

AUSTRALIA'S NATIONAL RURAL AFFAIRS WEEKLY

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Renewed push for cloud seeding

Reporter: Tim Lee

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Amid growing concern from farming communities and governments over the scarcity of water, the controversial issue of cloud seeding is back on the agenda with supporters claiming they now have the know-how to produce widespread and reliable rainfall.

Add to this the fact that the Snowy Hydro Authority has this month told the Federal Government that cloud seeding is the cheapest and most effective way to generate water vital to restoring the once mighty Murray River.

But Australia's peak scientific body, the CSIRO is far from convinced.

Like most Australians during the past few years Federal politician John Forrest, has been scanning the skies with growing frustration. Masses of promising clouds still sweep over the parched paddocks of his Mallee electorate. But mostly they bring no rain. And no relief from the drought, which grips Southern Australia.

"Well I'm a little bit frightened these clouds are classic drought clouds, we've been watching them for the last few years floating over our electorate, there's moisture up there, but I now have confirmed science that clouds right across continental Australian are so badly impacted by aerosols and so many other particles of carbonates coming from big cities and power stations that the moisture in the air, has got too many options so it won't co-alesce to form a sufficient molecule to form a rain drop, that is now confirmed science," John Forrest, Federal

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FARM FACTS

Current world production of seafood is almost 130 million tonnes a year, with 90+ million tonnes from the wild and over 30+ million tonnes from aquaculture.

Australia is the world's third largest wheat exporter with about a 16 per cent global market share.

Around two-thirds of Zimbabwe's workforce rely on agriculture for employment.

WEATHER

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Our clip of the week is *Dancing Shoes*, performed by Carter & Carter. | [Play clip](#) |

Member for Mallee said.

John Forrest believes there is a remedy. He advocates cloud seeding. Artificially inducing clouds to produce rain.

It's a subject, which provokes some emotive responses.

"Well people think that we shouldn't be fiddling with God's plan which is fine, I believe in that principle, but the reality is, we have. Inadvertently, not deliberately, we all drive motorcars, we all cause emissions to the atmosphere in one form or another, which creates this pollution and makes our clouds so dysfunctional. So we're all part of that and God's given us some grey matter to try and figure this out," John Forrest said.

Some of Australia's best brains have tried to do just that. But Australia's peak scientific body, the C.S.I.R.O, remains unconvinced of the effectiveness of seeding clouds.

"Look there's a limited amount of funding available for research into weather and climate and so it's about having a measured approach to where you would put your resources. At this stage the information isn't sufficient that this is an area that we should invest against other national priorities," Greg Ayers, CSIRO Atmospheric Research said.

From 1947, a year after its discovery, Australia quickly embraced cloud seeding. For some thirty years the Snowy Mountains Authority used it extensively to bolster rainfall to generate hydro-electricity and valuable irrigation water. The CSIRO was a world leader.

"But couldn't make it work to the extent that people could have the confidence it was worthwhile investing money in operational outcomes," John Forrest said.

Among farmer groups prolonged drought is fuelling a growing chorus wanting more scientific research devoted to better understanding the climate of southern

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Australia.

In June, public hearings of the House of Representatives Standing Committee on the Future of Water Resources put cloud seeding well and truly back on the public radar.

John Forrest, recently returned from a scientific tour of Israel, is utterly convinced it's time to re-examine the possibilities of rainfall enhancement here.

He'll shortly table his report in Federal Parliament.

"Currently in Australia, even though it's rained in our early winter, they're would be at least 13 million Australians in some level of water restrictions, so we're all in it, in the same boat," John Forrest said.

"Things are pretty bad in the Wimmera-Mallee system, the whole water system of the North-West of Victoria comes from the Grampian Mountains, it's the largest channel system in the world, it's a hundred years old and we're busy piping that now, but we haven't got ahead of the crisis of the storages, we got as low as 6 percent, a little bit of rain in the last month of so has brought that up to about 8 percent but Wimmera-Mallee Water and its customers are confronted with the reality that water has to be carted in tankers, so we've reached crisis point".

"I think a case needs to be made for a renewal of funding for cloud seeding on a fairly wide scale particularly in the Murray Darling Basin where the problem seem to be most severe. We have environments all the way up the Great Dividing Range which are conducive to cloud seeding, we've done trial programmes, I did one myself in 94-95 out of Tamworth, which in my view was an outstanding success, and successful programme were conducted many years ago in the Snowy Hydro catchments. Why aren't we doing it now, it's a great mystery to me," Ian Searle, Former Tasmanian Hydro Commission said.

For 36 years Ian Searle ran experiments and

oversaw cloud seeding operations across Southern Australia, most notably in recent years for Tasmania's Hydro-Electric Commission.

