# REVIEW OF WATER POLLUTION WITH SPECIAL FOCUS ON NEPAL

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**Abstract:**

Water is an important chemical and molecular substance due to which the existence of life has become possible. Therefore, the quality of water in the ponds as well as in natural water bodies should satisfy the standard limit set by the World Health Organization (WHO) or national standard. Water pollution occurs when harmful substances like chemicals or microorganisms contaminate streams, rivers, lakes, oceans, aquifers, or other bodies of water and that degrades water quality making toxic to humans and the environment. The study was conducted during the period from January to March 2020. Published articles, journals, thesis, manuals, standards, and database were collected from different sources and went on thoroughly. The conclusions are drawn based on those studied materials. The study found that the world is suffering from waterborne diseases. There are various factors for water pollution but climate change is also one of the causes of water pollution.

The study suggests for conducting frequent public awareness programs on water pollution and its harmful effects on the environment and public health. Moreover, the provision of the cleanliness of ponds and sources of water should be conducted on a regular basis to reduce water pollution. Potable water must be free from pathogenic organisms, containing low concentrations of compounds that are acutely toxic. The responsible organizations should make a plan to preserve and reduce water pollution in different sources of water along with ponds and rivers.

**Keywords**: Pollution of ponds, Tika Bhairav Rajkulo, water spouts, pond, wetland, water pollution

## 1. Introduction

The contamination of water bodies due to human activities or by natural phenomenon is water pollution. Rivers, lakes, ponds, oceans, aquifers, and rainwater includes waterbodies. When pollutants enter the natural atmosphere, it causes pollution. Pollution is a worldwide reason for the death and sickness of living beings [1]. Climate change as one of the external factors that have an effect on water quality and water ecosystems. For example, the result of temperature change on different water bodies like plain lakes, alpine lakes, ponds, and rivers plays an important role to degrade water quality [2]. Water quality refers to physical, chemical, and biological parameters, and is the condition of water utilized by humans on the relevance of standards value achieved through the treatment of the water [3]. The term environmental quality like air, soil, and water quality are outlined as measures of the condition for human beings to utilize for different purposes [4]. Water resource management focuses on the utilization of water resources [5]. Water, a restricted resource distributed globally and used for various functions by individual and nature itself. Management of water resources needs depth information about resources, capability, offering technology, hydrometeorology, and political factors. Integrated Water Resource Management (IWRM) integrates these fields into one body since these problems alone cannot resolve completely by water professionals [6].

Over the past decade, a series of revisions were done to generate and the use of natural resource management to determine basic norms. Numerous voices in science and policy have promoted the model in water management from normative and descriptive view. To facilitate dialogue and look at different approaches for scientific inquiry and water management; applied research and analysis are required [7]. Irrigation is another field of water management that supplies controlled amounts of water to plant at required intervals. Different types of Irrigation systems were employed mainly for agricultural purposes and to recharge the land in the dry season when there is no appropriate rainfall [8]. Canal irrigation system is a feature of cultural value and also used for filling ponds, washing clothes, disposition, and agriculture [9]. Another field of water management is wetland management. Wetlands are parts of the landscape defined by the presence of water. For this, the Ramsar Convention and Queensland wetland strategy, outline wetland as ***" Area of a marsh, water, whether formed natural or artificial, remain permanent or temporary with water that is stationary***

***or flowing, fresh, including areas of marine water''***. Furthermore, wetlands can be understood by human-made waterbodies such as fishponds, farm ponds, water reservoirs, sewage farms, and canals **[10, 11].**

### 1.1. Pond a source of water

Ponds are the source of wetland management. Ponds are the area filled with water that may be formed from natural phenomena or manmade. The majority of the ponds were manmade. Ponds are frequently fabricated or expanded beyond their original depth and boundaries that contain freshwater or standing water with the habitat of aquatic plants and animals **[12].** Ponds result from a large range of natural processes. The collection within the earth's surface that stores and preserves a sufficient amount of rainfall are considered a pond and takes the spread of geological and ecological events **[13, 14]**.The pond and lake have not been technically standardized. Limnologists and freshwater biologists have proposed prescribed definitions for pond as, "***bodies of water where light penetrates to the underside of the water body, bodies of water surface that is enough for a rooted plant to grow and water bodies that lack movement action on the coastline***". Accordingly, some bureaucracies and researchers put the technical definition of ponds and lakes that have been governed by size **[15]**. Farmers built ponds to store water and used for livestock and irrigation for many years [16]**.** Ponds are reliable and economical sources of water to address the increased demand for water. Commonly two types of ponds (embankment and Excavated) have been built based on engineers, field observation of land users, conservationists, and other wetland specialists [17]**.** Various types of pond are in existence that depends on their shape and size. Each of the ponds has its own unique characteristics. Some of the ponds classified by Velda's website include are mini pond, wildlife pond, fishpond, Swimming pond and irrigation pond **[18]**. Ponds are important means to conserve water resources that provide water for domestic purposes including water for livestock, washing clothes, irrigations, protecting the local environment, and sustainable water resources. Ponds water has various applications. Some uses of pond water, mentioned in the book of the United States department of agriculture are for livestock , fish production ,irrigation ,fire protection and recreation [17].

