



RAIN MAKERS OR CLOUD CUCKOO?

A stoush over whether the practice of cloud seeding could increase rainfall over parts of Australia has spilled into the parliamentary arena.

Some people call it snake oil; others swear by it and are pumping millions of dollars into research and the practice of it.

'It' is cloud seeding, and now an Australian company, a federal parliamentarian and the CSIRO are at loggerheads over Australia's attitude toward it as part of the House of Representatives Agriculture Committee's inquiry into future water supplies.

Cloud seeding is designed to help clouds provide rain or snow. It does this by assisting raindrop-sized droplets, or ice, to form in suitable clouds through the injection of an agent such as silver iodide crystals or, more recently, hygroscopic salt

(a mixture of sodium, magnesium and potassium chlorides). Injection can be either from a plane flying through or near the cloud, or from on-ground, gas-fired propulsion at mountain level.

The parliamentary champion of cloud seeding is John Forrest (Member for Mallee, Vic). In 2002 he visited Texas, where cloud seeding is practised over about a third of the state. He went to the US "as a cynic", but came back convinced of the necessity for greater Australian effort in the area. He observed the use of technologies which have never been tested in Australia, which he described in a report to parliament (*Harvesting the Skies*).

Photo: Getty Images

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Wing-mounted pyrotechnic flares are used to distribute seeding materials into clouds in Texas. Photo: John Forrest

“They chase the clouds and find the very precise location at which to introduce the agents ... with resultant rainfall.”

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“The Texans are convinced,” Mr Forrest says. “In Texas, their program has been supported by state funding to the tune of \$US5.88 million every year for the last five years. They measure the economic outcome for each dollar spent at 700 to one. They have a commitment from their state legislature for half the funding. The rest of it comes from the players, who are the water authorities scattered right across the west of Texas and all the local government divisions or counties, as they call them over there. In some situations, the farming bodies are contributing because they are convinced.”

Mr Forrest says the variety of weather and geological conditions in Texas are not unlike those in Australia.

“Driving through the Panhandle of Texas, you could be driving through the Western Division of New South Wales or through the federal division of Mallee. The only difference is the absence of mallee trees. Their underground water supply is on limestone: that is true of the water supply system for the eastern half of South Australia too. They have undulating, windblown sandhills—the same territory—with the deserts of New Mexico to the west.”

Mr Forrest says around 40 countries in the world put effort into weather modification science, including South Africa, the US and China, the latter spending around \$US100 million a year. His report provides details of programs he inspected in Texas, the results of which he says are very strictly monitored.

“They use a process called dynamic seeding, where they do not seed in a static way, as we have done and as we continue to do in Tasmania; they chase the clouds and find the very precise location at which to introduce the agents necessary to induce uplift and the creation of cumulous cloud, with resultant rainfall—a technique we have never used in Australia.

“The details are compelling and the report concludes by recommending that the CSIRO renew its interest in cloud seeding research based on the use of high technology interpretive radar, which is used in Texas; and that this interest should commence with an immediate visit by CSIRO meteorologists to Texas as a matter of urgency.”

Australia’s CSIRO abandoned dedicated research into cloud seeding in the 1980s.

“It has always been extremely difficult to establish whether cloud seeding works,” the CSIRO’s Dr Brian Ryan told the Agriculture Committee. Dr Ryan admits new techniques have not been tried or researched in Australia.

“Certainly, within CSIRO the priorities have been in developing weather applications and climate in a particular area. That is where our priorities have been—they have been determined in terms of partnerships with our stakeholders and that has determined the direction we are going. We have kept a watching brief on the state of weather modification. If we were to re-establish it in Australia, it would be a massive effort—I have certainly advised it, at least several times.

“If you are asking me to speak honestly in terms of what it would require, CSIRO itself would not actually have the capacity to undertake all the various areas concerned. For example, if you look at what is happening in places like the US, I am sure, if it starts up, there will be a whole lot of technologies—radar and those sorts of things—which currently we would certainly not have the ability to use. It would actually take a wide range of skills to be able to do it. I note that one of the submissions to your committee was from Monash University suggesting that a pathway to this could, in fact, be through a

CRC [cooperative research centre]. I think the attraction of that would be that it actually would require hard business sense. To create a CRC, you actually are required to get partners—the whole thing actually has to go through. I am sure that the CSIRO would be prepared to take part in discussions on such a thing.”

Dr Ryan indicated the CSIRO remained sceptical. “Our advice has consistently been that if someone wishes to undertake cloud seeding and invest in it, CSIRO does not have a problem. But we would always say to them, ‘If you want to know down the line whether there has been an answer, whether there has actually been a water increase, you have to actually develop methodologies which are going to show you’.”

An Australian company which advocates cloud seeding, Australian Management Consolidated Pty Ltd, has also given evidence. The company’s Managing Director, Aron Gingis, told the committee of work by Professor Daniel Rosenfeld, a decorated international meteorologist who works with NASA (the US Space Agency) and other organisations.

