بسم الله الرحمن الرحيم

(وجعلنا من الماء كل شيء حي) صدق الله العظيم

(الأنبياء: 30)

Water pollution

(H2O;Dihydrogen monoxide)

إذا كانت الدراسات العلمية تؤكد أن البلدان العربية والإسلامية مقبلة على موجة من الفقر المائي الذي يهدد مظاهر الحياة وخطوات التنمية، وأن أكثر من بليون من سكان العالم لا يعرفون الماء النقى، ومليار شخص في الدول النامية يعانون من نقص مياه الشرب، وأن أحدث تقارير للبنك الدولي تؤكد أن 80% من أمراض مواطني العالم الثالث منشؤها المياه الملوثة.. فان الإسلام هو أول دين سماوي سبق التشريعات الحديثة وأرسى مبادئ المحافظة على المياه وترشيد استهلاكها منذ أربعة عشر قرنا من الزمان.

والحديث عن المياه يعني في معظم الدول الأمن الغذائي، وهو ما يرادف الأمن القومي، ولقد تحولت المياه في ظل تزايد النمو السكاني ومعدلات الاستهلاك والندرة الملحوظة في مصادرها إلى محور من أهم محاور الصراع الدولي في الربع الأخير من القرن الماضي، وزاد الأمر حدة مع مطلع القرن الجديد حتى أن البعض تنبأ بنشوب حروب بين الدول بسبب المياه خلال القرن الحالي، خاصة في ظل صدور العديد من التقارير الدولية للبنك الدولي والمجلس العالمي للمياه والتي تحذر من "شح" المياه وندرتها، وتبنيها لسياسات جديدة لترشد استهلاك المياه، والمحافظة على مصادرها المختلفة من التلوث.

ولقد اهتمَّت معظم المنظمات الدولية بقضايا ندرة المياه واحتمالات تعرُّض العالم لأزمة مياه في المستقبل، ولذلك عقدت العديد من المؤتمرات الدولية والإقليمية تحت رعاية هذه المنظمات لتدارس هذه القضية، وحدّدت الأمم المتحدة يوم 22 مارس من كل عام يومًا عالميًّا للمياه لتلفت أنظار العالم إلى أهمية هذه المشكلة المتوقَّع حدوثها، وبدأت هذه المنظَّمات الدولية تُدخل قضايا المياه بطريقة جديدة في النظام العالمي، مما أدَّى في بعض الأحيان إن لم يكن في معظمها إلى زيادة حدة الصراع بين دول الشمال ودول الجنوب.

ولا غرابة في أن تمثل قضية المياه هذه الأهمية الكبيرة على المستوى الدولي، فالماء أساس كل حي، قال تعالى: { وجعلنا من الماء كل شيء حي} [الأنبياء: 30]، وقد نشأت الحياة منذ البداية وستبقى إلى يوم الساعة مرتبطة بالماء عصب الحياة، وأهم مكون من مكوناتها، وارتبط استقرار الإنسان على وجه الأرض وازدهار حضارته بالماء، وارتبطت الحضارات القديمة بمواقع مائية، عرف بعضها بالمسمى المائي مثل حضارة بين النهرين وحضارة وادى النيل، ودبت الحياة في مكة المكرمة بعد أن تفجر بئر زمزم استجابة لدعوة أبى الأنبياء إبراهيم - عليه السلام {ربنا إني أسكنت من ذريتي بواد غير ذي زرع عند بيتك المحرم، ربنا ليقيموا الصلاة فاجعل أفئدة من الناس تهوى إليهم، وارزقهم من الثمرات لعلهم يشكرون} [إبراهيم: 37].

• الماء يعني الحياة:

وكلمة الماء - كما هو معروف - هي المرادف لكلمة الحياة، والماء يعنى الزراعة والغذاء والغذاء والشراب والطاقة، ويصل الأمر إلى أن حجم الأراضي الزراعية يتحدد في كثير من دول العالم ليس فقط بحجم الأراضي القابلة للزراعة ولكن بكميات المياه العذبة المتوفرة.

وقد اثبت العلم استحالة الحياة على وجه الأرض دون الماء لارتباط الأنشطة البشرية المختلفة به، ولأنه المكون الهام في تركيب الخلية الحية، حيث يدخل في تكوين جميع خلايا الكائنات الحية بمختلف صورها وأشكالها وأحجامها وأنواعها، فالماء يكون نحو 90 % من أجسام الأحياء الدنيا، ونحو 60 - 70 % من أجسام الأحياء الراقية بما في ذلك الإنسان.

