

Heavy metals	Impacts
Chromium(Cr)	Cancer, anuria, nephritis, gastrointestinal ulceration, perforation in partition of nose. It penetrates cell membrane and badly affects central nervous system. Causes respiratory trouble, lung tumors when inhaled. May cause complications during pregnancy. Has adverse effects on aquatic life.
Manganese (Mn)	Growth retardation, fever, sexual impotence, muscles fatigue, eye blindness.
Cobalt (Co)	Paralysis, diarrhea, low blood pressure, lung irritation, bone defects.
Nickel (Ni)	Changes in muscle, brain, lungs, liver, kidney and can also cause cancer, tremor, paralysis and even death.
Boron (B)	Harmful to crops and affects metabolic activities of plants in higher concentration. Affects central nervous system.
Phosphates and nitrates	Deplete oxygen by excess algae production-giving bad odor and taste of water and detrimental to aquatic life. They are toxic for human and animal life if concentration is beyond permissible limits. Nitrates also cause cyanosis or blue body disease.
Sulphide	Gives bad odor, toxic to many aquatic organisms and animals.
Oil/Grease/Oil Sludge Petroleum product	Very harmful for soils, aquatic life, animal, human and plant life. They are very toxic. Agricultural land may suffer accumulation of oily waste affecting aeration and fertility. Many constituents of oily sludge are even carcinogenic and potent immunotoxicants.
Surfactants and detergents	They are toxic and harmful for aquatic life, animals and humans. Inhibit self-purification of water.
Pesticides/ Insecticides	Highly poisonous for humans and animals. Also they lower seed germination, destruction of nerve cells in certain regions of brain resulting in loss of dopamine which is used by nerve cells to communicate with brain. Some of these are physical poisons, some are protoplasmic poisons causing liver damage, some are respiratory poisons and some are nerve poisons.

Table 2. Diseases due to Microbial Pollution of Water

Diseases	Bacteria / Virus / Protozoa / Worm
Water Borne Diseases Bacterial: Typhoid Cholera Parathyroid Gastroenteritis Bacterial dysentery Virus: Hepatitis infectious Poliomyelitis Diarrhea Other enteric diseases (Protozoan): Amoebic dysentery Other intestinal diseases	<i>Salmonella typhi</i> <i>Vibrio cholera</i> <i>Salmonella paraphi</i> Enterotoxigenic <i>Escherichia coli</i> Variety of <i>Escherichia coli</i> Hepatitis A virus Polio Virus Variety of <i>Escherichia coli</i> Rota-virus, Echono-virus, coxasckie-virus, other viruses <i>Ent-amoebic histolitica</i> <i>Gardia sp. and Cryptosporidium sp.</i>
Water-washed diseases: Scabies Trachoma Bacillary dysentery	Various skin fungus species Trachoma infecting eyes <i>Escherichia coli</i>
Water based diseases: Schistosomiasis Guinea worm	Schistosoma sp. Guinea worm
Infection through water related insect vectors: Malaria	Plasmodium through Anaphelis
Infections due to defective sanitation polluted water Hookworms	Hookworms, Ascaris

Sources:

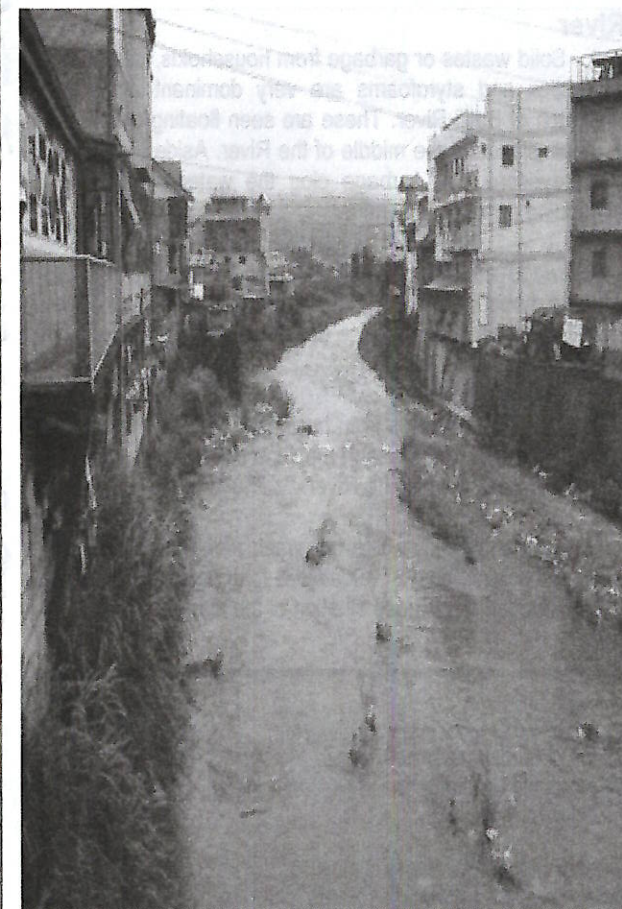
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Benguet State University
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HEALTH IMPACTS OF POLLUTED RIVERS



POLLUTED RIVERS AND THEIR EFFECTS TO OUR HEALTH

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

Identified major pollution sources at Balili River

A. Solid wastes or garbage from households, particularly plastics and styrofoams are very dominant along the stretch of Balili River. These are seen floating or forming small islands in the middle of the River. Aside from being an eyesore, the garbage clog the waterways causing flooding during heavy rains.

