OPINION

# Impact of nanotechnology on environment

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**ABSTRACT**

Nanotechnology has an effect on a variety of disciplines, including engineering, biology, chemistry, computing, materials science, and communications, in addition to its medical, ethical, mental, legal, and environmental uses.

**Key Words:** *Nanotechnology; Nanomedicine; Nanoparticles*

## INTRODUCTION

Improved industrial processes, water purification systems, energy systems, physical enhancement, nanomedicine, better food production methods, nutrition, and large-scale infrastructure auto-fabrication are a few of the major advantages of nanotechnology. Due to its smaller size, nanotechnology may enable the mechanization of tasks that were previously impractical due to physical constraints, potentially lowering the demand for human labor, resources, or upkeep.

Potential hazards include problems with the climate, human health, and safeties, as well as transitional consequences like the displacement of traditional industries as nanotechnology goods take over, which worry proponents of privacy rights. These might be especially crucial if any unfavorable consequences of nanoparticles are disregarded.

Nanomaterials (materials that incorporate nanoparticles) do not pose a threat in and of themselves. Only a few characteristics, most notably their enhanced reactivity and mobility, can make them risky. We wouldn't be dealing with a real threat until certain nanoparticles' characteristics made them detrimental to environment or living things. It is possible to refer to this as nano pollution. A nanomaterial's effects on the world We must distinguish between two types of nanostructures: "fixed" nanoparticles, or nanoscale particles that are incorporated into a substance, material, or device ("fixed" nano-particles), and "free" nanoparticles, or individual nanoparticles of a substance that are present at some point during production or use. These free nanoparticles could be basic compounds or nanoscale species of elements, but they could also be complicated compounds, like those in which a nanoparticle of one element is coated with another. Since nanoparticles vary significantly from their common counterparts, the known toxicity of the macro-sized material cannot be used to predict the negative effects of nanoparticles. Dealing with the effects of free nanoparticles on human health and the ecosystem is complicated by this.

Green nanotechnology is the application of nanotechnology to improve the viability of processes that have harmful environmental effects. It also alludes to the use of nanotechnology-related products to improve sustainability. It involves developing eco-friendly nano products and utilizing nano products to advance sustainability. To reduce potential risks to the environment and human health associated with the manufacture and use of nanotechnology products, as well as to promote the replacement of current products with new nano products that are more environmentally friendly throughout their life cycle; green nanotechnology has been defined as the development of clean technologies. Green nanotechnology aims to create nanomaterials and products that don't harm the ecosystem or people's health, as well as nano-products that solve environmental issues. In order to create nanomaterials and nano-products without toxic ingredients, at low temperatures, using less energy and renewable inputs when feasible, and using lifecycle thinking in all design and engineering stages, it utilizes existing concepts of green chemistry and green engineering. Multidisciplinary science and technology like nanotechnology demand immediate attention from many different traditional areas of knowledge. Despite having a fantastic moniker, nanotechnology is actually very useful for underdeveloped nations. The Greek term for dwarf, nano refers to dimensions of a different order of magnitude. Nanotechnology is defined in a variety of ways. The majorities of them are technical and typically have to do with making structures that are smaller than 100 nm, or 100 times a millionth of a millimeter. Nanotechnologies are lauded for their potential to improve the environment and derided for posing new hazards. Give an overview of the current and forthcoming environmental issues related to nanotechnologies in this paper by highlighting general issues and highlighting three particular instances. (nanosilver, carbon nanotubes, and nanoparticles used in environmental remediation). Nanotechnology can help with resolving the environmental issues of a world that is expanding quickly.

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Nanotechnology can create methods that enable more specialized and affordable remediation instruments. Many of the techniques used today to remove toxic contaminants are time-consuming, costly, and labor-intensive. It is frequently necessary to perform a pre-treatment procedure and remove the contaminated region, which disturbs the ecosystem. Nanotechnology enables the development of remediation technologies that can take place in situ and reach unreachable areas like crevices and aquifers, negating the need for pricey pump- and heat-related operations. Nanoscience can also be used to create remediation tools that are particular for a given pollutant (for example, metal), increasing affinity and selectivity as well as the sensitivity of the method. This is made possible by its capacity to manipulate matter at the molecule level.

Significant harm is done to human health, vegetation, and traditional heritage when air pollution levels are high. To achieve this goal, more work must be done. There must be action done on a global scale to lower ground-level ozone and particulate matter concentrations. Additional steps must be taken at the national level to reduce nitrogen oxide and particulate pollution caused by the use of studded tires. There are several methods that nanotechnology can be used to reduce air pollution. One way is by using Nano catalysts for gaseous processes that have more surface area. Catalysts function by accelerating chemical processes that change hazardous vapors from automobiles and industrial facilities into safe gases. Among the catalysts presently in use is one that removes volatile organic compounds from industrial smokestacks using nanofibers made of manganese oxide. Another method makes use of nanostructured membranes with pores tiny enough to remove carbon dioxide or methane from exhaust.