ونظرا لهذه الأهمية القصوى للماء جعله الله - سبحانه - حقا شائعا بين البشر جميعا، فحق الانتفاع بالماء مكفول للجميع دون إسراف ولا إفساد ولا احتقار ولا تعطيل، وهذا يعنى أن مصادر الماء لا يجوز لأحد أن يحتكرها أو يمنعها عن الآخرين، ولو أدركت الشعوب والحكومات هذه التعاليم الإسلامية لانتهت الصراعات التي تدور حول الماء وموارده المختلفة.

ولا شك ان تصرفات البشر من سوء استخدام المياه العذبة والإسراف فيها وتلويثها قد يكون سببا لندرة المياه، واهدار هذه النعمة الربانية، وحدوث الفقر المائي في بعض المناطق.. ولذلك فقد أصبحت مشكلة المياه تتصدر أولويات هموم سكان العالم خاصة وأن هناك أكثر من بليون من سكان العالم لا يعرفون الماء النقى.

وتعتبر المنطقة العربية من أكثر المناطق تأثرا بمشكلة المياه بسبب عدم وجود استراتيجية عامة كافية للمياه تتعامل مع هذا النقص الحاد، وحسب دراسة أعدها البنك الدولي لا يوجد في المنطقة العربية سوى 1% فقط من إجمالي المياه المتوفرة في العالم، والأخطر من ذلك - كما تشير الدراسة - أن الدول العربية تستهلك أكثر من 100% من مصادر مياهها المتجددة، ورغم ذلك فان هناك 60 مليون شخص من مواطني العالم العربي لا تتوافر لديهم مياه صحية.

ولا تقتصر مشكلة المياه في الوطن العربي على الندرة، وإنما تمتد إلى نوعية المياه التي تتدنى وتتحول إلى مياه غير صالحة للاستخدام لأسباب متعددة، وتسرى مشكلة المياه على كل المصادر المائية في الوطن العربي، فالأنهار العربية الكبرى مثل النيل والفرات تنبع من دول غير عربية وتجرى وتصب في بلدان عربية مما يجعل لدول المنبع ميزة استراتيجية في مواجهة البلدان العربية، كما يتطلب الاستغلال الأمثل للمياه الجوفية ومياه الأمطار استثمارات ضخمة لإقامة التجهيزات والمشروعات الأزمة لهذا الاستغلال.

- قيم إسلامية عظيمة:

واذا كانت مشاكل المياه تنحصر في التلوث والإسراف وسوء الاستخدام، فان هذه قضايا عالجها الإسلام منذ 14 قرنا من الزمان بما قرره من آداب وقواعد وأحكام للمحافظة على الماء وترشيد استهلاكه، فالماء هو مصدر الحياة، والمحافظة عليه تعني المحافظة على الحياة بأشكالها المختلفة.

حرم الإسلام كل ما يفسد حياة المسلمين، وفقا للقاعدة الفقهية التي تقول (ما أدى إلى الحرام فهو حرام)، والتلوث المائي يتسبب في حالات كثيرة في إزهاق الأرواح وقتل الأحياء ونشر الأوبئة والأمراض، ودرء هذا التلوث واجب.

أرسى الإسلام قواعد الطب الوقائي حماية للنفس وحماية للبيئة، ومن هذه القواعد ما يتعلق بالماء، فنهى رسول الله - صلى الله عليه وسلم - عن التبول في الماء الراكد في قوله - صلى الله عليه وسلم - (لا يبولن أحدكم في الماء الراكد ثم يغتسل فيه) رواه البخاري عن جابر -رضي الله عنه -، ومن المعروف أن هناك أمراضا كثيرة تنتج عن الاستحمام في الماء الراقد الذي سبق التبول فيه مثل الكوليرا والبلهارسيا. كما نهى - صلى الله عليه وسلم - (أن يبال في الماء الجاري) رواه الطبراني، وذلك للمحافظة على نظافة الماء من الطفيليات التي تكون مع البول وتؤدى إلى تلوث الماء

1. دعا الإسلام إلى المحافظة على الماء وعدم الإسراف في استهلاكه، فقال الرسول - صلى الله عليه وسلم -: (كلوا واشربوا والبسوا وتصدقوا من غير إسراف ولا مخيلة) رواه النسائي وابن ماجه.

