**RealKM Cooperative Limited**
www.realkm.com
realkm@knowquestion.com.au

**Response to call for inputs by Special Rapporteur on the promotion and protection of human rights in the context of climate change**

**"Access to information on climate change and human rights"**

This submission explores the problems and proposes solutions for three serious inadequacies in regard to existing United Nations / Intergovernmental Panel on Climate Change (IPCC) and Member States' approaches to collecting, sharing and monitoring information on climate change and human rights:

1. Inadequate actionable climate change information.
2. Inadequate incorporation of climatic variability information (both natural and climate change-related) in weather forecasting and reporting.
3. Inadequate protection of information archives from the impacts of climate change.

The first two of these inadequacies are causing the public to lack sufficient information to be able to assess the magnitude of actual and potential negative impacts on their human rights. The human rights impacted include the rights to life, development, health, food, water and sanitation, and adequate housing.

The third inadequacy relates to the impacts of climate change on information itself. The human rights impacted include the rights to development and cultural rights.

**1. Inadequate actionable climate change information**

The United Nations Framework Convention on Climate Change (UNFCCC) came into force in 1994 – 30 years ago this year – with the objective of stabilizing greenhouse gas concentrations at a level that would prevent dangerous anthropogenic (human induced) interference with the climate system (UN Climate Change, n.d.). However, last year's IPCC AR6 report (IPCC, 2023) states that:

> Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred. Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts and related losses and damages to nature and people (*high confidence*).

This represents a failure of UN-led global action parallelling the current lack of progress towards the UN Sustainable Development Goals (SDGs) (UN, 2023), and a failure of the actions of UN Member States, for example as revealed by my 2013 analysis of climate policy development in Australia (Boyes, 2013), with Australia having gone even further backwards since (Branco, 2021). Contributing to this failure has been the way in which the UN including the IPCC has sought to communicate climate change information.

As I discuss in the *RealKM Magazine* article "Improving knowledge management in the United Nations System" (Boyes, 2017), the IPCC is tasked with producing climate science reports and communicating those reports. But it is not tasked with facilitating effective knowledge transfer and

exchange so that both decision-makers and the general community can access climate science information and knowledge that is meaningful to them and their diverse situations and can be practically applied.

Mark Trexler, who has served as a lead author for the IPCC, writes in the *RealKM Magazine* article "Actionable knowledge for climate progress" (Trexler, 2017) that this means there is a vital need for *actionable* climate knowledge:

> The idea of actionable climate knowledge reflects the reality that an individual making a climate-relevant decision is doing so on the basis of her ability to answer the two questions that govern all human decision-making: "is it worth it," and "can I do it?" Each of us uses different information to answer the two questions, and it has to be extracted from the information deluge that crashes over us every day.

Reinforcing the need for the better transfer and exchange of actionable climate knowledge, notable climate scientists Kevin E. Trenberth, Melinda Marquis, and Stephen Zebiak argue in the journal *Nature Climate Change* that there is a vital need for a climate information system (Trenberth, Marquis, & Zebiak, 2016). Like Trexler, Trenberth has served as a lead author for the IPCC, and Marquis has served as deputy director of one of the three IPCC working groups.

It is important at this point to emphasise the difference between *information* and *knowledge* (Williams, 2014). Information is created as a representation of an object, event, action, or cognitive concept. However, knowledge is created from framed experience, values, contextual information, interaction with others (events) and expert insights. Information and knowledge are interrelated and interact, and both must be considered.

In regard to climate *information*, Trenberth, Marquis, and Zebiak advise that:

> The many challenges encountered in making, interpreting and acting on climate analyses, predictions and projections point to the need for much better climate information … such a system could provide clarity regarding the uncertainties in climate predictions, and allow development of sound risk management strategies. The climate information system would also enable and support climate services, which involve the production, translation, transfer, and use of climate knowledge and information in climate-informed decision making and climate-smart policy and planning.

In regard to climate *knowledge*, Trenberth, Marquis, and Zebiak advise that:

> There is abundant evidence that decision-makers need and want help in understanding the complicated climate/society interface in ways that facilitate better outcomes within their communities and businesses. In light of the increasingly expensive and devastating impacts of climate-related extreme events, it is now critical to build an integrated knowledge system that includes public and private partners.

Trexler has worked to address the need for this knowledge system with actionable climate knowledge through The Climate Web initiative (Trexler & Kosloff, n.d.). The Climate Web has had and continues to have a beneficial impact, but turning the vast and ever-growing volume of climate

information into actionable knowledge that is relevant and meaningful in people's everyday lives remains a significant challenge. However, two emerging linked tools have the potential to at long last substantially address this problem: knowledge graphs linked to generative artificial intelligence (AI).

Knowledge graphs acquire and integrate information into an ontology and apply a reasoner to derive new knowledge (Ehrlinger & Wöß, 2016; Hogan et al., 2021). A prominent example of the use of a knowledge graph is Wikidata, which acts as the central storage for the structured data for Wikipedia (Stanford University, n.d.). Highlighting the information management capability of knowledge graphs, a recent version of Wikidata had over 80 million objects, with over one billion relationships among those objects.