On tracing the history of ponds, Pond in Britain was thought to be found more than 8,000 years old[19]. Besides, such temporary ponds were found in California at around 5,000 years ago and also have remained many lake basins in the United States [20]**.** In context to Nepal believing in Buddhist mythology, Kathmandu Valley itself was a big pond (Nagdaha), and the Buddhist sage Manjushree, Who came from China, drained out the water from Chovar George. Myths aside, in the period of Lichhavi (second to ninth century) and Malla (14th to 16th century), numerous ponds were constructed in Nepal [21]**.** There is no official record from when the construction of ponds started but a contradiction about ponds are that they are the most long-lived of aquatic habitats. Historical records, documents, different inscriptions, and writings adequately indicate that in Nepal, the existence of artificial ponds started from the Malla period and managed by communities. In the Shah and Rana period of Nepal, many Dhungedhara, wells, and ponds were constructed to meet the growing demand for water for the population[22]. Due to the lack of sufficient data and information, it is difficult to provide the exact distribution of wetlands in Nepal. 163 wetland sites are identified in the Terai region and 2,323 glacial lakes from the High Himalaya region to date [23]**.** Wetlands played an important role in cultural activities like Holy bathing, the performance of rites and rituals, spiritual center, and origin-point of folklore, literature, art, and a center of biological resources [24]**.** Some experts have estimated that about 500 manmade ponds are there in Nepal. Out of them, 100 are believed to be located in the Kathmandu Valley, 150 in the Janakpur area, and the rest of the ponds are located all over the country [25]**.**

### 1.2 Raj kulo, Pond and Water spout (dhungedhara)

Ponds are water reservoirs and need water sources to fill. The sources of water that fills the ponds are especially canal system and rainfall. There are numerous ponds in the Thecho area. Some of them are Phangaa pokhari, Pinga pokhari, Buddha pokhari, etc. Rajkulo is a reliable source to fill the pond in that area. The origin of Rajkulo is from TikaBhairab, Lele with 1.5-meter-width and 1.3-meter-depth and a length of around 13 kilometers that ends at Bagmati River in Kupondol, was built in the Malla period by Malla kings as an integrated project for water supply and field irrigation [26]**.** This Raj Kulo not only irrigates the rice field but also provides constant flow of clean water to urban areas and helps to sustain the groundwater level by recharging aquifers on the way [27]**.** Nowadays, water in Rajkulo has decreased as a result; the pollution in ponds has increased. Some ponds inside Kathmandu valley hold important significance in their formation. Like Nagpokhari, Kamalpokhari, Ranipokhari, Gahanapokhari, Siddhapokhari, Taudaha, Nagdaha Rani

Pokhari, etc. are few of them. These ponds are not simply treated as water reservoirs but they carry religious and cultural values at present[28]. Taudaha pond is regarded as an important wetland site in the valley for the birds from the past [29]. Ranipokhari, the historic pond located at the heart of Kathmandu valley recharged by the rainwater flows from the rooftop of Tri-Chandra Campus is significant for religious purposes too [30]. The ponds around Lalitpur areas are important sources to recharge aquifers for waterspouts [31].

In the context of Kathmandu valley, ponds are the source of an aquifer to dhungedhara. Dhungedhara is a traditional water supply system made of stone especially found in the capital city of Nepal. Dhungedharas are part of a comprehensive drinking water supply system, specially made by rulers in the Ancient and Medieval period of Nepal. The first known waterspout was built in Kathmandu at Hadi Gaun by the grandson of Lichhavi King Mandev I in 550 AD, but some shreds of evidence show that such a similar structure was built earlier than and more hitis(waterspout) started to appear elsewhere in Kathmandu Valley [32]. In ancient times groundwater is an important source and supplies about 2.95 million liters of water per day in the valley [33]. Dhungedharas are connected to a system of canals and ponds, which brings fresh water from the hills of the valley to the cities [32]. In 2019, a survey conducted by Kathmandu Valley Water Supply Management Board (KVWSMB) found 573 Dhungedharas in ten municipalities of the Kathmandu valley. Out of 573 Dhungedharas, 479 recovered, 52 destroyed,42 lost, and half of the spouts dried [34].