2. نهى رسول الله - صلى الله عليه وسلم - عن الإسراف في استعمال الماء حتى ولو كان من أجل الوضوء، فقد روي عن عبد الله بن عمر أن رسول الله - صلى الله عليه وسلم - مر بسعد بن أبي وقاص وهو يتوضأ فقال (ما هذا الإسراف؟)، فقال: أفي الوضوء إسراف؟، قال (نعم وان كنت على نهر جار) أخرجه بن ماجه في سننه. وأخرج مسلم من حديث أنس - رضي الله عنه - قال: "كان النبي - صلى الله عليه وسلم - يتوضأ بالمد ويغتسل بالصاع إلى خمسة أمداد"، والإسراف يتحقق باستعمال الماء لغير فائدة شرعية، كأن يزيد في الغسل على الثلاث، وقد اتفق العلماء على أن الزيادة في غسل الأعضاء للوضوء على الثلاث مكروه، وأنه إسراف في استعمال الماء .

Water covers 70.9% of the Earth's surface, and is vital for all known forms of life. On Earth, 96.5% of the planet's water is found mostly in oceans; 1.7% in groundwater; 1.7% in glaciers and the ice caps of Antarctica and Greenland; a small fraction in other large water bodies, and 0.001% in the air as vapor, clouds (formed of solid and liquid water particles suspended in air), and precipitation. Only 2.5% of the Earth's water is fresh water, and 98.8% of that water is in ice and groundwater. Less than 0.3% of all freshwater is in rivers, lakes, and the atmosphere, and an even smaller amount of the Earth's freshwater (0.003%) is contained within biological bodies and manufactured products.

Water on Earth moves continually through the hydrological cycle of evaporation and transpiration (evapotranspiration),condensation, precipitation, and runoff, usually reaching the sea. Evaporation and transpiration contribute to the precipitation over land.

Safe drinking water is essential to humans and other life forms. Access to safe drinking water has improved over the last decades in almost every part of the world, but approximately one billion people still lack access to safe water and over 2.5 billion lack access to adequate sanitation. There is a clear correlation between access to safe water and Gross domestic product(GDP) per capita. However, some observers have estimated that by 2025 more than half of the world population will be facing water-based vulnerability. A recent report (November 2009) suggests that by 2030, in some developing regions of the world, water demand will exceed supply by 50%. Water plays an important role in the world economy, as it functions as a solvent for a wide variety of chemical substances and facilitates industrial cooling and transportation. Approximately 70% of the fresh water used by humans goes to agriculture.

Effects on human civilization

Civilization has historically flourished around rivers and major waterways; Mesopotamia, the so-called cradle of civilization, was situated between the major rivers Tigris and Euphrates; the ancient society of the Egyptians depended entirely upon the Buenos Nile. Large metropolises like Rotterdam, London, Montreal, Paris, New York City Aires, Shanghai, Tokyo, Chicago, and Hong Kong owe their success in part to their easy accessibility via water and the resultant expansion of trade. Islands with safe water ports, like Singapore, have flourished for the same reason. In places such as North Africa and the Middle East, where water is more scarce, access to clean drinking water was and is a major factor in human development.

There are three main sources of water:

1- Rain

2- Surface water : Oceans, Rivers and streams , tanks , ponds & lakes

3- ground water : shallow wells, Deep wells , Springs

Sources of fresh water

1. Surface water
2. Under river flow
3. Ground water
4. Desalination
5. Frozen water

Uses of fresh water

1. Agricultural

   - Increasing water scarcity

2. Industrial

3. Household

4. Recreation

5. Environmental

Water stress

1. Population growth
2. Expansion of business activity
3. Rapid urbanization
4. Climate change
5. Depletion of aquifers
6. Pollution and water protection
7. Water and conflict

Water pollution
is the contamination of water bodies
(e.g. lakes, rivers, oceans and groundwater).
Water pollution occurs when pollutants are discharged directly or indirectly into water bodies without adequate treatment to remove harmful compounds.
Water pollution affects plants and organisms living in these bodies of water. In almost all cases the effect is damaging not only to individual species and populations, but also to the natural biological communities.

Types of Water Pollution

1.Chemicals (natural/synthetic; biodegradable/non-biodegradable)
2.Thermal loading (associated with electrical generating facilities)
3.Sewage contamination (pathogens, nutrients, toxics)
4.Eutrophication (overabundance of nutrients in a waterway)
5.Biological Agents (exotic and invasive species; infectious agents)
6.Salts (salination)
7.Erosion and sedimentation
9.Oil pollution
11.Agricultural pollution
12.Radioactive substances
13.Marine dumping
14.River dumping

Chemical and other contaminants

Contaminants may include organic and inorganic substances.

