COMMUNITY EDUCATION ON CLIMATE CHANGE ADAPTATION: A BYPRODUCT OF INTEGRATED WATER RESOURCES MANAGEMENT, IN DURLUNG BASIN NEPAL

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ABSTRACT

The impacts of climate change on the water cycle are believed to have considerable consequences for the society in the years to come. It is predicted that a country like Nepal faced huge change in hydrological cycle due to variation in the pattern of rainfall resulting the variation in the availability of water for personal use, productive use, irrigation and power generation etc. Himalayan rural people in developing country being deprived of infrastructure and knowledge have no way to come up in the thought of mitigation and adaptation of creeping climate change impacts. Involvement of local government school on measurement of climatic variable such as temperature, humidity, rainfall, river water level etc. by both automatic meteorological station and manual set up and publishing this information on public board has been able to proof a step to build capability on climate Change Adaptation. Integrated Water Resource Management Committee and local School have shown high level of local partnership in of the area for the Integrated Water Resource Management researches. This process has boost the people's consciousness about the change of water resource availability as well as change in climatic parameter which not only related to water but also to their agriculture, forest, trading and many more resources on which their livelihood is dependent on.

Keywords : Climate Change Adaptation, Integrated Water Resource Management, Community Partnership, School Involvement, Developing country**.**

INTRODUCTION

Integrated Water Resources Management (IWRM) is a process which promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems (1). IWRM consider the strengthening of human resources development in terms of awareness creation programs, training of water managers, the development of new

institutions in a way to match the goal for effective information management, environment and development, the integration of water planning into national economy and financing and scientific means (2). Water is a key indicator to feel the climate change impacts such as floods, droughts etc. Floods and droughts are increasing apparently in many parts of the world and are already undermine

farm yields and national harvests reducing household and national food availability, and agricultural income derived from crop sales. Adaptation to increase resilience to climate change is vital in order to reduce its impacts that are happening now and in the future. Human beings have got great level of adaptation quality but this studies in fact is an insufficiently studied part of the subject of climate change (3). Actions need to be taken to help communities and ecosystems to cope with the changing rainfall patterns and other extreme weather events. Improved understanding of communities' water resources will allow them for more efficient and flexible allocation systems and better investment in infrastructure, both to improve access to water and reduce risks from climate change. Keur et al. (2008) presented a common terminology that honors the most important aspects from natural and social sciences and is helpful to determine the strategies to better handle and manage uncertainties such as climate change in IWRM(4). Galaz (2007) addresses the lag between our growing understanding of resilient interconnected freshwater resources (and their governance) and the reforms being promoted by policy makers(5). Smithers and Smit (1997) recognize that the ecological property of systems mediates the effects characteristics of climatic events thus by understanding the ecological change in metaphysical parameter of climate change can guided for and different types of adaptation naturally(6). Adaptation as adaptive capacity (7, 8, and 9) or the ability or capacity of a system to modify or change its characteristics or behavior of a society so as to cope better with existing or anticipated external stresses which will reduce social vulnerability (10). Public sector participation is encouraged in water resource development by the Nepal government through water resource policies an excellent example of this observed on Farmer Managed Irrigation System. Ostrom et.al (2011) highlighted that decision made by Farmers to farmers can build on an innovative intervention that not only provides physical improvements but also enhances farmers' problem-solving capacity. Overall, local institutions should be involved to manage and conserve natural resources(12).

Integrated Water Resources Management, in Durlung Basin Kavre, Nepal is an action research project awarded by the University Grant Commission, Nepal to Kathmandu University. To secure the objectives series of methods such as baseline survey, physical measurement of climatic parameters, capacity building and holistic problem solving through social interaction and institutionalization that also addresses livelihood issues has been implemented. One increasingly significant cross-cutting management issue is climate change adaptation in IWRM (13). This paper, therefore, seeks to review if IWRM implemented in Durlung River basin has possibilities to increase adaptive capacity to climate of the local inhabitants.

PROJECT AREA:

The Durlung River basin of approximately 61 sq. km area is comprises with the total of Chamrnbesi VDC and some part of Milche VDC of Kavre District as well as some part of Thulo Durlung VDC, Chandanpur VDC and Kaleshor VDC, of Lalitpur District. It is located at foothills of Mahabharata range, altitude varies from 1000 m (*Dobhan Khola*) to 2336 m (*Go Bhangyang*) above sea level. Durlung River flows between Lalitpur and Kavre district and carry water from perennial tributaries like Polsing Khola , Ghatte Khola ,Ratun Khola , Naman etc. are turbulent high current rivers .