### 1.3 Water pollution in Global and Regional Context

The progressive analysis and revision of water resource policy seem more important. It has been insisted that water pollution is the leading global problem for death and diseases of living beings [35]. Water pollution accounts for the death of Eighteen million people in 2015 A.D. [36]. Pollution destroys the environment and oversize carbon dioxide on the earth therefore action should be taken as soon as possible [37]. The World Environmental Organization (WEO) conjointly struggles with water pollution issues in developing and developed countries. The report on water quality of different water bodies in the USA shows forty-four percentage on stream, sixty-four percentage on lakes, and thirty percentage on bays were classified as polluted [38]. Most of the European pollution policies use public funds for investment in pollution reduction technologies. The large investment of more than €100 billion, has been used to reduce pollution in European water bodies [39]. The sustainable water conference held by Pan African Chemistry Network (PACN) in August suggested to the African Nations to be alert regarding water quality. The document also serves as a roadmap for African academia, government, and industry to find solutions to water quality [40]. The trends of quality and quantity parameters in protecting water resources in Australia show a reduction with increased to turbidity, micro-pollutants, and pathogens. Infrastructure Australia reports that water utilities and regional towns are failing to produce safe water supply [41]. Brazil has 12% of the world's available freshwater in the world but suffers from water shortages, droughts, and pollution levels [42]. The use of plastic and its disposal on water resources makes the water bodies polluted. United Nations Environment Program (UNEP) focused on the minimization of plastic uses and its control on the water resources. The annual report of UNEP-2018 shows the work on the reduction of plastic and helps nations and individuals for significant commitments to giving up single-use plastics [43]. Furthermore, UNEP in its report on global environment outlook 2019 recaps decision-makers to take speedy actions to address challenging environmental issues to succeed the Sustainable Development Goals as well as other internationally agreed environmental goals, such as the Paris agreement to combat the situation on pollution before it takes hazardous situations [44].

Water pollution is one of the most important issues faced by Asian countries promptly. As evident, untreated sewage is the largest sort of pollution in Asian countries. The Asian continent continues to face serious water quality issues that contribute to freshwater scarcity, ill health, and even deaths. Several countries are implementing ambitious programs to build wastewater treatment plants and rehabilitate tarnished water resources. To prevent pollution and protect water resource countries like China, India, Thailand, Philippines, Bangladesh, and Indonesia have passed water quality acts and laws but emerging economies and rapid industrialization lead more challenging [45]. The measurement and water analysis of Ganga and Yamuna's reflect the impurity presence in rivers of India [46]. Shanghai has problems with water quality in freshwater, water treatment, and household water. Water quality data from 1979 to 2016 shows that microbe's eutrophication, important metals, and organic pollutants contaminate the Huangpu and Yangtze Kiang Rivers [47]. Drinking water quality management and monitoring seem poor in most of the SAARC Countries. Water sources of surface and groundwater measurement result in contamination with coliforms, harmful metals, and pesticides. Human activities like improper disposal of municipal and industrial effluents and agrochemicals

deteriorate water quality and threats to public health in Pakistan [48]. In Sri Lanka, Water resources in surface area are useless by various phylogenies activities. Oil spills, the mercantilism of waste from ships, coral and sand mining, and activities of marine pollution are at intervals levels [49]. Another Asian country Bangladesh depends on groundwater. The water quality analysis withdrawn from wells shows the need for favorable recharge conditions to get pure water [50].

