated development approach are important. In the view the research will be conducted by using the interpretative

group methods. For this survey data collection will be carried out in two types such as, primary and secondary data.

Collect the data of the present status of the water resources then will be calculate the full supply level of the surface water during the rainy season. This will give the result of shortage of surface water. By calculate annual rainfall we can predict the runoff water as well.

Archival records will be analyzed to find the gap between the institutional arrangement and rural level practices regarding water resource management.

6.1 Analysis

Data will be analyzed by using SPSS software and SWOT method

7 POLICIES PROPOSED

- Increase the efficiency of use reduce losses of irrigation water.
- Assess the current practices of water management for climate resilience and identify ways to improve them
- Identify and map areas vulnerable to drought and flood hazards, prepare disaster risk management plan.
- Promote low water demanding crops and varieties and crop diversification.
- Launch participatory cascade management programme in selected rural tank catchments.
- Introducing rain water harvesting methods.

8 CONCLUSION

Climate change is the main reason for the disasters, which is affecting the population in the view of livelihood concerned to Agriculture and industry. There are several studies carried out to mitigate the water related disasters in Sri Lanka. Studies show that water demand and food security of the nation can be adversely affected due to impact of climate change. Although scientists have suggested that the rainfall received by Sri Lankans has decreased in many areas of the country. Previous studies have the following limitations on their findings. Specially the research area Vavuniya is under the dry zone to mitigate the water related disasters. During the monsoon period around four months district is getting the rain water. But recent years pattern totally changed. We get huge amount of rain water in the short time period means days. Most of the reservoirs are in the abundant stage those can not store the rain water and get the flash flood finally flood water goes to sea. Lack of the storage capacity and management of the surface water reservoirs also may be a problem for

the water related disasters.

There are some policies and strategies formulated by the government recently. But implementation of the policies is very poor in this area. This negligence may be the main reason that people are still facing hazards.

By collecting the data from the institutions and field survey and analyzing available data in this area are useful to get the conclusion. Finally this survey shall give good result to maintain the integrated development through identify the gaps between the water resource management of the community institutions and the current policies. Ensure the community awareness and established the water management group in the village level and the divisional level, proper maintain the integrated water resource development approaches are the main keys to mitigate the water related disasters in this area.

8.1 Benefits of the study

- Integrated water resource management leads reduce hazard and risk will improve agricultural productivity and will be increase the cropping intensity.
- Strengthening linkage between disaster management and integrated water resource management.
- Reduce the accumulation of the vulnerability.
- Strengthening the existing policies.
- Integrate approach of water sharing.
- By identify the gap can build the very good relationship between policy makers and the water consumers.
- Improving water management practices that will reduce the water related disasters.
- Avoiding any damage to water quality.

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