

Gandhi on science

The champion of India's freedom movement was a supporter of sustainable development.

India's tourist shops do a good trade in Gandhi memorabilia. One particularly popular souvenir is a plaque that lists Mohandas Karamchand (Mahatma) Gandhi's 'seven social sins'. These include 'politics without principles', 'commerce without morality' and 'science without humanity'.

During his lifetime and after his assassination in January 1948, Gandhi, the human-rights barrister turned freedom campaigner, has been mischaracterized as anti-science — often because of his concerns over the human and environmental impacts of industrial technologies.

But in the month that the world commemorates the 150th anniversary of Gandhi's birth, it is time to revisit our understanding of this aspect of his life and work. Gandhi was a keen student of the art of experimentation — his autobiography is subtitled 'The Story of My Experiments with Truth'. He was an enthusiastic inventor and an assiduous innovator, making, discarding and refining snake-catching tools, sandals made from used tyres, and methods for rural sanitation, not to mention the small cotton-spinning wheels that would become his trademark.

Anil Gupta at the Indian Institute of Management in Ahmedabad, who has researched rural innovation in India for 40 years, says that Gandhi was also an early adopter of developing and improving technologies using crowd-sourcing — in 1929 he announced a competition, with a cash prize, to design a lightweight spinning wheel that could produce thread from raw cotton. It would be of solid build quality that would last for 20 years. "Gandhi was an engineer at heart," adds Anil Rajvanshi, director of the Nimbkar Agricultural Research Institute in Phaltan, India.

Gandhi adopted experimental methods equally in his planning and execution of civil-disobedience campaigns against colonial rule. That legacy alone has endured to the extent that climate-change protest groups such as Extinction Rebellion describe themselves as following in a Gandhian tradition.

Gandhi drew the line at the resource-intensive, industrial-scale engineering that Britain brought to India after the first waves of the Industrial Revolution. Inspired in part by the writings of Ralph Waldo Emerson, John Ruskin, Henry David Thoreau and Leo Tolstoy, he called for manufacturing on a more human scale, in which decisions about technologies rested with workers and communities.

Gandhi was aware that he was perceived as being anti-science. His biographer Ramachandra Guha quotes a 1925 speech to college students in Trivandrum (now Thiruvananthapuram) in southern India, in which Gandhi said that this misconception was a "common superstition". In the same address, he said that "we cannot live without science", but urged a form of accountability: "In my humble

"He was an enthusiastic inventor and an assiduous innovator." opinion there are limitations even to scientific search, and the limitations that I place upon scientific search are the limitations that humanity imposes upon us."

Gandhi understood that technology's negative impacts are often felt disproportionately by low-income rural populations. In that same speech to the Trivandrum students, he challenged his young audience to think of these communities in their work. "Unfortunately, we, who learn in colleges, forget that India lives in her villages and not in her towns. How will you infect the people of the villages with your scientific knowledge?" he asked them.

In the end, Gandhi's call for less-harmful technologies was out of sync with India's newly independent leadership, and also went against the grain of post-Second World War science and technology policy-making in most countries. India's first prime minister, Jawaharlal Nehru, was strongly influenced by European industrial technology and also by the model of large publicly funded laboratories — the forerunners to today's vibrant and globally renowned institutes of science and technology. By contrast, Gandhi's ideas were seen as quaint and impractical.

Influential figures from history often leave contested legacies. But in one respect at least, the space for debate about Gandhi's life and impact has narrowed. As the world continues to grapple with how to respond to climate change, biodiversity loss, persistent poverty, and poor health and nutrition, Gandhi's commitment to what we now call sustainability is perhaps more relevant today than in his own time. ■

Nile tensions

Let researchers finish their work on the impacts of Africa's largest hydropower dam.

Scientists investigating the hydrology of the Nile are likely to have heard the story of their tenth-century predecessor, mathematician and physicist Ibn al-Haytham. The ruler of Egypt asked al-Haytham to dam the river, but it proved too great an engineering challenge. Fearing the caliph's wrath, al-Haytham is said to have feigned illness to avoid being punished.

Thankfully, the scientists currently advising Egypt, Ethiopia and Sudan on the Grand Ethiopian Renaissance Dam do not face anything like the same risks. But they are nevertheless under pressure as talks between the three countries — and especially between Egypt and Ethiopia — have hit an impasse (see page 159).

Ethiopia says the hydropower dam is needed urgently, because two-thirds of the country has lacked electricity for too long. Egypt is in less of a hurry. Ninety per cent of its fresh water comes from the Nile, and it is concerned that the dam will create water scarcity for its 100 million inhabitants over the five to seven years needed to fill the dam's reservoir. Last week, Egypt decided that it wants another country

to mediate the dispute — naming the United States as its preferred choice. Ethiopia rejects this proposal. This is an unfortunate turn of events. There might well be a need for mediation, but now is too soon. The countries are still waiting for the outcome of an independent scientific assessment of the dam's risks to downstream countries.

In 2015, Egypt, Ethiopia and Sudan agreed that an expert panel, the National Independent Scientific Research Group (NISRG), would assess the environmental impacts of each country's preferred timetable for constructing the dam. The group has been meeting regularly and is preparing to produce a consensus report and provide recommendations. But Egypt's decision to call for mediation before the scientists have had a chance to report puts the NISRG in an awkward position: the researchers representing Egypt, especially, might feel pressure not to write or say anything that could undermine their government's negotiating position.

Instead of rushing straight into mediation, the countries should let their scientific advisers complete the task that has been asked of them. The researchers should be allowed to publish their findings for scrutiny by everyone concerned, not least the citizens of the three countries, who will be most affected by the dam.

International involvement might be needed if the scientific advisers are unable to produce a consensus report, or if, once the findings are published, political leaders are unwilling or unable to shift their positions. But until then, Egypt, Ethiopia and Sudan need to let the researchers finish the job they have been asked to do. ■