### 1.4 Water pollution in the context of Nepal

The most serious environmental issue in Nepal is water pollution. The majority of the population still lacks basic drinking water supply service, depending on unimproved and unreliable sources of water such as pond, unprotected well, and stream [51]. It is due to the major pollutants like sewage, industrial effluents, agricultural residues, and chemicals. The increase in the migrant population in Kathmandu valley from different parts of Nepal leads to haphazard urbanization resulting in heavy pressure on existing natural resources [52]. Urban water quality in the valley is not good enough to sustain a healthy water ecosystem as well as healthy life. Numerous cases of water-borne diseases like cholera, dysentery, typhoid, and skin diseases are reported every year [53]. In Kathmandu valley, continuously pumped groundwater leads to surpassing the natural recharge. This situation causes pollution and scarcity of water with a lower down of water table [54]. Several deep and groundwater sample tests show arsenic content. The arsenic in deep groundwater of Kathmandu valley of 52% samples exceeded the WHO standard [55]. In the Terai region of Nepal, people trust groundwater to fulfill their water demands. The use of groundwater in recent decades in this area has become essential for livelihood and food security [56]. Water quality of the river sites from the Saptakosi river with altitude varied from 1300-3440m above sea level show organic pollution analyzed by Eight different biotic indices and score methods [57]. Pokhara is a city of the lake but losing its water bodies. Sedimentation leads to shrinking of Phewa Lake and other big lakes of this area. The pollution on these lakes has affected aquatic animals and birdlife [58].

Drinking water in Nepal found to be unsafe especially during the rainy season. The contamination levels reached up to the maximum limit. Higher bacteriological and chemical contamination was found in water from wells, tube wells, and stone spouts; almost all the chemical parameters tested from these sources exceeded national standards [59]. The untreated discharge from the Bhrikuti paper mill into the Narayani river and from the Everest paper mill into the Orahi river result in more extensive damage of water resources [52]. The Physio-chemical study of the Tinau river of Butwal, Rupandehi of Nepal shows that the pollution of water exceeds the drinking water standard due to riverbed extraction. The pH of water shows more alkaline than other freshwater rivers[60]. The water quality analysis of the Jagadispur wetland reservoir of Kapilvastu of Nepal shows that the values of pH, electrical conductivity, total dissolved solids, nitrate, phosphate, bicarbonate, and chemical oxygen demand in the permissible range [61]. The study on the water quality of Ranipokhari at different stations found to be highly contaminated with bacteria and algae. The microorganisms are E.coli, Citrobacter, Klebsiella, Proteus, and Salmonella species [30]. The study on bacterial parameters and heavy metals of the Sundarijal reservoir and its main tributaries are found to be on the acceptable range but bacteriologically they are not safe to consume without proper treatment [62].

The surface and subsurface water of the Kathmandu valley seem brutally contaminated by various pollutants. Most of the deep tube wells of the Kathmandu valley comprise a greater amount of ammonia, iron, higher turbidity, and color values than those of the WHO guideline values. Groundwater wells of Kathmandu Valley show that the concentration of iron (Fe), manganese (Mn), zinc (Zn) and arsenic (As) as 17.9 mg/L, 1.04 mg/L, 0.95 mg/L, and 0.143 mg/L, respectively[63]. The traditional water supply system in the Kathmandu valley depends on dhungedhara (waterspout). The supply of water to Dhungedhara depends on both the ground and surface water. Most of the stone spouts receive water either from spring or nearby aquifer [64]. Due to rapid urbanization in Kathmandu valley, the majority of the waterspouts found in Lalitpur areas are now in the phase of defunct. These dhungedharas have significant heritage conservation value and thus can contribute to tourism and the national economy with social and cultural norms [65]. The fundamental requirements for potable water must be free from pathogenic organisms, containing low concentrations of compounds that are acutely toxic [66]. Water quality parameters of the Bagmati River and its tributaries like Hanumante Khola, Dhobi Khola, Tukucha, Teku, and the Bishnumati Khola are comparatively more polluted than that of Nakhu Khola and Balkhu Khola [67]. Physicochemical analysis such as TDS, pH, Conductivity Hardness, total alkalinity of Nagdaha was found to be ecologically sound [68].

### 1.5 Water policy, law, regulations and Water Quality Standard of Nepal

The government of Nepal has publicized National Drinking water Quality Guidelines, which lays out plans to improve the water quality to make it safe for drinking. It includes guideline values for parameters. The acts and regulations are summarized in the tabular form hereunder **[69, 70].**

