Preface December 2, 2022

The Guide to the Science of Global Warming and Climate Change, the Guide, is an introduction to Climate Science as it is presently understood. The study of Climate Science is actually a study of all of the physical and biological processes which shape Earth – and the growing impact of human activities. The relatively recent ability to simultaneously consider the numerous known processes and systems are a direct consequence of the rapid development of computational capability and access to it (both computing power and numerical methods). Modelling innovations able to consider the complexity of Climate Science are being implemented. Consequently, Climate Science is sufficiently understood to:

1. Confirm that global warming and climate change is happening now.
2. Confirm that human activities are the principal cause of climate change.
3. Confirm that human activities, including those causing climate change, may result in the sixth extinction of life on Earth.
4. Identify need to adapt to imminent effects of climate change.
5. Identify need to develop and implement strategies to mitigate human caused climate change before this is no longer possible and the worst effects become likely.

The study of the science of global warming and climate change continues at a rapid pace. It is benefitting from the collection and synthesis of information on every aspect of Earth's physical and biological environment. Virtually one hundred per cent of the global scientific community accepts that human activities are the cause of recent, present and future global warming and climate change. That said, resources are needed:

1. To improve understanding of how changes in climate will affect the physical environment.
2. To improve understanding of the circulation of water in the oceans, seas and lakes.
3. To improve understanding of the circulation of the atmosphere and the potential impacts of climate change on weather patterns – e. g. cyclones, droughts and heat domes.
4. To improve understanding of the impact of climate change on the hydrologic cycle.
5. To improve understanding of natural sources of greenhouse gases – methane in particular.
6. To improve the ability to monitor greenhouse gas emissions on a global scale.
7. To improve understanding of the cryosphere including permafrost, sea-ice, glaciers, ice fields, Greenland and Antarctica and their response to global warming.
8. To develop methodologies that link changes in climate to changes in the variability of weather – essential to adaptation and the development of resilience in response to inevitable climate change.
9. To develop improved understanding of Earth's biodiversity and its relationship to the physical environment and so understand how it would respond to climate change.
10. To continue to improve climate modelling capabilities.

11. To deliver the message of the seriousness of global warming and climate change to everyone in the global community and of humanity's urgent task to mitigate it.

It continues to be difficult to understand, much less accept, the views and actions of climate change denialists who continue their mission to undermine the validity of climate change science and the need to mitigate it. This situation is reminiscent of the frog slowly being boiled to death as described in the famous 2006 Al Gore documentary, An Inconvenient Truth, where the gradually warming water is analogous to the warming climate and the frog is a climate change denialist (or a member of the uninformed or uninterested public, or a victim of ignorance or in fact a frog).

Climate change denialism is simply a populist, conspiracy embracing point-of-view that seems to have found a home in main stream politics under the guise of being pragmatic and fostering intelligent business practices. Contrary to denialist views, those who accept climate change science are not impractical, idealistic or extreme left-wing. Rather, responsible citizens accept Climate Science advocating for important and timely local, provincial, national and international governance directed towards managing and avoiding the worst impacts of climate change – protecting Earth and all life on it. Mitigating climate change is the responsibility of all politicians regardless of political affiliation. Every effort must be made to inform the public of the science of climate change and the urgent need to avoid the worst effects of human caused climate change. A well-informed public will choose a well-informed government that is prepared to act.

It is worth noting that most major businesses and certainly most of the financial community accept the science of global warming and climate change; that is, they do not embrace denialist mantra. It is considered good business practice to include consideration of the potential impacts of human caused climate change and mitigation of it in business practice.

It has been two years since this Guide was first published on the internet. The Update Log is a testament to how Climate Science has grown in scope and how it is being actively discussed in growing numbers of 'science interested' venues and forums. Considerable effort is being made by numerous independent and government funded agencies and institutes, universities and colleges, newspapers, magazines, newsletters, independent forums, public broadcasting, social media and individuals to report new science in a language that can be understood by the general public and published in places where they have ready access to it. The Guide is providing reliable direction for the independent study of Climate Science published on the web which can also lead to the discovery of the world of peer reviewed articles published in reputable journals.

The organization of this Guide is serving to expedite the introduction and discussion of Climate Science. Even new science, published almost every week, finds a place and a context. Efforts are underway to make the content even more accessible.