Organic water pollutants include:

1. Detergents
2. Disinfection by-products found in chemically disinfected drinking water, such as chloroform
3. Food processing waste, which can include oxygen-demanding substances, fats and grease
4. Insecticides and herbicides, a huge range of organohalides and otherchemical compounds

5.Petroleum hydrocarbons, including fuels (gasoline, diesel fuel, jet fuels, andfuel oil) and lubricants (motor oil), and fuel combustion byproducts, fromstormwater runoff
6.Tree and bush debris from logging operations
7.Volatile organic compounds (VOCs), such as industrial solvents, from improper storage.
8.Chlorinated solvents, which are dense non-aqueous phase liquids (DNAPLs), may fall to the bottom of reservoirs, since they don't mix well with water and are denser.
9.Polychlorinated biphenyl (PCBs)
10.Trichloroethylene
11.Perchlorate
12.Various chemical compounds found in personal hygiene and cosmetic products

Inorganic water pollutants include:

1. Acidity caused by industrial discharges (especially sulfur dioxide from power plants)
2. Ammonia from food processing waste
3. Chemical waste as industrial by-products
4. Fertilizers containing nutrients--nitrates and phosphates--which are found in stormwater runoff from agriculture, as well as commercial and residential use.
5. Heavy metals from motor vehicles (via urban stormwater runoff) and acid mine drainage
6. Silt (sediment) in runoff from construction sites, logging, slash and burn practices or land clearing sites

Oil pollution

Petroleum often pollutes water in the form of oil. Oil spills from ships and super-tankers, and from off-shore oil drilling operations cause pollution. Oil and petrol that leaks from cars and trucks also washes off roads and into waterways through storm water drains.

Oil forms a thin layer on top of water and act like a lid on the surface and the water. Animals and plants living in the water can't breathe, the oil coats the feathers of water birds, and the fur of animals that swim in the water, causing them to become sick and, if there is a great amount of oil on their bodies, to die. Even the insects that live on the surface of the water are badly affected .


STOP OIL POLLUTION

Thermal pollution

Thermal pollution is the rise or fall in the temperature of a natural body of water caused by human influence. Thermal pollution, unlike chemical pollution, results in a change in the physical properties of water. A common cause of thermal pollution is the use of water as a coolant by power plants and industrial manufacturers. Elevated water temperatures decreases oxygen levels (which can kill fish) and affects ecosystem composition, such as invasion by newthermophilic species. Urban runoff may also elevate temperature in surface waters.

Thermal pollution can also be caused by the release of very cold water from the base of reservoirs into warmer rivers.

Sewage water pollution

Sewage water pollution is one of the major problems in cities. The sewage water is drained off into rivers without treatment. The careless disposal of sewage water leads to a chain of problems, such as spreading of diseases, eutrophication, increase in Biological Oxygen Demand (BOD), etc.

The waste water that flows after being used for domestic, industrial and other purposes is termed as sewage water. In ideal situations, the sewage water is channeled or piped out of cities for treatment. Bulk of the sewage contains water as the main component, while other constituents include organic wastes and chemicals.

Wastewater : is any water that has been adversely affected in quality by anthropogenic influence. It comprises liquid waste discharged by domestic residences, commercial properties, industry, and/or agriculture and can encompass a wide range of potential contaminants and concentrations. In the most common usage, it refers to the municipal wastewater that contains a broad spectrum of contaminants resulting from the mixing of wastewaters from different sources.

Sewage : is correctly the subset of wastewater that is contaminated with feces or urine, but is often used to mean any waste water. "Sewage" includes domestic, municipal, or industrial liquid waste products disposed of, usually via a pipe or sewer or similar structure, sometimes in a cesspool emptier.

The physical infrastructure, including pipes, pumps, screens, channels etc. used to convey sewage from its origin to the point of eventual treatment or disposal is termed sewerage.

