Increased Use of Radiography in the Aviation Industry Can Improve Safety

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Although radiography is mainly used in medicine, x-raying may be beneficial in the field of aviation. Wings and other parts of the airplane experience stress and can potentially be damaged. While aircraft manufacturers have established recommended ranges of motion, it is still possible to have problems within the aircraft components. It is expensive and dangerous to dismantle the airplane, which is why x-rays can be a useful tool in assessing the condition of the aircraft. Aircraft crashes from improper maintenance and design failures cause tragedies that may be avoided with proper testing and maintenance by utilizing x-rays. NASA states that “radiographic testing provides a permanent visual record of the defects for possible future use.” X-radiation gives us a record of the discrepancies in an aircraft that we can use as a reference in the future and also makes it easier to find the fault.

During flight, any maneuver that causes acceleration or deceleration increases the forces and stresses the wings and fuselage. Tension, compression, shear, bending, and torsion are issues that airframes must endure during flight. With cycles of parts being used due to the material, there is a chance that fatigue cracks could go unchecked, as they can occur randomly and variably. Aircraft need many maintenance hours to be safe to fly, and approximately 3600 radiographic images are taken by a manufacturer when inspecting the parts. Faults in the structural integrity of the aircraft can be detrimental to safety. X-raying aircraft is the future for aircraft engineers to examine aircraft hardware without damaging the airplane, as the X-ray allows for direct viewing of the components of the aircraft. Direct viewing of the components of the aircraft will allow for less maintenance time and for most of the issues with the aircraft to be addressed and fixed.

Investigating the Impact of Climate Change On Habitat Loss, Species Extinction, And Northward Migration In The Arctic

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It was hypothesized that the increase in greenhouse gas emissions is expected to increase arctic sea levels and lead to vast CO2 release into the atmosphere. This potentially disrupts natural habitats, leading to the northern migration and extinction of many arctic species.

As greenhouse gas emissions rise, the Arctic and Antarctic regions are warming more than twice as fast as the rest of the world (Bamber, 2022). Earth's increasing temperature led to ice caps melting at faster rates, forcing species such as polar bears and North Atlantic right whales to migrate northward into regions of higher land density, escaping from warming oceans and rising sea levels as food sources become scarce.

Reputable sources were utilized to investigate the relationship between increasing greenhouse gas emissions and rising arctic sea levels to explain how climate change impacts arctic species. The NSF Ice Core Facility measured CO2 levels in Greenland ice cores, correlating greater ice depths in the Northern Hemisphere with greater CO2 concentrations, which consequently is released into the atmosphere when ice melts. UNESCO gives access to sea level data taken from stations across the Northern Hemisphere. Data taken from Prudhoe Bay, Alaska within the previous 30 days supported that sea levels are generally on the rise, causing certain marine and arctic species to migrate northward due to habitat loss. The IUCN Red List of Threatened Species provides data on vulnerable populations and habitats, labeling polar bears as vulnerable since 2015 due to severe weather causing habitat shifting and North Atlantic right whales as critically endangered since 2020 due to rapid population decline

Current data supports the statement that climate change is a major threat to arctic species by causing their populations to decline as they are losing their habitats and food sources, forcing northward migration in search of colder environments.

Investigating the Impacts of War on Carbon Dioxide Levels and the Environment

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For centuries wars have been like a plague on our planet, with endless deaths and destruction. Today we will look at the impact that war and the military have on our planet. We will look at carbon dioxide (CO2) levels in the atmosphere, and deaths across various. CO2 levels raised during the Houthi insurgency war in Yemen that took place between 2004 to 2014 (Macrotrends, 2018). An average of 700,000 people died in this war. Wars may directly or indirectly cause damage to the environment and humans, not just through loss of life, but also by contributing to (CO2) emissions. During this discussion we will answer: how does the military influence CO2 levels? What are the impacts of war on the environment?

According to Figure 5, in the Vietnam War 5 billion acres of land were destroyed which killed 50% of the mangrove population in that area, and killed 2 million people. The bombing of Nagasaki and Hiroshima killed in total 105,000 innocent people. Temperatures in Hiroshima got up to 7200*F. All infrastructure, flora and fauna were destroyed instantly due to the high temperatures.