B. Sewage are also directly discharged into the river by some households and business establishments. These pollutants do not only pose danger and risk to aquatic life but also humans.

C. Untreated effluents from business establishments such as used oil from motor and machine shops also contribute to the degradation of the River.

D. Human activities like car wash along the River. Improper containment of excavated materials from the said construction may cause siltation of the river.

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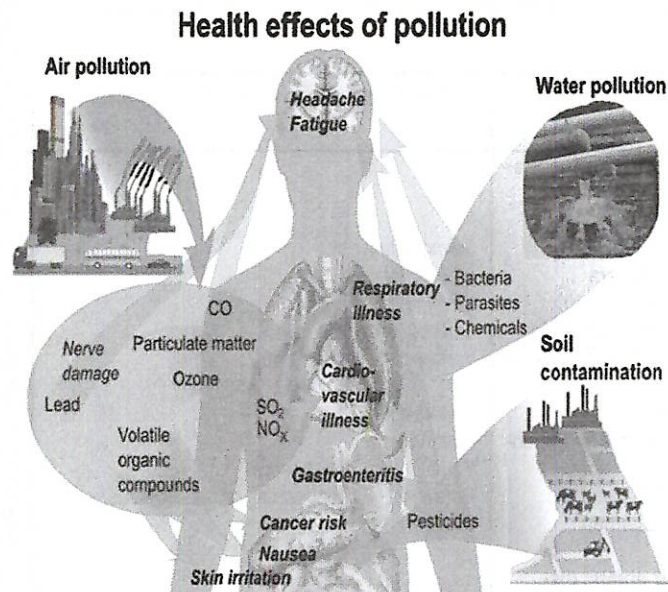


Figure 1. Effects of air and water pollution

Specific contaminants in polluted rivers include a wide spectrum of chemicals and pathogens which are dangerous not only to the river flora and fauna but also to the health of people located around these polluted rivers as reflected in Tables 1 and 2.

Heavy metals	Impacts
Zinc (Zn)	Heavy doses of Zn salts (165 mg) for 26 days causes vomiting, renal damage, cramps, etc.
Copper (Cu)	Excess of Cu in human body (more than 470 mg) is toxic, may cause hypertension, sporadic fever, uremia, coma.
Barium (Ba)	Excessive salivation, colic, vomiting, diarrhea, tremors*, paralysis of muscles or nervous system, damage to heart and blood vessels.
Iron (Fe)	Rapid respiration and pulse rates, congestion of blood vessels, hypertension and drowsiness.
Cadmium (Cd)	Vomiting, diarrhea, abdominal pains, loss of consciousness. During first phase, discoloration of teeth, loss of sense of smell, mouth dryness occurs. Afterwards it may cause decrease of red blood cells, impairment of bone marrow, lumber pains, disturbance in calcium metabolism, softening of bones, fractures, skeletal deformations, damage of kidney, hypertension, tumor formation, heart disease, impaired reproductive function, genetic mutation, etc.

Heavy metals	Impacts
Mercury (Hg)	Mercury is very toxic. Excess mercury in human body (more than 100 mg) may cause headache, abdominal pain, diarrhea, destruction of hemoglobin, tremors*, very bad effects on cerebral functions and central nervous system, paralysis, inactivates functional proteins, damage of renal tissues, hyper coagulability of blood, mimamata disease, and even death. It may cause impairment of vision and muscles and even coma. It disturbs reproductive and endocrine system. Also causes insomnia, memory loss, gum inflammation, loosening of teeth, loss of appetite, etc.
Lead (Pb)	Brain damage, vomiting, loss of appetite, convulsions, uncoordinated body movements, ill effects of various water pollutants: It is retained in liver, kidney, brain, muscle, soft tissues, bones. Leads to high rate of miscarriages, affects skin, and respiratory system, damages kidney, liver and brain cells. Disturbs endocrine system, causes anemia, and long term exposure may cause even death.
Arsenic (As)	Poisonous to fishes, animals and humans. Greater than 25 mg of arsenic causes vomiting, diarrhea, nausea, irritation of nose and throat, abdominal pain, skin eruptions inflammations and even death. It binds globulin of blood hemoglobin in erythrocytes. May cause cancer of skin, lungs and liver, chromosomal aberration and damage, gangrene, loss of hearing, injury to nerve tissue, liver and kidney damage. Minor symptoms of As poisoning, weight loss, hair loss, nausea, depression, fatigue, white lines across toe nails and finger nails.
Vanadium (V)	It is very toxic, may cause paralysis.
Silver (Ag)	Pathological change in kidney, liver and may even damage kidney.
Fluoride (F)	Excess fluoride intake in body results in progressive crippling scourge (sponging)/fluorosis of bones, teeth. May cause metabolic alternations in soft tissues and their functional mechanism.
Selenium (Se)	Fever, nervousness, vomiting, falling of blood pressure, causes damage to liver, kidney and spleen, loss of nails and hair, causes blindness to animals.