



Climate Change Effect on Water Supply Sanitation and Hygiene (WASH) Sector

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Author's contribution

The sole author designed, analysed, interpreted and prepared the manuscript.

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ABSTRACT

To continue the exiting ecosystem and healthier future for our upcoming generation. Current generation indeed need to be aware of mitigation and adaptation action to be taken for the sake minimization of climate change effect at local, regional or global level. For the mandatory operationalization, global governance is must; so that harmonisation, coordination and collaboration can start from all levels. In addition, all kinds of development sector should establish a climate change mitigation and adaptation plan. Effects climate change has not only brought a warmer world but also create an anthropogenic effect on the society likely health, social, economic and humanitarian injuries. Disasters such as landslide; flooding, tsunami sometimes cause to life casualties. In developing world, focus to be taken for proper WASH services i.e. waterborne diseases like diarrhoea, dysentery and cholera may cause many illnesses that lead the loss of human.

Keywords: *Water supply; sanitation; hygiene; climate change; adaptation; defecation and ecological sanitation.*

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ABBREVIATIONS

WASH : Water Supply Sanitation and Hygiene
GHG : Greenhouse Gas
CFC : Chlorofluorocarbon
SDG : Sustainable Development Goal

1. INTRODUCTION

The main consequences indicating the climate change is warming or cooling. It is expected that the trend of global temperature is rising the consequences of global warming; the effect can be realised locally. It can be evaluated observing long trend of temperature rising, which harm the local ecosystem. The affect in local level is not only because of their own cause, but also consequences of global phenomenon. Climate change will have significant impact on water and sanitation resources; which is directly related to livelihood. It has already visualised some of the settlement areas around Himalayan region/periphery already started suffering from water scarcity. The impact on water resources includes water shortages in dry seasons, while rising temperatures is causing faster melt and retreat among glaciers, which may cause sudden flooding following glacial lake outbursts. Increases in seasonal temperatures will likely to affect agricultural production and yield. Rising temperatures, glacial retreat, and changes in water availability and quality will lead the changes in natural biodiversity. Changes in water quantity and quality due to climate change are to affect food availability, stability, access and utilization. National withdrawals of groundwater and tapping of surface water to satisfy demands have grown dramatically. This rapid growth in water demand is due to the increasing reliance on irrigation to achieve food security, the growth of industrial uses, and the increasing use per capita for domestic purposes [1].

It is felt that longest drought after so many years, high or partial rainfall or flood in so many years, high or lower temperature in so many years. In this scenario, prediction of climate change effect can be differentiated local environmental changes, makes confusion as it combines with the climatic cycle; the phenomenon is called climate change. It is basically due to the increased amount of greenhouse gases in the atmosphere that intensified the greenhouse effect; which is the cause of human activities that

release Green House Gases (GHGs). Those GHGs are Carbon dioxide (CO₂), Methane (CH₄), Nitrous oxide (N₂O), Chlorofluorocarbons (CFCs) and Ozone (O₃). From the current estimate based on the projected data, the mean temperature of earth will increase by 0.20 centigrade per decade. This data can be projected 2⁰C rise in earth average temperature by the year 2100, similarly corresponding rise in mean sea level by 6 cm/decade [2]. The global climate is the average of all regional trends, and in this scenario; so scientists have concluded that Earth's temperature the climate, as a whole, is warming up.

2. METHODOLOGY

The adverse effects of industrialisation of developed countries have degradation of air and water quality and the increase in greenhouse; the poorest / under development countries' people likely in Nepal will suffer from its effect earliest and most, because of their geographical locations, low incomes, and limited institutional capacity, as well as their greater reliance on climate-sensitive sectors like agriculture. So, the main objective of this study is to find, support and significance effect of climate change in WASH sector management.

This study is done on desk, consultation with experts, participation of research related national and international seminars and workshops. It is done by the theoretical review of different types of WASH and climate change models, which provided an immediate and vivid understanding of the problem. It also focuses on capacity to represent, understand, predict or manage the behavior of environmental systems at all level, and to communicate those improvements to a wide scientific and professional society.

3. RESULTS AND DISCUSSION

3.1 WASH Sector

Countries itself and its people cannot mitigate effect of climate change in their locality. It is the global phenomenon and need to take action at global level. But the local adaptations need to start from local level and later replicate it to global level. For that collective action is needed to mitigate by reducing the carbon foot

print. The development technology and their implementation criteria need to be change from the beginning, policy and implementation guideline has to be reviewed, the easy and sustainable water supply system is needed to make in practice; which needs minimum investment for the scheme sustainability [3]. Likely, Sanitation system needs to be focused on climate change prospective; which options may have potentiality of less carbon emission. Similarly, need to encourage the preventive measure like water safety. Similarly, onsite pit latrine is best for sanitation. If we see from climate change point of view aerobic treatment system is better, oxidation pond is even better and anaerobic treatment system with methane burning is even better and connection to bio-gas plant have significance help [4].