| SN | Act or Regulation | Areas Addressed |
|---|---|---|
| 1. | Essential Commodity Protection Act 1955 (2012 BS) | • It seems drinking water an essential commodity and strictly protects drinking water.<br>• Prohibits any unauthorized use or misuse, stealing, damaging, etc. of drinking water. |
| 2. | Muluki Ain 1963 (2020 BS) | • Sets out the order of priority of use of water for irrigation.<br>• Regulates traditional farmer-managed irrigation systems. |
| 3. | Solid Waste (Management and Resource Mobilization) Center Act 1987 (2044 BS) | • Establishes the Solid Waste<br>• Management and Resource Mobilization Center as the responsible authority for the management of solid waste.<br>• Deals with the pollution of water by solid waste. |
| 4. | Solid Waste (Management and Resource Mobilization) Regulation 1989 (2046 BS) | • Deals with the collection, transportation, and disposal of solid waste.<br>• Deals with the provision of public toilets and bathhouses. |
| 5. | Nepal Water Supply Corporation Act1989 (2046 BS) | • Establishes the Nepal Water Supply Corporation as the perpetual, autonomous government-controlled corporation responsible for the supply of drinking water.<br>• Prohibits certain acts and provides penalties/punishment for violation. |
| 6. | The Constitution of the Kingdom of Nepal 1990 (2047 BS) | • Guarantees the right to life and property.<br>• Provides for the acquisition of property under certain circumstances and compensation. |
| 7. | Water Resource Act 1992 (2049 BS) | • The umbrella Act governing water resource management.<br>• It provides for the formation of water user associations and establishes a system of licensing.<br>• Prohibits water pollution. |
| 8. | Electricity Act 1992 (2049 BS) | • Governs the use of water for hydropower production.<br>• Establishes a system of licensing. Sets out the powers, functions, and duties of a license holder.<br>• Sets out the powers of the government. |
| 9. | Industrial Enterprises Act 1992 (2049 BS) | • Requires permission for the extension and diversification of environmentally sensitive industries.<br>• It provides financial incentives for industrial enterprises that minimize harmful effects on the environment. |
| 10. | Water Resource Regulation 1993 (2050 BS) | • The umbrella Regulation governing water resource management.<br>• Sets out the procedure to register a Water User Association and to obtain a license.<br>• Establishes the District Water Resource Committee.<br>• Sets out the rights and obligations of Water User Associations and license holders. |
| 11. | Electricity Regulation 1993 (2050 BS) | • Sets out the procedure for obtaining a license.<br>• Deals with the acquisition of house, land, and compensation.<br>• Sets out the powers, functions, and duties of license holders. |
| 12. | Environment Protection Act 1996 (2053 BS) | • Requires certain persons/bodies to conduct an EIA or IEE.<br>• Deals with the prevention and control of pollution. |
| 13. | Environment Protection Regulation 1997 (2054 BS) | • Lists the water-related projects required to conduct an EIA or IEE. |

| | | |
|---|---|---|
| | | • Deals with the control of water pollution and pollution control certificate |
| 14. | Drinking-Water Regulation 1998 (2055 BS) | • Regulates the use of drinking water.<br>• Provides for the formation of Drinking Water User Associations and sets out the procedure for registration. Deals with licensing of use drinking water.<br>• Deals with the control of water pollution and maintenance of quality standards for drinking water.<br>• Sets out the conditions of service utilization by consumers. |
| 15. | Local Self Governance Act 1999 (2055 BS) | • Establishes a decentralized governance structure<br>• Sets out the powers, functions, and duties of the VDC, Municipality, and DDC concerning water and sanitation.<br>• Sets out which natural resources are assets of local bodies and empowers local bodies to levy a natural resource tax. |

(Source: Water law in Nepal, Water Aid 2005)

| | | |
|---|---|---|
| 16. | Local Self Governance Regulation 1999 (2056 BS) | • Sets out the powers, functions, and duties of VDC, Municipality, and DDC concerning water and sanitation.<br>• Establishes the procedure for the formulation of the water-related plan and project implementation |
| 17. | Irrigation Regulation 2000 (2056 BS) | • Deals with Irrigation Water User Associations and the transfer of projects to Irrigation Water User Associations<br>• Available groundwater resources shall, be developed and utilized as the surface water reservoirs, and arrangements made for conservation, promotion, and control in the quality. |
| 18. | National Wetland Policy 2003 | • Defines Wetlands as perennial water bodies that originate from underground sources of water or rains. It means swampy areas with flowing or stagnant fresh or saltwater that are natural or synthetic, or permanent or temporary. Wetlands also mean marshy lands, riverine floodplains, lakes, ponds, water storage areas, and agricultural lands.<br>• Goals are to conserve and manage wetlands resources wisely and in a sustainable way with local people's participation and to put the conservation and management aspects of wetlands conservation within the framework of broader environmental management. |
| 19. | Water Supply Management Board Act, 2063 (2006) | • prevents the misuse of potable water and prevent pollution of potable water<br>• carried out, study, research and survey on the source, distribution of potable water, and sanitation |
| 20. | The Constitution of the Nepal 2015(2072 BS) | • Rights regarding a clean environment<br>• Policies regarding the conservation, management, and use of natural resources |

(Source: WEPA web page December 2019)

The government of Nepal has issued this notice of implementation of National Drinking Water Quality Standards, 2062 under the provision of Water Resources Act, 2049, Clause 18, and Sub Clause 1[71].