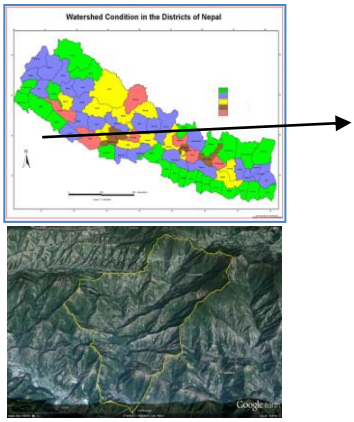

Figure 1. Location map of Durlung River basin in Kavre and Lalitpur districts

Also the topography is very much friendly to use water for hydropower generation, irrigation and drinking and tourism etc. It comprises 2000 households. The basin is underdeveloped and remote it comprises of only 3 secondary schools and few primary schools.

Baseline survey

45 % of household surveyed from different VDCs, wards and settlements of Durlung watershed in a question to knowing and understanding of climate change term they said they do not know the term. Focus group discussion carried in 7 clusters and individual talk to key informant also revels of not been aware of climate change and climate change effect.

Figure 2. FGD in Jhingedanda cluster of Durlung Basin.

This proof that the knowledge of habitant is poor towards the encroaching climate change effect for their livelihood. But they do experience some disaster such as cracks and rock fall, landslides, floods and crop failure. They also experience the intensity and occurrence of such event being increasing. Thus we can say there is climate change effect in the area. They do also experience other climatic variation such as rise and fall in temperature, early start of winter, foggy and longer winter then earlier, and shift of monsoon, prolonged and unexpected rain. This shows there is certainly change in their climate and thus causing crop failure and other uncertain disaster. It is important for the community to know and experience the shift in climatic variability and whether pattern to adjust themselves with change to reduce the disaster effect.

School Involvement

School participation was secured in the project. IWRM sensitization work shop and followed by the responsibilities to tract records of climatic and river data. Environmental club was formed in each higher secondary school and five motivated student are awarded with name "Environmental Alert" with some stationary support in their studies.

Figure 3. Manual measurement of rain (a) and river (b).
Publication on whether board (c).

The challenge of measuring local data in IWRM is solved by using local school in coordination with village/ watershed level community association. Three manual stations equipped with rain gauge, thermometer and hygrometer were established in three secondary schools of the watershed area. For measuring water level of the river a staff gauge is prepared from locally available materials (1 m) and installed in the river. Environmental alert and a teacher supervisor were given training and responsibility to measure rainfall, temperature, humidity in school premises and the reading of water level in the river. They further published daily data in a weather board placed in visible spot of the school. This has given ample opportunities for the students in school to learn and make other people at home to understand daily weather variation. Unless people become aware and capable of understanding and measuring the data from village it is impossible for them to plan for IWRM. If weather and climatic variation is understood by locals they can assimilate themselves in a way to save their crop and possible local disaster.

Community Partnership

A very wide range and people from different background has been linked with the project. Government personnel, Water and Energy Commission Secretariat (WECS), District Water Resource Management, Kavre and Lalitpur districts, Kathmandu University, Village Development Committees (VDCs), Durlung Integrated Water Resource Management Committee (DIWRMC) and various individuals are involved in the project. DIWRMC is a local level organization on water resource management; it was some sort of water parliament for the watershed, since it is formed by the member selected from water user group of each VDCs. A pillar of two ways participation from community level organization, such as Durlung Integrated Water Resource Management Committee (DIWRMC) to the governmental hierarchical organization of water resource management was observed. DIWRMC made sub group to draft the Constitution of the committee. In which various aspects such as possibilities for multiple uses of water resources (for drinking, fisheries, irrigation, recreation) for each cluster of habitation along with Pico and Micro hydro-power production points in the basin area are explained. Though climate change is not mention in the constitution but associated risks of water for the community are also identified. This suggests that communities are aware of change in the climate and effects on water resource.

Figure 4. Various Meetings of DIWRMC.

DIWRMC also established a DAVIS Vantage Pro2 Automatic Weather Station (AWS) in Sano Durlung, Chamrangbesi VDC which records the weather parameters. As the console with display is placed in the house of local tea shop, it is visible for everyone to refer the daily temperature, relative humidity, solar radiation, wind speed and direction and rainfall. An explanation sheet was attached near the console so that enthusiastic local youth and villager can read the data and talk about the temperature viability not only in hot and cold reference but in degree centigrade. Nowadays this make them more aware of fluctuation weather parameters and equipped them to understand climate change in long run.

Figure 5. Automatic whether station.

CONCLUSION

Uneducated local people are not aware of a term climate change and find no meaning of such quarries with them. But same time they are witness of the event of climate change. IWRM sensitization and participation on measuring climatic variable and water level of river make the student and their guardians aware of possibilities of change of climate and effect on water and then on land. It is extrapolated as the awareness may enhance their innovativeness to formulate adaptive mechanism. The term climate change and its effect were missing in the constitution of DIWRMC though the disaster management and risk minimization has been clearly mentioned. In all the process of IWRM pilot study at Durlung watershed, the term climate change is found to be implicit not the explicit.

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