

# [F the use of the cork lough environmental sciences essay](https://assignbuster.com/f-the-use-of-the-cork-lough-environmental-sciences-essay/)

Health Risk Assessment of the use of the Cork Lough for kayaking

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## Introduction

The Cork Lough is located in the Southern suburbs of Cork city. It covers six hectares and is approximately 0. 2 – 1. 5 metres in depth. Fed by rainwater and run off from activity round the lake, the water quality is considered poor. During high peak times (for example, Summer), the lake attracts up to one thousand visitors per day. Visitors include those who partake in recreational fishing and ball games, joggers, dog walkers, bird feeders and visitors to the children’s play area (located beside the lake). The quality of the water in the Cork Lough has been gradually declining since the 1950s and there have been regular problems with phytoplankton blooms, turbid water and very low oxygen in summer months. Some species of cyanobacteria are also known to occur at times. This can be supported by the Cork Heritage Council (nd) who states that in recent years, the Cork Lough has frequently experienced incidents of very poor water quality, including a growth of toxic microorganisms in the water and on several occasions’ numbers of birds have been found dead. The origins of the problem are probably linked through many different factors. The loss of aquatic vegetation which would naturally aerate and clean the water is one problem as well as the large amount of organic matter entering the water, which encourages the growth of algae and bacteria and these in turn further reduce the oxygen levels and can also produce toxins (Heritage Council, nd). The proposed kayak club activities on the Lough are exposed to many risks and hazards that are identified on the Lough and in the surrounding area. If the Cork city Council is to permit kayaking on the Cork Lough, the risks and hazards accompanying the lake must be taken into account through risk assessment. This paper will seek to reveal and recognise health risks associated with recreational activities on lake.

## Hazard Identification

This section contains a summary of information about the hazards of toxins and other risk factors involved with the proposed kayaking on the Cork Lough. As the Cork Lough covers just 6 hectares, and various other activities occur around the Lough daily, the kayakers may pose a risk not only to themselves but for others around them. The Lough is fed by run off from activity around the lake. The lake attracts hundreds of dog walkers per day and the run off from dog faeces can enter the lake, as well as bird faeces. This creates the risk of pathogens entering the lake, which is hazardous as, in the case of a proposed kayaker capsizing and ingesting water, pathogens may also be consumed. The Lough is also a wildlife sanctuary, home to hundreds of birds annually. It is home to swans, ducks, geese and coots and so bird faeces is also a major health hazard on the lake as birds also carry pathogens such as gastroenteritis which prove to be a risk to human health. Water recreation has been associated with outbreaks of acute gastrointestinal illness caused by viruses, bacteria and protozoa (Dziuban et al, 2006; Yoder et al, 2004). Cyanobacteria are common and naturally occur in most recreational water environments. They are of public health concern because some varieties emit toxins that can have a harmful effect on recreational water users (National Health and Medical Research Council, 2009). Cynotoxins in the case of algal bloom which the lake is often subjected to, can cause skin irritation directly (high risk) through swallowing or receiving a splash in the eye or mouth. The toxins can also affect human health indirectly (low risk) through handling foods or objects following exposure to infected water sources. Freshwater is often subject to erratic or enduring overgrowth of cyanobacteria. When people visit the same waters for recreational activities, exposure to cyanobacteria is inevitable. Therefore, there is a possibility that on occasion, kayaking in the Cork Lough is a forum for exposure to cyanobacteria. Cyanobacteria have adapted to different habitats in many distinctive ways such as, nitrogen fixation, ability to control strength, light harvesting colourings, and distinguished cell types for reproduction or remaining inactive, allowing them an advantage over many competitors (Kaebernick and Neilan, 2000). Man – made impacting factors such as increased nutrient loading in freshwater environments, resulting in the international occurrence of cyanobacterial blooms. Though blooms are unpleasant both to look at and due to released smell and taste factors, certain metabolites generated by some cyanobacterial species present a more serious issue (Carmichael, 1994). Due to their unpleasant effects on humans, these compounds have been categorised as `toxins'. The chemical composition of many cyanotoxins and their negative effect on animals have been clarified and recently studied. Cyanobacteria have the ability to produce an array of physically and functionally distinct toxins. Contact with these powerful natural contaminants by cutaneous, inhalation, or oral exposures in untreated waters concerns public health workers and researchers because of the risks of severe and possibly prolonged health effects (Stone and Bress, 2006). Illnesses that have been reported extend from minor, self-regulating skin rashes and hay fever-like symptoms to harsh severe gastroenteritis and can possibly be fatal (ibid). Stone and Bress (2006), state that ingestion of cyanotoxin infected recreational water is the most hazardous pathway of exposure. Guidelines for recreational exposure to cyanobacteria have been published by the World Health Organization, and have been adapted and implemented by regional or national governments of several countries. Other hazards and risks that must be taken into account include the risk of capsizing and the subsequent possibility of receiving a head injury. The lough is enclosed by a cemented border and this poses a risk of head injury. The Cork Lough is situated beside a main city road and within a housing estate. Traffic may be another issue as there is limited parking available and groups of people crossing busy roads with heavy equipment can be dangerous.

