

# Structural Disinfection through Shock Chlorination in Rural Water Supply Schemes for safe water.



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## Background

The Government of Nepal issued a notice of implementation of National Drinking Water Quality Standards (NDWQS), 2062 (2005 AD) under the provision of the Water Resources Act, 2049, Clause 18 and Sub Clause 1. To ensure that the water supplied by agencies to the consumers comply with the standards, the directives for implementation of NDWQS were also published in the same notice. All governmental and non-governmental agencies involved with water supply and health services, including laboratories, should abide by the provisions of the directives.

NDWQS prescribes that water suppliers, including User Committees (UCs), should follow the provisions of Implementation Directives for National Drinking Water Quality Standards, 2005 and shall maintain Drinking Water Quality Parameters as per NDWQS. In general, the National Drinking Water Quality standards prescribe concentration limits for six physical, 19 chemical and two microbiological parameters. However, considering mainly the difference in water quality pertaining to hydro geological conditions, availability of facilities, level of institutional development and socio-economic conditions between urban and rural area, NDWQS prescribes a set of five physical, nine chemical and two microbiological parameters for rural water supply systems; differentiating between surface water and ground water.

The Rural Village Water Resources Management Project (RVWRMP) supports the provision of drinking water in remote rural VDCs in far west Nepal (currently we are working in 94 VDCs). Given the difficult geographical conditions and the high risk of contamination, we face considerable challenges in working with communities to meet the Standards and ensure the good quality of drinking water supplies. However, we have encountered some good practices, described here.

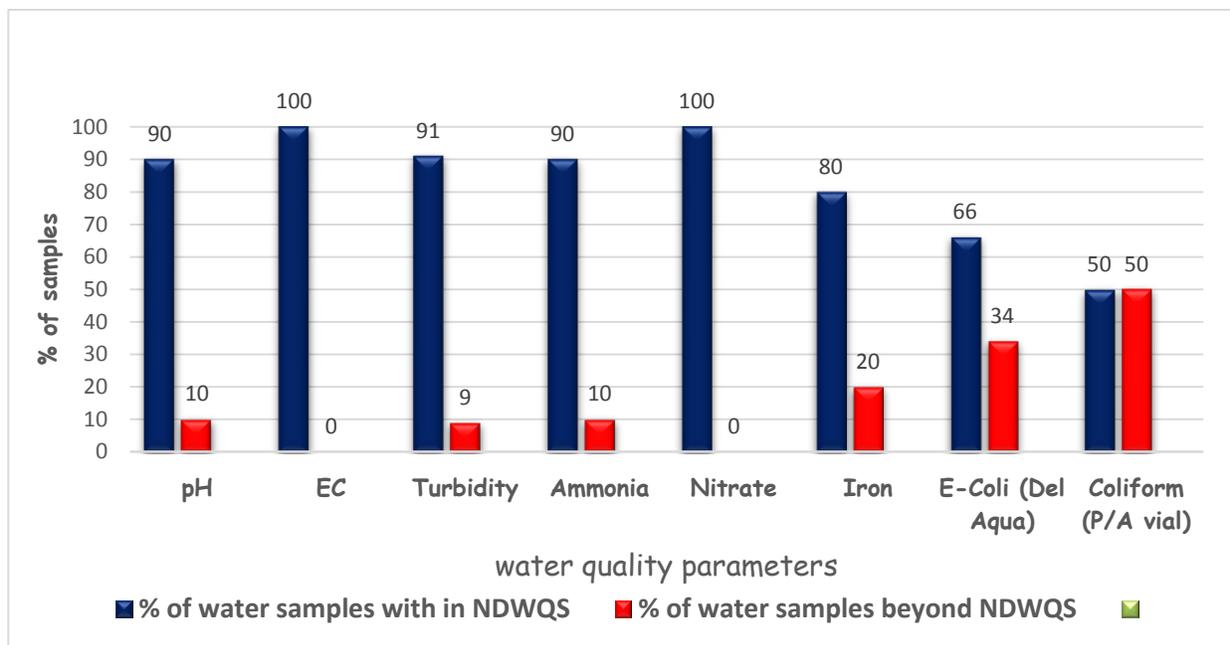
## Existing Practice of water quality monitoring

There are only a few accredited laboratories within the country which are within a range of days and weeks from the remote water supply area. A major concern of water sector actors these days is how to meet the requirements of the National Drinking Water Quality Standards and their Implementation Directives. The time frame for implementing the directive in rural water supply schemes has already started in year 2010 with the dead line in year 2015. In this line the support agencies are being involved in water quality monitoring to some extent. For monitoring of microbiological parameters in rural area,

the bacteriological test kits used by agencies are DelAqua or WagTech test kits. The standards require to conduct test for E.Coli for fecal pollution and total coliforms, whereas those field test kits can test "total coliforms" and "fecal coliforms" but cannot test for "E.coli" specifically. Field level monitoring of physical and chemical parameters can also be done by field test kits.

### Water quality examination: Experience in RVWRMP

In the Rural Village Water Resources Management Project, more than 1400 water samples from sources, reservoirs, taps and other structures have been examined and result is shown in the graph. Physical and Chemical parameters are at “not to worry” status, whereas microbiological contamination is generally high. RVWRMP operates a mini laboratory at its Project Support Unit at Dhangadhi. It has a facility for analyzing some physical, chemical and biological parameters of water prescribed in NDWQS. However, biological parameters are monitored using Del Aqua field test kit and presence / absence (P/A) vial. Physical parameters are being tested by digital equipment whereas arsenic is being measured with an arsenator. Field level water quality monitoring is basically done using field test kits. RVWRMP employs staff trained on water quality sampling techniques and handling of DelAqua, WagTech and ENPHO test kits. Bacteriological monitoring is being done using Del Aqua and the Presence/Absence Vial. Other physical and chemical parameters are being tested using the ENPHO kit.