Origin

Wastewater or sewage can come from (text in brackets indicates likely inclusions or contaminants):

1.Human waste (faeces, used toilet paper or wipes, urine, or other bodily fluids), also known as blackwater, usually from lavatories;

2.Cesspit leakage;

3.Septic tank discharge;

4.Sewage treatment plant discharge;

5.Washing water (personal, clothes, floors, dishes, etc.), also known as greywater or sullage;

6.Rainfall collected on roofs, yards, hard-standings, etc. (generally clean with traces of oils and fuel);

7.Groundwater infiltrated into sewage;

8.Surplus manufactured liquids from domestic sources (drinks, cooking oil,pesticides, lubricating oil, paint, cleaning liquids, etc.);

9.Urban rainfall runoff from roads, carparks, roofs, sidewalks, or pavements (contains oils, animal faeces, litter, fuel or rubber residues, metals from vehicle exhausts, etc.);

10.Seawater ingress (high volumes of salt and micro-biota);
11.Direct ingress of river water (high volumes of micro-biota);
12.Direct ingress of manmade liquids (illegal disposal of pesticides, used oils, etc.);
13.Highway drainage (oil, de-icing agents, rubber residues);
14.Storm drains (almost anything, including cars, shopping trolleys, trees, cattle, etc.);
15.Blackwater (surface water contaminated by sewage);
16.Industrial waste

industrial site drainage (silt, sand, alkali, oil, chemical residues);

1.Industrial cooling waters (biocides, heat, slimes, silt);

2.Industrial process waters;

3.Organic or bio-degradable waste, including waste from abattoirs, creameries, and ice cream manufacture;

4.Organic or non bio-degradable/difficult-to-treat waste (pharmaceutical or pesticide manufacturing);

5.extreme pH waste (from acid/alkali manufacturing, metal plating);

6.Toxic waste (metal plating, cyanide production, pesticide manufacturing, etc.);

7.Solids and Emulsions (paper manufacturing, foodstuffs, lubricating and hydraulic oil manufacturing, etc.);

8.agricultural drainage, direct and diffuse.

Wastewater constituents

The composition of wastewater varies widely. This is a partial list of what it may contain:

-Water (> 95%) which is often added during flushing to carry waste down a drain;
-Pathogens such as bacteria, viruses, prions and parasitic worms;
-Non-pathogenic bacteria;
-Organic particles such as feces, hairs, food, vomit, paper fibers, plant material, humus, etc.;
-Soluble organic material such as urea, fruit sugars, soluble proteins, drugs, pharmaceuticals, etc.;
-Inorganic particles such as sand, grit, metal particles, ceramics, etc.;
-Soluble inorganic material such as ammonia, road-salt, sea-salt, cyanide, hydrogen sulfide, thiocyanates, thiosulfates, etc.;
-Animals such as protozoa, insects, arthropods, small fish, etc.;
-Macro-solids such as sanitary napkins, nappies/diapers, condoms, needles, children's toys, dead animals or plants, etc.;
-Gases such as hydrogen sulfide, carbon dioxide, methane, etc.;
-Emulsions such as paints, adhesives, mayonnaise, hair colorants, emulsified oils, etc.;
-Toxins such as pesticides, poisons, herbicides, etc.
-Pharmaceuticals and other hormones.

Wastewater quality indicators

Any oxidizable material present in a natural waterway or in an industrial wastewater will be oxidized both by biochemical(bacterial) or chemical processes. The result is that the oxygen content of the water will be decreased

Since all natural waterways contain bacteria and nutrients, almost any waste compounds introduced into such waterways will initiate biochemical reactions. Those biochemical reactions create what is measured in the laboratory as the Biochemical oxygen demand (BOD). Such chemicals are also liable to be broken down using strong oxidizing agents and these chemical reactions create what is measured in the laboratory as the Chemical oxygen demand(COD). Both the BOD and COD tests are a measure of the relative oxygen-depletion effect of a waste contaminant. Both have been widely adopted as a measure of pollution effect. The BOD test measures the oxygen demand of biodegradablepollutants whereas the

COD test measures the oxygen demand of oxidizable pollutants.

Waterborne diseases

Waterborne diseases are caused by pathogenic microorganisms which are directly transmitted when contaminated fresh water is consumed. Contaminated fresh water, used in the preparation of food, can be the source of foodborne disease through consumption of the same microorganisms. According to the World Health Organization, diarrheal disease accounts for an estimated 4.1% of the total DALY global burden of disease and is responsible for the deaths of 1.8 million people every year. It was estimated that 88% of that burden is attributable to unsafe water supply, sanitation and hygiene, and is mostly concentrated in children in developing countries.

Waterborne disease can be caused by protozoa, viruses, or bacteria, many of which are intestinal parasites.