## Exposure Assessment

The level of which cyanotoxins present a human health risk depends on the exposure to these toxins. Recreational water use is one of the major routes of exposure to cyanotoxins. According to Falconer et al (1999), there are three potential routes of exposure to cyanotoxins that can be identified. These include the direct contact of unprotected parts of the body, including sensitive areas like the ears, eyes and throat, and areas covered by a swimming costume (Piolotto et al. 1997), accidental swallowing (Turner et al, 1990) and inhalation of water. The epidemiological study of Piolotto et al (1997) observed that health effects occurred at ‘ low cyanobaterial cell densities’. These were clearly linked to the cyanobacterial cell population, but not to the concentration of microcystins (Falconer et al. 1999). Therefore this hazard seems to be as a result of extra or other anonymous, cyanobacterial metabolites or compounds from subordinate bacteria, even at restrained levels of exposure (ibid). Absorption of contaminants through swallowing, exchange with the nasal mucosa or by inhalation are likely to be significant methods of contact with cyanotoxins, even at moderate levels of exposure. Turner et al. (1990) illustrate from one case of several human illnesses, that inhalation and resorption through nasal and pharyngeal mucous membranes may offer a high risk in water sports involving exhaustive submersion of the head e. g. kayak capsizing. Allergic and toxic dermal reactions of unpredictable severity are known from apnobacteria as well as from freshwater algae but have not been recognised comprehensively (Falconer et al. 1999). Bathing suits and particularly wet suits, have a tendency to to intensify such affects by accruing cyanobacterial cells, thus enhancing the disturbance of cells and therefore the discharge of cell matters onto the wearers skin. As kayakers wear wet suits, this may prove to increase the hazard and the exposure to the hazard. Kayak lessons often run once or twice a week for one hour. The level of exposure to the risks and hazards that are present on the Cork Lough is dependent on the duration and amount of activity that they will be conducting by the lake. This will determine the exposure levels to the toxins as well as the surrounding risks and hazards.

## Dose Responses

In this assessment, it is necessary to evaluate information to estimate the amount of a chemical or a toxin that is likely to result in a particular health effect in humans. An established principle in toxicology is that " the dose makes the poison". For example, a common place chemical like table salt is harmless in small quantities but it can cause illness in large doses. This assessment has established that human exposures to cyanotoxins are most common through contact with recreational waters and drinking water. According to Hudnell (2008), persistent low level contact with contaminated water may cause severe illness typified by non – specific symptoms such as gastro – intestinal distress, skin rashes, respiratory exertion and flu – like symptoms. Lower level exposures also may instigate prolonged illness in some individuals. The cyanotoxins contain neurotoxins that can cause distress to the nervous system, hepatotoxins that can affect the liver, and dermatoxins that can affect the skin (EPA, 2012). The existence of high levels of cyanotoxins in recreational water and drinking water can result in an extensive range of symptoms including fever, headaches, muscle and joint pain, blisters, stomach cramps, diarrhoea, vomiting, mouth ulcers, and allergic reactions (ibid). These effects can ensure within minutes to days after the exposure. In severe circumstances, seizures, liver failure, respiratory arrest, and sometimes even death may follow. Evidence suggests that long-term exposure to microcystins and cylindrospermopsin may encourage the growth of tumors and in turn promote cancer. The tangible hazard to cyanotoxins at low levels in drinking water and the long-term effects to the exposure to these toxins is undefined.

## Risk Characterisation

Many health risks and hazards have been identified in this assessment of the Lough, Cork. As the Lough is home and a certified bird sanctuary, it is inevitable that the lake will be contaminated with faecal coliforms. . Faecal coliform at the Lough has been documented to reach up to > 30000 per 100ml of water in summer months demonstrating the incidence of high levels of pathogenic organisms and subsequently a public health risk for potential recreational water users. Along with other visible risks such as algal bloom, road traffic risks and the potential for physical injury, this report has determined that the risks that are associated with the proposed kayak club visiting the Lough on a regular basis are hazardous and plentiful.

## Recommendation

In conclusion, this report can recommend that Cork City Council should decline access to the Cork Lough for the use of the local kayak club. The potential health outcomes which may result from the hazards associated with the Lough are acute and dangerous. Therefore it is advised that the Cork City Council declines usages of the Lough for kayaking and that the lake will remain available for other recreational purposes such as fishing, walking, jogging and so forth.