Professor Rosenfeld contends that airborne pollution is having a negative effect on rainfall, a finding he first published after the massive 1998 bushfires in south-east Asia, which he observed as part of a joint NASA-NASDA (Japanese Space Agency) tropical rainfall measuring mission. Mr Gingis outlined the findings to the committee.

“The findings were that TRMM, which is the tropical rainfall measure mission, observed first-hand evidence of smog from forest fires. The smoke from the fires—that had been started by developers clearing land—shut off precipitation for hundreds, if not thousands, of kilometres downward in Kalimantan.

“In other words, when these fires were created, the clouds did not precipitate any more. They went right into the ocean without any precipitation.”

The result was that rain-starved forests were drying off. The clouds that were not producing rain, however, continued to produce lightning, which started more fires in inaccessible areas which could not be controlled. “It created a snowball effect,” Mr Gingis said.

“We explained to them [the Indonesians] at the time that in order to eradicate those fires and that terrible smoke that affected them, the only thing they could do was to stop developers burning fires upwind in those developing areas. Slowly the monsoonal rains—that is the only thing that could help—would then close the fires downwind.”

Mr Gingis explained that this finding had implications for Australia.

“Unfortunately, when we focused our instruments and NASA satellites on south-east Australia, we found a very similar picture,” he told the committee. By tracking pollution plumes emitted by power stations, smelters, refineries and large metropolitan areas, looking at the physical impacts on clouds as they encountered that pollution, and then comparing the rainfall from those clouds with non-polluted periods, Professor Rosenfeld and Mr Gingis again came to what they believe is a startling conclusion—rainfall from clouds affected by the pollution is markedly inhibited, to the point of total suppression.

“The finding is that urban and industrial air pollution causes a substantial reduction of rainfall and snowfall,” Mr Gingis said. “The consequence is a substantial reduction in flow of the Murray-Darling, Goulburn, Murrumbidgee and other rivers in New South Wales and Victoria. Of course it impacts on the economic decline in certain rural communities in the Murray-Darling Basin.

“We also have an estimation of how much physical rainfall we believe is lost in the Victorian Alps and the Snowy Mountains. We believe that only in the area of the Victorian Alps and the Snowy Mountains, on average every year, we are losing approximately five million megalitres.”

Professor Rosenfeld and Mr Gingis contend that the adverse effect occurs through pollution affecting the physical structure of clouds. They say polluted clouds contain abnormally small water droplets. About a million small droplets must collide and coalesce to form a raindrop.

“What we have found, unfortunately, is that as soon as the average size of the particles is smaller than 50 microns, these particles will not coalesce. If they do not coalesce, there is no rainfall. In order for a drop to fall on the ground, you need to have millions of those small particles to collide, to coalesce. If there is no coalescent process in those clouds, the clouds will just drift along with all that water.

“What we have found is two things happening with those clouds. One is that they evaporate, like in this particular case: they just disappear. The other is that they drive those clouds full of water right through the mainland of Australia into the ocean.”

Mr Gingis and Professor Rosenfeld say that cloud seeding can be used to help those small particles to collide and coalesce.

“Cloud seeding is one of the solutions to mitigate the situation,” Mr Gingis said.

Mr Gingis has a problematic relationship with the CSIRO. He accuses them of criticising and ignoring his company and Professor Rosenfeld because they fear funding being directed away from their own programs.

“They are prepared to trial all over the world. They are prepared to cloud seed. They are prepared to learn by errors. But what have we got?” He wants a cloud seeding trial to be conducted over the Snowy Mountains.

“We have to be given a budget to do

proper research. With the state of our relationship with the CSIRO, I will not work with the CSIRO. I will work directly with the water authorities and directly with the Snowy Mountains scientific research authority, with the government.”

John Forrest is supportive.

“It disturbs me that our own venerated CSIRO are not attributing significant scientific merit to Professor Rosenfeld’s work,” he told parliament. “I have been very proud of the work of the CSIRO here in Australia, and years ago we led the charge in the scientific research associated with cloud seeding and trying to impact our rainfall patterns. So I am disturbed that Professor Rosenfeld’s work is not regarded as having scientific merit which is worthy of some research commitment here in Australia. If we do not get smart about looking at other expert evidence and applications then the crisis that is already upon us will become so severe that it could well be too late.

“I call upon the CSIRO to take a serious look at Professor Rosenfeld’s work.” ■

Links

Transcripts of evidence and submissions from the CSIRO and Australian Management Consolidated, plus John Forrest’s report *Harvesting the Skies*, are available on the water inquiry website at www.aph.gov.au/house/committee/primind/waterinq

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Smog over Melbourne—is it inhibiting rain? Photo: Craig Hughes/NewsPix