Artificial Intelligence and Sustainability

April 9, 2025

The article by Prof. Martin Carbajo-Núñez OFM, published in the Blog of the Alphonsian Academy

The development of digital technologies and, more specifically, Artificial Intelligence (AI) offers enormous opportunities for progress, but also poses challenges in terms of sustainability.

Along with many positive aspects, the development of AI is also negatively impacting the physical and social ecosystem. In the social context, sources of information tend to shrink, promoting a "single, algorithmically elaborated thought" [1]. At the physical level, AI has a considerable environmental impact, mainly due to the high ecological cost associated with the extraction of rare earths, essential for the manufacturing of its technological components. The scarcity of these materials requires complex, slow, and expensive extraction processes, which contribute significantly to environmental degradation. Although more sustainable alternatives are being explored, they are still in their early stages.

Currently, China produces about 70% and processes more than 80% of the world's rare earths. The European Commission identifies 17 of these rare earth metals, including antimony, beryllium, germanium, graphite, lutetium, promethium, tantalum, vanadium, and tungsten [2]. The extreme scarcity of some of these materials requires the removal of enormous amounts of earth to obtain them. An extreme case is obtaining one kilogram of lutetium, which usually requires the removal of 200 tons of rock [3].

AI consumes large amounts of water. It is estimated that ChatGPT-3 uses half a litre of water for cooling to answer 20 to 50 questions. In 2027, total consumption will be between 4.2 and 6.6 billion cubic meters of water, more than four times what Denmark consumes.

AI also requires enormous amounts of electricity. It is estimated that a search on ChatGPT can require between three and ten times more energy than one on Google [4]. The International Energy Agency, in its 2024 report, states that the nearly 8,000 data centers in the world (33% in the USA) will use more than 1,000 TWh in 2026, an amount equivalent to the current consumption of Japan. This excessive consumption is increasing greenhouse gases and forcing the regulation of their use in some countries. Already in 2020, Singapore was forced to temporarily limit the number of new data centers because they had reached 7% of the total electricity consumption in the country.

In the face of these worrying data that require creative solutions, AI also offers new opportunities for ecosystem sustainability. In particular, AI can help monitor methane emissions that contribute to the greenhouse effect and control other aspects of the current ecological crisis. It can also be used to anticipate energy consumption and respond appropriately, as well as optimize the use of existing electricity networks and renewable energy production. In addition, it can contribute to better water management and more efficient waste and recycling management. It can also help analyze environmental data, such as deforestation, plastic pollution in the oceans, and anticipate possible natural disasters.

The greatest danger is that AI is controlled by a few multinationals for profit. This concentration of power in a few hands is a threat to democratic life, ecosystem sustainability and integral development.

[1] Francisco, «Message for the 58th World Communications Day» (24.01.2024), in OR 19 (24.01.2024) 8.

[2] European Commission, «Raw Materials Policy and Strategy», on the Internet: https://single-market-economy.ec.europa.eu/sectors/raw-materials/policy-and-strategy-raw-materials_en

[3] Kettmajer Michele, «The collective power of digital data», in Rivista di Scienze dell'Educazione 62/1 (2024) 16-36.

[4] https://www.europapress.es/portaltic/sector/noticia-consulta-chatgpt-consume-tres-veces-mas-energia-buscador-google-20230728164651.html?utm_source=chatgpt.com

(original Spanish text)