"Hydro Tasmania and make it pay twenty times more than the cost to run the programme, I have no doubt we could do similar things in other environments where there are mountains producing clouds where rain should be falling, rain, snow, hail whatever," Ian Searle said.

Clouds are made up of millions of minute water droplets. To fall earthward they need to join millions of other cloud nuclei, in the form of dust, salt from evaporated sea spray, sand or material from forest fires, volcanic eruptions and pollution.

Droplets of water can form small ice crystals on the surfaces of the cloud nuclei. When water vapour freezes onto the surface of these crystals they become heavier and eventually fall as rain.

Cloud seeding releases particles, which mimic this process.

Greg Ayers concedes Tasmanian conditions, mostly rain bearing clouds from the south-west coast, do suit cloud seeding operations.

"That doesn't occur with the same level of productivity over the continent, that's the issue that cloud seeding will work in some particular regions where the conditions are just right and they are in Tasmania, but they appear not to be so on the mainland, particularly as you move further north," Greg Ayers said.

The chief of CSIRO's Division of Atmospheric Research says the Division's focus is on the bigger picture, such as understanding and finding solutions to climate change, climate variability and the impact of tiny airborne particles known as atmospheric aerosol.

Proponents of cloud-seeding argue it's those very factors, which make a compelling case for cloud-seeding.

"Droughts are a common phenomenon, everybody knows about El Nino and it is documented way back well over a hundred years so we have a problem of changing cycles of weather anyway but I believe this problem of recurring drought is being exacerbated by industrial pollution throughout the world, not just locally and some of these pollution processes are shutting off the rain forming processes in the clouds. This was well-documented a few years ago in Indonesia when they were burning off vast tracts of forest land and the smoke plumes were effecting the clouds, effectively shutting off the rain forming processes. We were asked to go and seed clouds over there and get the rain started again. But that is one part of the problem," Ian Searle said.

With escalating irrigation water restrictions and low milk prices John O'Brien has decided to quit dairying, and switch totally to growing beef cattle. Diminishing rainfall in the past thirty years is also to blame.

"We seem to have gone into a period of lower than average rainfall and also at the same time a lower effective rainfall in the rainfall events, instead of getting say fifteen mils in a change that comes through quite often we come back to say five to seven mils and five to seven mils means nothing in grass production," John O'Brien, Farmer/Vic Farmers' Federation said.

O'Brien has long been a prominent advocate of water reform. His farm is to the nor-west of the Latrobe Valley, the hub of Victoria's coal-fired electricity industry.

"Most of our weather systems are coming from the Sou-West and between here and Sale, you'll often see on a sou-westerly change what I term, 'corridors of rain' and corridors of dryness and it's clicking in my mind that, 'have we got an influence from the power-stations?' Because we've got three to the Sou-west of us. It may not be but it's fairly co-incident because we've gone into plain country, no other interference that we've got these strips of rains as it happens in rainfall events," John O'Brien said.

O'Brien's astute observations were borne out last summer with the visit of a prominent Israeli scientist.

"Professor Danny Rosenfeld called here and in that range of 10-50 kilometres downstream of power stations it appears overseas the same thing, we have a diminution of rainfall because we don't get the diffusion effect and the condensing of the rain droplets out of the cloud formation. Whether we've got lower intensity systems going through, that's the other factor, but definitely our effective rainfall has dropped off...well since about 1970".

The Victorian Farmers' Federation has endorsed his resolution for the Federal Science Minister to put more resources towards understanding what influences the weather of South Eastern Australia.

"The get the CSIRO and other appropriate other bodies to look at rainfall enhancement programs because the techniques they're using in Israel and Texas, overseas have improved the rainfall in those areas but they target the clouds, whereas 25-30 years back a lot of the research was flying blind, they target the clouds which the they thought might seed, with the new technology that's available I'm quite sure that they can target the right clouds, that one will rain, that cloud front won't rain, so put your effort into the one that's going to work," John O'Brien said.

Aron Gingis has no doubt the scientific findings of his countryman Professor Danny Rosenfeld of Hebrew University and his American colleague William Woodley, have taken the guesswork out of cloud seeding.

Rosenfeld's techniques employ satellite imagery developed by NASA and the Japanese Space Agency, NASDA.

Gingis' company promises good rainfall by advising State and Federal Governments, water authorities the crucial questions of...

"Which clouds to seed, when to seed and what

cloud seeding material to utilise to maximise precipitation ability of those clouds," Aron Gingis, Australian Management Consolidated said.

