



The Royal Society of Queensland

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Science, Scientific Method and Climate – FAQs

This brief explains science as the pursuit of knowledge about the natural world.

What is science?

Science is the search for knowledge about natural systems through ‘scientific method’. It traces cause and effect by the application of rational analysis to experimental data.

Do you need a tertiary degree to be a scientist?

Yes and no. Sometimes the term ‘scientists’ is confined to qualified professionals in contrast with ‘naturalists’. But scientific method can be applied by anybody, such as through the growing movement of ‘citizen science’ that welcomes people of all ages and backgrounds. The Royal Society of Queensland is non-elitist and imposes no educational qualifications for membership.

What is the connection between science and environmental activism?

Scientists seek knowledge and hope that their studies lead to evidence-based policy-making and decision-making, but is inherently non-activist. Environmentalists seek to influence policy and development decisions. Environmentalists rely upon scientific knowledge to assess the consequences of development and so they can be regarded as ‘translators’ of that knowledge.

How can I learn more about science?

The simplest method is to join a science-based club or society. Browse the list of 25 member societies of the Queensland Science Network <https://scienceqld.org/> for a group with a focus that appeals to you.

What is the history and current role of the Royal Society of Queensland?

There is an independent Royal Society in each of the Australian States. The Royal Society of Queensland is the State’s senior learned institution, tracing its ancestry from 1660 – founding of the Royal Society of London. It was established in 1884 and in the same year published the first issue of its annual *Proceedings*, a generalist peer-reviewed journal, now in its 124th volume. The Governor of Queensland His Excellency The Honourable Paul de Jersey AC is Patron.

Traditionally, its scope has been general science, science-related policy and education. It has recently been active in other evidence-led fields of scholarly expertise. The Letters Patent under which it is incorporated do not limit the scholarly scope of its activities.

The Society seeks to increase awareness of and respect for evidence-based enquiry in Queensland. It endeavours to serve as a custodian of scholarly tradition. It encourages original research and the application of scientific knowledge and method to policy-making and decision-making. In an era of “fake news”, this mission is more vital for public affairs than ever.

The Society is not politically aligned nor beholden to commercial interests. Its main contemporary activities are advocating for evidence-led policy; networking between members, government and the community; holding seminars crossing disciplinary and sectoral silos; and publishing the annual *Proceedings* plus special themed issues. The Society is run by volunteers.

The Royal Society of Queensland Research Fund sponsors small-scale research projects in the natural sciences. Donations to the Fund are tax deductible.

The Society convenes an informal Queensland Science Network, a collaboration of some 26 knowledge-based, community scientific societies: <https://scienceqld.org>.

Does science move forward by consensus?

No and yes. By examining evidence, scientists continually challenge the boundaries of current knowledge. Once a theory is accepted by a majority of researchers in the field, new research tends to build on the current consensus and to examine new questions without continually revisiting previously settled answers. However, previous orthodoxy is always open to revision if non-conforming evidence arises. In this way science is continually self-correcting.

Why is there so much argument about climate science?

There is very little argument within scientific circles about the reality of climate change or about the primary cause – being emissions of carbon dioxide through the burning of fossil fuels. Almost 100% of credentialled climate scientists accept this consensus. The consensus is threatening for many companies whose business depends upon burning fossil fuels. These industries have funded campaigns to spread doubt about the scientific consensus and about the good faith of prominent scientific spokespeople. Also, people with an ideological hostility to environmentalists have joined the denialist campaigns.

How can scientists be sure that their climate consensus is correct?

The confidence in scientific explanations of global warming derives from reinforcement by numerous scientific disciplines: atmospheric physics, oceanography, ecology, pollen studies and many others. Any single discipline can sometimes be side-tracked on a false trail until new experimentation eliminates fallacies, but the fundamentals of global warming have been well attested since the first report of the Intergovernmental Panel on Climate Change in 1990.

A theory explaining the connection between atmospheric carbon dioxide and global temperature was published by physicist Svante Arrhenius as long ago as 1896.

References on climate science

‘Climate science’ is shorthand for a cluster of scientific disciplines. The public authorities CSIRO (www.csiro.au/en/Research/Environment/Atmosphere-and-climate) and the Bureau of Meteorology (www.bom.gov.au/climate/) are the primary sources of Australia-specific raw data and interpreted data. Both bodies are non-partisan and authoritative.

Two books by The Spinney Press give good summaries of the science and its implications:

The Climate Change Crisis: <http://spinneypress.com.au/books/the-climate-change-crisis/> and

Extreme Weather and Natural Disasters: <http://spinneypress.com.au/books/extreme-weather-and-natural-disasters/>. These can be ordered online.

The Australia-based website *Skeptical Science* <https://skepticalscience.com/> has an extensive treatment of climate phenomena and misconceptions. Features of the public controversy are traced and explained.

Do recent weather extremes prove that the climate is changing?

Yes and no. Recent examples of extremes:

- Temperatures in January 2019 were the hottest ever recorded in Australia for that month.
- Floods in North Queensland; the Ross River Dam filled to 242% its capacity.
- Fires burnt across Tasmania for up to 6 weeks.

Weather is not climate and extreme events could in principle result from natural variability. However, the pattern of repeatedly broken records, of all kinds, around the world, is consistent with scientists’ predictions of the effects of climate change. Also, the incontrovertible rise in average global temperature of more than 1 degree C is causing far-reaching effects on evaporation, plant vigour, food crops and plant and animal distribution. Afforestation on an extensive scale is arguably the only practicable remedy and even that may not be enough to avoid catastrophic disruption to global human populations.

Conclusion

Attacks on the scientific consensus about global warming are political and are unsupported by any coherent scientific model. The climate obeys the laws of nature, not the theories of economics or the opinions of political commentators. The implications of these attacks for food security, disaster preparedness and every other aspect of contemporary public affairs are profound.