**(A) National Drinking Water Quality Standard**

| S.N | Parameter | Nepal Standard | S.N | Parameter | Nepal Standard |
|---|---|---|---|---|---|
| **Physical Parameters** | | | | | |
| 1 | pH | 6.5-8.5 | 4 | Total dissolved solids | <750 |
| 2 | Conductivity(µS/cm) | 1500 | 5 | Color(Hazen) | <15 |
| 3 | Turbidity(NTU) | < 5(10) | 6 | Temperature ($^{o}$c) | _ |
| **Chemical Parameters** | | | | | |
| 1 | Total Alkality(mg/L) | | 14 | Calcium (mg/L) | |

| | | | | | |
|---|---|---|---|---|---|
| 2 | Total hardness (mg/L) | <500 | 15 | Magnesium(mg/L) | |
| 3 | Calcium Hardness(mg/L) | | 16 | Chloride content (mg/L) | 200 |
| 4 | Magnesium Hardness (mg/L) | | 17 | Iron content(mg/L) | 0.3 |
| 5 | Iron (mg/L) | 0.3 (3) | 18 | Fluoride (mg/L) | 0.5 -1.5* |
| 6 | Manganese (mg/L) | 0.2 | 19 | Lead (mg/L) | 0.01 |
| 7 | Arsenic (mg/L) | 0.05 | 20 | Ammonia (mg/L) | 1.5 |
| 8 | Cadmium (mg/L) | 0.003 | 21 | Chloride (mg/L) | 250 |
| 9 | Chromium (mg/L) | 0.05 | 22 | Sulphate (mg/L) | 250 |
| 10 | Cyanide (mg/L) | 0.07 | 23 | Nitrate (mg/L) | 50 |
| 11 | Total Hardness (mg/L) | 500 | 24 | Mercury (mg/L) | 0.001 |
| 12 | Calcium (mg/L) | 200 | 25 | Aluminum (mg/L) | 0.2 |
| 13 | Zinc (mg/L) | 3 | 26 | Residual Chlorine(mg/L) | 0.1-0.2* |
| **Microbiological Parameters** | | | | | |
| 1 | E.coli(CFU/100ml) | 0 | 2 | Total Coliform | 0 in 95% samples |

(Source: Ministry of Physical Planning and Works National Drinking Water Quality Standards, 2005)

## 2. Conclusions

The contamination of water bodies due to human activities or by natural phenomenon is water pollution. Rivers, lakes, ponds, oceans, aquifers, and rainwater include waterbodies. When pollutants enter the natural atmosphere, it causes pollution. Pollution is a worldwide cause for the death and sickness of living beings. Climate change as one of the external factor has an effect on water quality and water ecosystems. The change of temperature on different water bodies like plain lakes, alpine lakes, ponds, and rivers plays an important role to degrade water quality. Water quality refers to physical, chemical, and biological parameters, and is the condition of water utilized by humans on the relevance of standards value achieved through the treatment of the water. Water is important for all living beings. Therefore, water quality needs to be in a balanced state. This study focuses on water pollution in ponds and other water resources. Besides this, it also highlights laws, policies, rules, and regulations on water and water quality standard of Nepal. Pollutants such as household waste, sewage discharge, and agricultural runoff mixed in the ponds and other water resources which results in water bodies as pollution.

Pollution has an effect on different physical, chemical, and biological water parameters. Water pollution on different sources of water across the globe and in Nepal results in the effect on human health and cause waterborne diseases. Ponds are important means to conserve water resources that provide water for domestic purposes, for livestock, washing clothes, irrigations, protecting the local environment, and sustainable water resources. The study found that the world is suffering from waterborne diseases. There are various factors for water pollution but climate change is also one of the causes of water pollution. The study suggests for conducting frequent public awareness programs on water pollution and its harmful effects on the environment and public health. Moreover, the provision of the cleanliness of ponds and sources of water should be conducted on a regular basis to reduce water pollution. Potable water must be free from pathogenic organisms, containing low concentrations of compounds that are acutely toxic. The responsible organizations should make a plan to preserve and reduce water pollution in different sources of water along with ponds and rivers.

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