Medical Ecology is an emerging science that defines those aspects of the environment that have a direct bearing on human health. The concept of ecosystem functions and services helps to describe global processes that contribute to our well-being, helping to cleanse the air we breathe, the water we drink, and the food we eat. The term “Medical Ecology” was first coined by the eminent microbiologist, Rene Dubos, who intended it to embrace the concept that natural systems, if explored fully, would provide for many of our needs, as for example, quinine did regarding the treatment of malaria. Dubos discovered gramicidin in 1939, a powerful topical anti-microbial agent. Together with Alexander Fleming's discovery of penicillin in 1928, these findings led the way into the modern era of anti-microbial therapy.[1]

Infectious disease agents are some of the most devastating contaminants of our water supplies. Most diarrheal diseases are waterborne, and infants, in particular, suffer from them in places throughout the world where the drinking water supply is routinely contaminated with human feces. In fact, more children die each year from diarrheal infections (some 10-15 million) than from any other single cause. Water pollution of various types continues to erode away the amount of potable water available to us, worldwide. Water is the single most valuable ecosystem service provided to us by natural systems, besides the production of oxygen by plants, but we are not yet united as a species in preventing further decay of this resource. The following applications will reveal the extent to which we need to remediate that service before water is once again a thing we can afford to take for granted.

Virtually all types of water pollution are harmful to the health of humans and animals. Water pollution may not damage our health immediately but can be harmful after long term exposure. Different forms of pollutants affect the health of animals in different ways:

- Heavy metals from industrial processes can accumulate in nearby lakes and rivers. These are toxic to marine life such as fish and shellfish, and subsequently to the humans who eat them.
- Industrial waste often contains many toxic compounds that damage the health of aquatic animals and those who eat them. Some of the toxins in industrial waste may only have a mild effect whereas other can be fatal. They can cause immune suppression, reproductive failure or acute poisoning.
- Microbial pollutants from sewage often result in infectious diseases that infect aquatic life and terrestrial life through drinking water. Microbial water pollution is a major problem in the developing world, with diseases such as cholera and typhoid fever being the primary cause of infant mortality in Africa, for example.
- Organic matter and nutrients causes an increase in aerobic algae and depletes oxygen from the water column. This causes the suffocation of fish and other aquatic organisms.
- Sulfate particles from acid rain can cause harm the health of marine life in the rivers and lakes it contaminates, and can result in mortality.
- Suspended particles in freshwater reduces the quality of drinking water for humans and the aquatic environment for marine life. Suspended particles can often reduce the amount of sunlight penetrating the water, disrupting the growth of photosynthetic plants and micro-organisms.[2]

Dirty water is the world's biggest health risk, and continues to threaten both quality of life and public health. When water from rain and melting snow runs off roofs and roads into our rivers, it picks up toxic chemicals, dirt, trash and disease-carrying organisms along the way. Many of our water resources also lack basic protections, making them vulnerable to pollution from factory farms, industrial plants, and activities like fracking. This can lead to drinking water contamination, habitat degradation and beach closures.

Belarus has an extensive network of piped water and sanitation, yet 15 percent of the population still lacks access to them. Eight percent of the country's water supply networks and 5 percent of the sewerage networks need replacing, and 227 wastewater treatment plants need repairs. Groundwater contamination is a hazard. Drinking water is of poor quality because of its high iron content.
The government is making it a priority to bring safe drinking water to people, and to build good wastewater treatment and sanitation facilities.

The regional center Gorodok is a good example of the impact of better water and sanitation. It has 14,000 residents and wastewater treatment facilities built in the 1950s. As a result of overloading and deterioration of some buildings and facilities, treated wastewater had bad quality. Contaminated water was discharged through soil-reclamation canals into the Gorozhanka River and beyond, and into the system of lakes that feeds the Western Dvina River, which in turn flows into the Baltic Sea.

The dirty wastewater contained phosphorus and nitrogen compounds, which caused algae blooms and led to a gradual change in ponds and lakes, effectively slowly turning them into swamps. This process can be clearly observed in the coastal zone of the river Gorozhanka.[3]

Everyday household activities contribute to water pollution. When it rains, fertilizer from lawns, oil from driveways, paint and solvent residues from walls and decks and even pet waste are all washed into storm sewers or nearby lakes, rivers and streams -- the same lakes, rivers and streams we rely on for drinking water supply, boating, swimming and fishing. Also, improper handling of materials around the house can lead to pollution. Here are some ways you can help reduce your impact on waterways.

1. Recycle and dispose of all trash properly. Never flush non-degradable products -- such as disposable diapers or plastic tampon applicators -- down the toilet. They can damage the sewage treatment process and end up littering beaches and waters. And make sure to properly dispose of all pet waste from your property to keep it out of storm drains and water supplies.
2. Use nontoxic household products whenever possible. Discarding harmful products correctly is important, but not buying them in the first place is even better. Ask local stores to carry nontoxic products if they don't already.
3. Don’t throw litter into rivers, lakes or oceans. Help clean up any litter you see on beaches or in rivers and lakes, make sure it is safe to collect the litter and put it in a nearby dustbin.
4. Conserve water by turning off the tap when running water is not necessary. This helps prevent water shortages and reduces the amount of contaminated water that needs treatment.
5. Be "green" when washing your car. Skip the home carwash. Take your car to a professional – professional carwashes are required to drain their wastewater into sewer systems, where it is treated before being discharged. This spices your local rivers and bays from the brake fluid, oil and automotive fluids that could otherwise contaminate your water. Many carwashes also recycle their wastewater, and use less than half the amount of water of a home carwash. Ask around to find a carwash that practices wastewater recycling.
6. Be an activist. Educate yourself about water issues in your community. Find out where and how decisions are made about investments in projects and programs to protect your water and the rates and charges you pay for water and wastewater service. Contact your public officials and attend hearings to encourage them to support laws and programs to protect our water. Ask officials to control polluted runoff, ensure protection for wetlands and other aquatic ecosystems, reduce the flow of toxics into our waterways, and strengthen enforcement. Volunteer for a beach or stream clean up, tree planting, water quality sampling, or stream pollution monitoring project sponsored by a local environmental group or watershed council.[4]

According to H.H. Mitchell, Journal of Biological Chemistry 158, the brain and heart are composed of and even the bones are watery: 31%.[5] In fact, humans are an integral part of nature, but most of the time we are unaware of our connectedness to the rest of the world. Medical Ecology links natural processes with living on earth, from the point of view of being human. The environment in which we live is characterized by countless physical, chemical, and biological systems, and it is in this complex setting that we carry out our lives, whether we are aware of them or not. The more aware of them we are, the more likely it is that we can avoid those situations that take away from our sense of well-being.

REFERENCES