"Satellite technology has now given us the capacity to watch this happening. In fact Israeli scientists have investigated this quite comprehensively and demonstrated examples to me of different weather events where this plume has floated across and it particularly west of Adelaide are the Grampian mountains which are the catchment for the Wimmera system," John Forrest said.

John Forrest, recently returned from Israel is another fan of Rosenfeld's work.

"That's what I admire about the Israelis. It is the mother of all inventions to be surrounded by hostile Arabs and to be so desperate for water that they're prepared to make substantial investment in research effort. So they were watching what was happening with their dust-ridden clouds coming from the West over Libya and Egypt, yet somehow coming across over the Mediterranean the clouds were able to heal themselves, so they thought, what's causing that? They went out there, took some measurements, made observations by satellite, which is excellent technology in terms of understanding clouds physics and they discovered that the natural process of the sea with sea spray in the clouds is actually a healing process," John Forrest said.

"And when you think about it, 590 thousand cubic kilometres of rain falls on the oceans, the oceans are a natural process that heals that cloud system. So they're now busy spraying their clouds with agricultural spray aircraft with a very fine mist, using Dead Sea brine. They're using their Dead Sea, the saltiest sea in the world as a resource. This is pretty creative and that's the sort of creative research I'd like to see here in Australia".

Some 40 countries worldwide are using cloud seeding. Funded by State governments, water boards and local government, annually Texans spend \$11 million dollars Australian on cloud

seeding programs. In some parts of the United States cloud seeding programs have run continuously for 50 years.

But the CSIRO remains sceptical of the impact of pollution on rainfall patterns.

"Pollution may play a part, but it's not clear that patterns of pollution and patterns of rainfall have been related in a way that suggests that there's a major effect in Australia," Greg Ayers said.

The CSIRO ended its work on cloud seeding in 1994. Some of its early experiments in Western Victoria proved inconclusive. Ian Searle claims the trials were conducted incorrectly.

Aron Gingis is even more critical of the CSIRO. He alleges some of its scientists now go out of their way to publicly belittle the new evidence at forums and before state and Federal authorities.

"We have found substantial evidence that CSIRO are not approaching this science with the required objectivity. And we now, put in the position, where we ourselves, feel very uncomfortable to work with the CSIRO. Previously we approached them and asked them to work with us, for the benefit of this country," Aron Gingis said.

"I'm at a loss to get some scientists to explain that to me, why the dramatic change in our weather outcomes since 1975, I'm just more and more convinced it's the result of industrialisation and man-made intervention with our clouds preventing them from forming in a natural way," John Forret said.

John Forrest last year travelled to Texas and viewed comprehensive weather modification programs there. He says it's not about inducing unusual rainfall patterns or trying to make Australia's arid inland into a rain belt, but rather producing sustainable and reliable rainfall.

"What I just appeal to Australians is to not be

so defensive of this, which is what I've had for the last few years, people locking up because of some religious perception or a scientific embargo question, whatever the reason, open your minds because the rest of the world has left us behind," John Forrest said.

John Forrest urges Australia's scientific community to embrace the issue and supply enough evidence for Federal Government funding into rain enhancement programs.

So far the Australian Wheat Board is one the few bodies enthused by his plan. Undeterred the Member for Mallee is seeking to stage an international symposium on the topic. At Forrest's request, the Israeli Science Minister will write to his Australian counterpart proposing bi-lateral co-operation into weather modification research.

"Most of our people are looking sideways or downwards and very few are looking upwards and the clouds are the repositories of the water resources of the world and we need to be looking at how to capture a little more as they pass over our particular part of the country," Ian Searle said.

"People think that it's about the fact we could be stealing someone else's rain or that we could be damaging the environmental outcome in some dangerous way. Well I say to that is, frankly, the southern half of the continent, through this drought, no-one's been getting any rain of substance," John Forrest said.

For farmers, when it rains can be as critical as how much it rains. In rural communities there's a growing anxiety over the frequency of unusually dry years and a sense of urgency to better understand it.

"Otherwise I would say now we have to alter our farming practices, the species of pasture we're growing so we can compensate for the lower rainfall seasons," John O'Brien said.

"If we only knew how much water is passing by in the clouds above our heads, day by day, year in year out and how little of it actually

falls out as rain, we would have a completely different view on what we should be doing to increase the water resources available to agriculture, river systems, the environment and so on," Ian Searle said.

"It is a challenge which has a solution being offered so therefore we shouldn't panic by it. So yes I'm looking forward to the engaging debate, it's a scientific debate," John Forrest said.

"At this stage that level of verification hasn't been published in a way that can be independently reviewed," Greg Ayers said.

So what will it take to change your mind on that?

"That level of credible scientific output".

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