

Scientific Imperatives for COVID -19: Water Sector**GOPAL KRISHAN**

National Institute of Hydrology Roorkee- 247 667 (Uttarakhand), India.

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COVID-19 is an infectious disease caused by a newly discovered coronavirus, spread from person to person through respiratory droplets and contact. Covid-19 known to affect respiratory system leading to infections ranging from the common cold to more severe diseases with common symptoms such as fever, tiredness, dry cough and shortness of breath or difficulty in breathing¹ while some infected people don't develop any symptoms.² Presently, there are no specific vaccines or treatment, therefore, the best way to prevent and slow down transmission is awareness about the COVID-19 virus, protecting oneself and others from infection by washing hands frequently or using an alcohol based sanitizer, covering cough droplets using mask, non-pharmaceutical layered multiple interventions with optimal timings such as universal closures, social distancing and self-quarantine for its mitigation and suppression.³All these encourage chances of self-recovery through immunity building without any special treatment.

COVID-19 is one of the severest human adversities impacting global economy with one of the impacts directly or indirectly on water resources that human needs for their survival. The preventive measures taken against COVID 19 likely to have profound effect on research and development activities in water sector. Way the mankind faces the challenges in water sector and transform these into opportunities will be decided by the global response to this crisis. Some of the areas to consider and impacts are discussed below:

Survival of Coronavirus in Water

There are chances that water⁴ might permit the survival of the COVID-19 under favourable conditions such as light, temperature, pH, salinity, sediment, organic matter, presence of antagonistic micro-organisms but it is not confirmed about its viability to spread yet. In addition to this, air and water interface can be crucial for any study relating to survival. Wang *et al.*, (2005)⁵ reported survival of a surrogate human coronavirus

CONTACT Gopal Krishan ✉ drgopal.krishan@gmail.com 📍 National Institute of Hydrology Roorkee- 247 667 (Uttarakhand), India.

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for 2 days in de-chlorinated tap water and in hospital wastewater at 20°C. But there are no such reports on survival of COVID-19 in water by now. However, the COVID 19 virus has been detected in wastewater in Netherland⁶ the faeces of infected individuals⁷ might be due to gastrointestinal cells infection⁸ but its concentration and viability has not been proved.⁹ So there are chances that coronaviruses may exist in and could maintain their viability in sewage and hospital wastewater, originating from the faecal discharge of infected patients.^{10, 11} In the year 2003, study was conducted in Hong Kong¹² on existence and spread of Severe Acute Respiratory Syndrome (SARS) disease through aerosolisation of water droplets containing coronaviruses in a leaking pipes.¹¹

Researchers reported that coronaviruses are susceptible to treatment processes,¹³ so some innovative techniques are required for their treatments. In developed countries the routine treatment equipment may be effective in killing or removing coronavirus from water but efforts are needed to test the efficacy of these equipment and maybe produced in large scale for the benefit of society and sanitation in developing countries also. Some guidelines have also been issued for use and reuse of water and wastewater.¹⁴ Some other effective practices¹⁵ for (i) water treatment against coronaviruses are: hypochlorous acid/peracetic acid, chlorine, ultraviolet irradiation, as well as chlorine, are thought to kill coronaviruses or development of water filters where virus can not penetrate; (ii) wastewater treatment – use of membrane bioreactors, co use of beneficial microorganisms and the physical separation of suspended solids.

Water as Protection Tool

Water has been proved to be very crucial in protections against infections by containing using intervention of hand washing. But this has put a question mark on water security¹⁰ by wastage of fresh water resource and this will be lead to further complications in case of excessive use of our largest fresh water storage i.e. groundwater.^{16, 17} This will also hamper the achievement of sustainable development goal no. 6 which will be further slowed down or delayed.¹⁰ As we all know that availability of fresh water is not same all over the world.¹⁰ In this time of crises, we can speed up our efforts to move one step further towards sustainable development.¹⁰ There is a need to think seriously over water storage systems, rain water harvesting techniques, effective water and waste water treatment systems.

There are various agencies like WHO, UNICEF, infection prevention and control working in this direction and one important aspect for water and sanitation practitioners and health care providers interested in water, sanitation and hygiene (WASH)¹⁸ suggested some measures such as- (i) improvement in water safety and treatment right at the source water distribution point (ii) ensuring its safe and clean storage after supply. In addition to these WASH¹⁸ has also issued some guidelines on hand hygiene, sanitation, cleaning practices and disposal of grey water and their treatments.

Financial Issues

Extended lockdowns, funds diversion to Covid-19 prevention and a great uncertainty about its severity might lead to financial crisis and instability in all the sectors.¹⁹ Imposition of tougher and longer lasting containment measures and disbursing funds towards these measures may also affect the water sector by way of not getting the allotted budget for its development. For countering this problem, developed countries with the help of central banks should come forward to support, stabilize and provide monetary help for a certain time period to developing countries to safeguard one and all.

During and post COVID 19, it will be crucial for researchers, academicians, engineers and water managers to think creatively to adopt out-of-the-box and affordable solutions to deal with the crisis. So, this is the time for implementation of an integrated and holistic approach where hydrologists, researchers, environment engineers, public health engineers, microbiologists, pathologists and finance managers work together with people participation to come out of this crisis for providing safe and clean water to all for their daily needs.²⁰

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