

Editorial

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Change in the weather

A renewed push for scientific research into weather-modification technologies is long overdue.

In the 1956 movie *The Rainmaker*, Burt Lancaster plays a con man catering to the dreams of spinster Katharine Hepburn. And while both stars triumph in the end — the rain does fall, and she comes out of her shell — the implication remains that rain-making is little more than a scam.

Today's rain-makers struggle with their own credibility issues. They do have well established methods for seeding clouds with silver iodide crystals, which in most cases bolster precipitation by a small but significant amount (see [page 970](#)). That's enough to make the effort worthwhile for communities looking to bolster the snowpack on which they rely for water in summer, or to target rainfall over an agricultural area rather than a neighbouring one that is barren.

Yet weather-modification supporters face a perceived negative bias in the scientific community. For instance, a 2003 report from the US National Research Council publicly doubted whether weather-modification techniques work at all, although it did call for more investment in the field. There has yet to be the definitive experiment that settles exactly how well cloud seeding — or other weather-modification techniques, such as diverting fog or suppressing hail — works (or not).

Part of the scepticism is due to the field's chequered history. The field was born in a blaze of enthusiasm in the General Electric Research Laboratory in New York in 1946, when researchers began dreaming of weather modification on a grand scale — showering areas with rain and redirecting lightning strikes. But decades passed with little concrete progress; even the United States' wonderfully named Project Stormfury, which aimed to weaken hurricanes before they reached land, fizzled out in 1983. And basic questions remain unanswered regarding cloud and atmospheric physics, such as the influence of air-pollution aerosols.

As is the case in so many areas, the issues with weather modification boil down partly to an uneven allocation of resources. Some countries, such as Israel, have bucked the trend; the country's early experiments with cloud seeding identified the many scientific unknowns that remain, and the government has continued to fund ongoing work to understand those factors better. Other countries, such as the United States, have simply given up; the most promising experiment in America is run not by the federal government but by the state of Wyoming, which is spending nearly US\$9 million on a five-year series of cloud-seeding experiments evaluated by experts from the National Center for Atmospheric Research. That's the type of targeted and rigorous study that needs to be done in weather modification, but it took Wyoming to do it.

Elsewhere, plenty of money is flooding into the field, but on the wrong methods. There is little doubt that China's massive weather-modification undertaking has huge appeal for its rain-starved farmers. But most of the money goes on the operational costs of running technologies that have yet to be validated by science. China has the resources and the willpower to lead the world in weather-modification research, but has not yet stepped fully into that role. One promising move, however, is its newly established centre for weather-modification research.

If researchers could improve their understanding of weather modification, it might then be possible to tackle some of the larger legal and political issues. What happens, for instance, when one country wrings excess water out of a cloud before it drifts over a similarly parched neighbour? How does one engage cross-border negotiations on atmospheric rain, when terrestrial water (in aqueducts and rivers) itself is so contentious? Who actually owns the weather?

The stakes are high, as weather modification is one of those areas in which science can have an immediate and obvious benefit for society. It's long past time to invest modest funds in the basic understanding of it. Otherwise, the world's rain-makers may find themselves considerably less successful than Burt Lancaster.