The climate change impacts and its adaptation/ resilience strategy in Water Supply Sanitation and Hygiene (WASH) sector is considered as one of the major components. In every aspects of WASH infrastructures intervention, climate change issues are importantly considered [3]. WASH program on environmental management like source conservation, promotion of Ecological Sanitation (EcoSan) and Decentralised Wastewater Treatment System (DEWATS) technologies, and holistic WASH planning and water management at local levels [5]. It is necessary to think that development in different governance level global, regional and local for its effective implementation.

3.1.1 Management of sustainable water supply system

Proper and sustainable management of drinking water sources like source and pond protection. Similarly, much more effort being made for the improvement of water quality in urban and semi-urban areas; even though, it has not been properly assured and ensured that water is safe. In consequences, more energy is being used and during heating more carbon is generating. So, we need to focus on water safety plan; ensuring the direct drinking quality. In addition, we can focus on solar lifting water supply system in rural as well as urban. In addition, when the quality water supply at nearer location of house, people will be saving of considerable amount of time; which they need to devote for fetching of drinking water. Those save time can be used income generation activities [6].

3.1.2 Rainwater harvesting (RWH)

When there is sufficient rainfall pattern, but only in certain months. So the rainwater can be collected in certain areas in Reservoir tank or cost-effectively on ponds. Later on, stored water can be used for drinking, domestic use and vegetable farming. It is estimated that about 10 litre per person per day of water can be also collected from roof top. Because of growing population in the world, Rainwater Harvesting (RWH) is popular day by day. It is also cost effective and climate change friendly techniques; which also can help to uplift the poor by vegetable farming. People can collect water in nearer location, can use for the kitchen gardening.

3.1.3 Sanitation and hygiene behaviour

A sustainable sanitation system has to not only be economically viable, socially acceptable, technically and institutionally appropriate, which protect environment and natural resources. Sanitation can act at different levels, protecting the household, the community and society. Further down effects of waterborne sewage contamination affect the society negatively on health and environment [3,7]. For countries with very low access to basic sanitation, the effective management of excreta at the household level may have the greatest health implications and benefits but may also be the biggest challenge. The sanitation system is to protect and promote human health by providing a clean environment and breaking the cycle of disease (repetition). In the case of latrines, it is easy to see that this sanitation system acts at a household level.

3.1.4 Promotion of ecological sanitation (EcoSan)

The sanitation based on the principle that urine and faeces are not simply waste products of the human digestion process, but also an asset to contribute for better health and food production and reduce pollution; if it managed properly. It is effective fertilizer; which contains all kinds of manure for plants. It promotes sanitation and recycle of nutrient; when urine mixed with 1:4 water and used with drip irrigation system fulfils both water as well as fertilizer needs. The collected urine and stored until it can be used as a fertilizer on plants or crops. The faeces drop into a pit, vault or container to which a handful of either ash or lime is added. This has the effect of

drying the faeces; which has a positive impact on reducing smell and destroying pathogens. Some form of alternating double or multiple storage system is required to avoid mixing fresh and composted manure.

3.2 Use of Drip Irrigation Technology

Small-irrigation technology like drip irrigation provides water directly to the plant root at required time through plastic tubes, thereby preventing losses due to evaporation. This type of technology is 90% efficient, and therefore requires less amount of water for growing of such plants likely vegetables [8]. This kind of technology is widely used in dry Arabian countries; where water is much scarce; such technology is already started different parts of the Nepal [9]. One of the research interventions based on successes from Asia is from small-scale drip irrigation; which shows the improvement of household nutrition in rural parts through better vegetable production.

3.3 Saving of Energy

Solar panel / battery can be used for the lighting at home, likely solar water panel and heater is very effective in Nepal for warm the water; which is gaining in popularity. It can be used for lighting and lifting water from nearby water sources from springs/streams for drinking and drip irrigation purposes. It will reduce the hardship in water supply and upliftment of livelihood condition of rural poor. In addition, it saves energy to meet the demand.

4. CONCLUSION

Urban areas with high dense are the biggest emitters of Green House Gases (GHGs); which produce the maximum amount of industrial and vehicle emissions. Those cities produce a "Heat Island Effect"; refers in urban settings where buildings and asphalt roads absorb and thereafter release more solar energy and thus increase the surrounding air and surface temperatures. Although they do not directly contribute for global warming but increases the demands for air conditioning, thereby increasing the emissions of GHGs.

Climate change's impact has happened in some of the factors of our day to day necessity daily

like shelter, water, food and air. The global warming of the earth is gradual, but its effect for extreme weather events storms, tsunami, droughts and floods can be happened and its consequences will be felt dramatically. The present scenario and trend of development planning options are based on economic and social aspect. To make the ecosystem sustain and make our generation longer with comfort; we need to take action globally. So, harmonisation, coordination and collaboration need to be done at all level.

COMPETING INTERESTS

Author has declared that no competing interests exist.

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