Source: MIS/RVWRMP

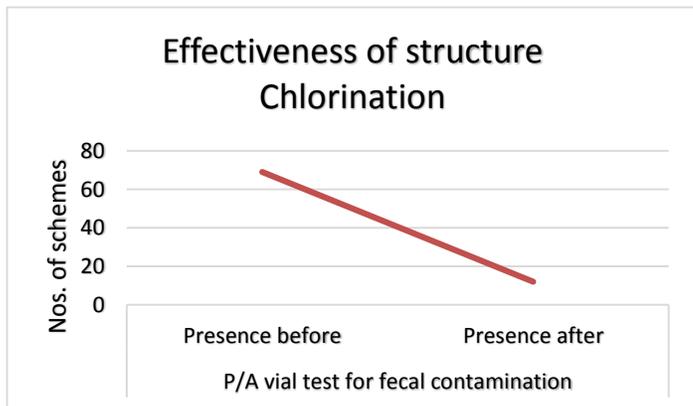
### Water safety Plan: A sustainable way for safe water

At the same time, RVWRMP has started institutional strengthening of UCs and Village Water, Sanitation and Hygiene Coordination Committees (V-WASH-CC) to formulate, implement and monitor Water Safety Plans (WSPs). A Water Safety Plan is a plan to ensure the safety of drinking water through the use of a comprehensive risk assessment and risk management approach that covers all components in water supply from catchment to consumer - i.e. from source to mouth. RVWRMP’s WSP mainly focuses on

biological contamination, targeting reducing diarrheal diseases. The project is utilizing pre-defined hazards that may lead to deterioration in water quality and continuity of water availability. This is done to assist the rural community, with very little knowledge on predicting risks.

### **Shock Chlorination: One time chlorination before commencing the system**

Ensuring the delivery of safe drinking water is the most important task of any water related authority. Though RVWRMP and many other organizations have been proactively involved in mainstreaming water quality monitoring among their activities, many questions arise with respect to NDWQS and its implementation directives. The biological quality of the sources has been found safe in many sources, but when it comes to structures like reservoirs, it may test positive for contamination. The water supply system structures may get contaminated through the unhygienic behavior of laborers or masons, and or even through tools and construction materials during construction of structures. So the Rural Village Water Resources Management Project has been recently practicing “Shock Chlorination” of the structures with a high dose of chlorine ie 20 mg/L for 2 hrs. The biological test with P/A vial has shown encouraging results. The shock chlorination is done one time before beginning to use the system. In every technical training either to staffs or VMWs, the Chlorination method is disseminated. Presently the shock chlorination practice is performed in the presence of RV field staff only.



### **Way forward**

- Water safety plan formulation, implementation and monitoring should be considered as the most important activities. In this regard, capacity building of different stakeholders, especially the Water User Committees and Village Water, Sanitation and Hygiene Coordination Committee (V-WASH-CC) should be done by concerned agencies.
- In the meantime, shock chlorination coupled with a P/A vial test will be the easiest way to achieve and monitor water safety.
- Recognition as the standard for use of Presence-Absence test kits by UCs to monitor water quality of rural water supply schemes - at least for those schemes that are beyond the range of 6 hours from accredited laboratories.



- Field test kits (DelAqua, WagTech, ENPHO etc.) should be approved for performing water quality monitoring. They should be calibrated by accredited laboratories annually. Trained human resources (instead of a microbiologist) and certified/calibrated test kits should be recognized as an approved means of water quality monitoring.
- Concerned support/facilitating agencies should support the establishment of institutional arrangements at VDC level and should provide certified/calibrated field test kits (simple field kits developed by ENPHO or other agency) to V-WASH-CCs. All UCs should be trained to use the kit for the water quality assessment of their respective schemes, as prescribed in NDWQS.
- With other sector partners, establish a mini laboratory (Del Aqua/Wag Tech kit) at district level so that the D-WASH-CC is capable of providing necessary support to UCs for water quality monitoring.
- D-WASH-CCs should conduct water safety audit annually in the water supply schemes.
- The DDC and VDC should allocate 1-2% of their investment in the water sector for consumables required for water quality examination, formulation and implementation of water safety plan at scheme level.

### **Conclusion**

As the Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) is the active facilitating agency to promote water, sanitation and hygiene in the rural area, it should advocate at the central level to revise the implementation directive of the National Drinking Water Quality Standards. The above suggested points for revision would make the directives more practical, and would strengthen user committees of rural water supply schemes to be able to improve and maintain the water quality standards. Until then, DoLIDAR should advocate for a “one time” chlorination of the water supply structures before commencing the supply. Institutional capacity development at district and VDC level for water safety plan formulation, implementation and monitoring is a very important aspect to ensure good water quality at scheme and household level. An equally important aspect is to train in-house human resources of DoLIDAR in water quality aspects.

### **Reference materials:**

1. National Drinking Water Quality Standards 2005, Government of Nepal, Ministry of Physical Planning and Works
2. Implementation Directives for National Drinking Water Quality Standards 2005, Government of Nepal, Ministry of Physical Planning and Works
3. Community Water Safety Monitoring Guideline for RVWRMP II, Rural Village Water Resources Management Project
4. MIS/RVWRMP 2014
5. National Drinking Water Quality Standards and Implementation Directives 2062: Practical perspective of Rural Water Supply Schemes by Sunil Kumar Das and Parikshit Shrestha on infrastructural Journal/DoLIDAR day 2012.