Protozoal Infections

Amoebiasis(hand-to-mouth)
Cryptosporidiosis(oral)
Cyclosporiasis
Giardiasis (oral-fecal) (hand-to-mouth)
Microsporidiosis

Parasitic Infections

Schistosomiasis(immersion)
Dracunculiasis(Guinea Worm Disease)
Taeniasis
FasciolopsiasisHymenolepiasis(Dwarf Tapeworm Infection)
Onchocerciasis(River blindness)
Echinococcosis(Hydatid disease)
coenurosis
Ascariasis
Enterobiasis

Bacterial Infections

Botulism
Campylobacteriosis
Cholera
***E. coli* Infection**
***M. marinum* infection**
Dysentery
Legionellosis (two distinct forms: Legionnaires' disease and Pontiac fever)
Leptospirosis
Otitis Externa(swimmer's ear)
Salmonellosis
Typhoid fever
Vibrio Illness

Viral Infections

Adenovirus infection
Gastroenteritis
SARS (Severe Acute Respiratory Syndrome)
Hepatitis A
Poliomyelitis(Polio)
Polyomavirus infection

Water Pollution

Two major classifications

1. Point Source
2. Non-point Source

1.Point Sources

*Single large source

*Can localize it to one spot

- Industrial Plants
- Sewage pipes

Point source

Point source water pollution refers to contaminants that enter a waterway from a single, identifiable source, such as a pipe or ditch. Examples of sources in this category include discharges from a sewage treatment plant, a factory, or a city storm drain. The U.S. Clean Water Act(CWA) defines point source for regulatory enforcement purposes.[The CWA definition of point source was amended in 1987 to include municipal storm sewer systems, as well as industrial storm water, such as from construction sites.

2. Non-point Sources

*Diffuse source or many smaller point sources

*Automobiles

*Fertilizer on fields

2. Non–point sources

Non–point source pollution refers to diffuse contamination that does not originate from a single discrete source. NPS pollution is often the cumulative effect of small amounts of contaminants gathered from a large area. A common example is the leaching out of nitrogen compounds from fertilized agricultural lands. Nutrient runoff in stormwater from "sheet flow" over an agricultural field or a forest are also cited as examples of NPS pollution.

Contaminated storm water washed off of parking lots, roads and highways, called urban runoff, is sometimes included under the category of NPS pollution. However, this runoff is typically channeled into storm drain systems and discharged through pipes to local surface waters, and is a point source. However where such water is not channeled and drains directly to ground it is a non-point source.

Surface runoff, also called nonpoint source pollution, from a farm field in Iowa, United States during a rain storm. Topsoil as well as farm fertilizers and other potential pollutants run off unprotected farm fields when heavy rains occur.

Raw sewage and industrial waste flows across international borders—New River passes from Mexicali to Calexico, California


(CNN/COURTESY WWF/FILE)

Measurement of water pollution

Water pollution may be analyzed through several broad categories of methods: physical, chemical and biological. Most involve collection of samples, followed by specialized analytical tests. Some methods may be conducted *in situ*,without sampling, such as temperature. Government agencies and research organizations have published standardized, validated analytical test methods to facilitate the comparability of results from disparate testing events.

Sampling

Sampling of water for physical or chemical testing can be done by several methods, depending on the accuracy needed and the characteristics of the contaminant. Many contamination events are sharply restricted in time, most commonly in association with rain events. For this reason "grab" samples are often inadequate for fully quantifying contaminant levels. Scientists gathering this type of data often employ auto-sampler devices that pump increments of water at either time or discharge intervals.

Sampling for biological testing involves collection of plants and/or animals from the surface water body. Depending on the type of assessment, the organisms may be identified for biosurveys (population counts) and returned to the water body, or they may be dissected for bioassays to determine toxicity.

Physical testing

Common physical tests of water include temperature, solids concentrations (e.g., total suspended solids (TSS)) and turbidity.

Chemical testing

Water samples may be examined using the principles of analytical chemistry. Many published test methods are available for both organic and inorganic compounds. Frequently used methods include pH, biochemical oxygen demand (BOD), chemical oxygen demand (COD), nutrients (nitrate and phosphorus compounds), metals (including copper, zinc,cadmium, lead and mercury) , oil and grease, total petroleum hydrocarbons (TPH), and pesticides.

Biological testing

Biological testing involves the use of plant, animal, and/or microbial indicators to monitor the health of an aquatic ecosystem. *Bacteriological water analysis*

Water Pollution prevention& control

1. Environmental management
2. Regulation and monitoring of pollution
3. Pollution prevention
4. Waste management
5. Waste minimisation
6. Domestic sewage
7. Industrial wastewater
8. Agricultural wastewater
9. Construction site stormwater
10. Urban runoff (stormwater)


Thank you
very much