Wars do directly and indirectly cause damage to the environment, loss of human lives, and contribute to CO2 levels one way or another. Military activity does appear to contribute to CO2 levels especially during war. The impacts of war on the environment as seen by the examples given would be a spike in CO2 levels, deforestation, loss of human lives, pollution and higher temperatures

Private Jets: Friend of our Celebrities and Enemy of our Earth

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Private jets emit over 5 times more pollution per passenger than commercial airplanes. Aviation emissions alone contribute to 17% of early deaths around the world. Despite the harm these flights cause to our environment and health, private flights are on the rise and carbon emissions are rising with it. Public figures have added a cumbersome amount of pollution into the environment, often using private jets on small distances that could be achieved in a 2 hour car ride.

For famous individuals, riding a commercial airplane can be a great risk and inconvenience. Many simply want privacy, which cannot be attained in shared aircrafts. In some cases, it is the most sensible way to travel as mentioned by Halkias et al (2024) . Nevertheless, the potential for private jets emissions to cause damage to the environment should not be overlooked.

There are many sustainable ways to travel that don't compromise safety, or add unnecessary amounts of CO_2 into the environment, such as hydrogen powered or electric planes (Saha et al, 2024). Private jets may be necessary on some occasions, especially for major politicians. However for most scenarios, it simply just isn't economical.

How Can Various Countermeasures Used in Aviation to Control Bird Strikes be Improved to be More Environmentally Friendly?

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Birds are a vital part of our ecosystem. They are also the most common wildlife threat to airplane landing and takeoff. Some airports will kill thousands of birds annually to preserve commercial airplanes and the lives of passengers, which are at significant risk due to bird strikes. Most of the wildlife prevention methods being used today, such as habitat modification, shooting, trapping, repellants, toxicants, and many others, do not take into consideration how it will negatively affect the birds and the environment we live in.

An innovative solution to mitigate bird strikes involves utilizing drones to mist bird repellent in areas prone to bird activity around airports. Citrus oil, while fettering birds due to its strong scent, is non-harmful to avian species, ensuring the well-being of wildlife in the vicinity. The misting process, carried out by drones, allows for precise and targeted application, reducing the overall environmental impact.

Additional ideas such as augmenting radar-based systems with artificial intelligence to allow for more accurate bird detection and avoidance strategies are considered. Using sustainable materials and production processes can contribute to an overall environmentally friendly solution. This combination of precision, eco-friendly components, and bird-friendly outcomes makes it a promising and sustainable method to enhance aviation safety.

Investigating the Relationship Between Particulate Matter Emissions Closer to Major Airports in the USA and their Possible Effects on the Common Public Health

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In America, thousands of aircraft fly daily. Each of these planes emits pollution into the atmosphere. One particular pollutant is “fine inhalable particles, with diameters that are generally 2.5 micrometers and smaller” (or PM 2.5) (EPA, 2023). The World Health Organization (WHO) has set a recommended daily Air Quality Guideline (AQG) of 15 ug/m^3.

An FAA.gov article from 2022 cites several studies noting adverse respiratory effects due to ambient and aviation related PM 2.5 emissions. One cited study attributed “16,000 premature deaths per year globally to global aviation emissions, with 87 percent attributable to PM2.5 (and)...about a third of these mortalities are attributable to PM2.5 exposures within 20 kilometers of an airport.”

Our hypothesis was that the closer the sample site is to a major airport, the higher the PM 2.5. Major international, high traffic airports were chosen for study. All available EPA outdoor air quality sample data were used. The distance of each site from the airport was compared to the average annual PM 2.5 data.

In general, the closer the EPA sample site was from the airport, the higher the average annual PM 2.5 concentration. The correlation that was found was weak. However the highest r-squared values were as follows: DeKalb–Peachtree: 27%, Dallas Fort Worth: 41%, and Los Angeles: 60%.

This partially supports the hypothesis that the closer a location is to a major airport, the higher the particulate matter emission rate. However, it is not as substantial as we had expected.

Future study will address the limitations of this study by sampling the airports in person after gaining permission, checking more states and checking more pollutants which previous researchers have studied such as Sulfate, Elemental Carbon, NO2, SO2 Ammonium, and Nitrate.