Knowledge graphs are also an important aspect of artificial intelligence (AI) in knowledge management (KM) (Hogan et al., 2021; Stanford University, n.d.), and indeed, many businesses are already using knowledge graphs for AI-enabled KM (Jarrahi et al., 2023). The recent explosion of generative AI has further enhanced this linkage, and now, innovative initiatives have started to use generative AI linked to knowledge graphs for climate information and knowledge. A notable example is Climate Policy Radar (Climate Policy Radar CIC, 2024), which has received support from the Google's first generative AI accelerator (Lewin, 2024). Climate Policy Radar uses an open digital database and knowledge graph for climate law and policy with a generative AI-enabled search interface. This significant emerging potential needs to be further researched, investigated, and developed.

However, this won't be enough. As I alert in the *RealKM Magazine* article "The Paris Agreement: knowledge management and climate science denial" (Boyes, 2015), achieving actionable climate knowledge is very complex because climate science does not readily integrate with the diverse and often very divergent circumstances and perspectives of the billions of different members of society. The difficulties people face in trying to move past this complexity is likely to be a significant factor in climate science denial (Boyes, 2015). Forward progress requires complexity science, which disappointingly remains an inappropriately neglected focus in international development, despite four notable papers from the Overseas Development Institute (ODI) on the topic, including one titled *Taking responsibility for complexity: How implementation can achieve results in the face of complex problems* (Jones, 2011) (Ramalingam et al., 2008; Hummelbrunner & Jones, 2013a; Hummelbrunner & Jones, 2013b).

*It is recommended* that the United Nations and Member States (1) facilitate further research, investigation, and development in regard to the use of knowledge graphs linked to generative AI, to help provide the public with adequate information and knowledge for them to be able to assess the magnitude of actual and potential negative impacts on their human rights, and (2) take responsibility for complexity in climate action and the challenges it creates for actionable climate knowledge.

**2. Inadequate incorporation of climatic variability information (both natural and climate change-related) in weather forecasting and reporting**

Over the past few years, climate-related disasters have impacted on the human rights of the people of Australia to such an extreme extent that bushfire and flood victims are increasingly being diagnosed with and treated for post-traumatic stress disorder (PTSD) (Coletta, 2020; Shih, 2022), a

severely debilitating and often life-long mental health condition considered to be more commonly associated with the impacts of war. However, despite these extreme impacts, government agencies in Australia continue to contribute to the potential for further human rights infringements through an ongoing failure to adequately incorporate climatic variability information (both natural and climate change-related) in weather forecasting and reporting.

As I report in the *RealKM Magazine* articles "Climate knowledge ignorance has again seen communities "surprised" by expected floods" (Boyes, 2022) and "The vital knowledge missing from Australia's bushfire crisis debates: Part 1 – What can climate history tell us?"(Boyes, 2020), measures of climatic variability, and in particular the Pacific Decadal Oscillation (PDO) / Interdecadal Pacific Oscillation (IPO), have indicated the potential for bushfire and flood extreme weather disasters well before they occurred, but government agencies in Australia failed to adequately alert to or plan for the risks. They are still failing to do so, despite the potential for the PDO/IPO to supercharge the extreme weather effects of climate change (Henley et al., 2017). The PDO/IPO operates over a long timescale of up to several decades. The PDO and IPO are essentially the same interdecadal variability, with the PDO traditionally defined within the North Pacific while the IPO covers the whole Pacific basin (Dong & Dai, 2015).

As I discuss in the two *RealKM Magazine* articles referenced in the paragraph above, Australian Government Bureau of Meteorology climate briefings and forecasts focus heavily on climate drivers that operate over shorter time cycles, including the El Niño-Southern Oscillation (ENSO), Indian Ocean Dipole (IOD), and Southern Annular Mode (SAM), to neglect of the decades-long PDO/IPO. Why this is happening is not clear, but the differences between weather and climate and their related areas of expertise are potentially contributing factors.

Weather is the state of the atmosphere at a particular location over the short-term, whereas climate is the average of the weather patterns in a location over a longer period of time, usually 30 years or more (NOAA, n.d.). However, even though it has climate reporting responsibilities, the Australian Government Bureau of Meteorology is primarily a weather-focused rather than climate-focused organisation, being responsible for the daily weather forecasts for the nation. The large body of meteorological expertise needed for this significant responsibility may result in an unintentionally biased focus on shorter-term climate cycles that more directly influence day-to-day weather. I explore the limitations that meteorologists can have in conceptualizing climatic variability, and what should be done about this, in the *RealKM Magazine* article "Critical Eye: Why those climate views can't be given equal voice and hearing" (Boyes, 2021).

While the examples given above are from just one country, Australia, the PDO/IPO affects the climate globally (Dong & Dai, 2015), including having significantly influenced global averaged sea surface temperature throughout the 20$^{th}$ century (Meehl et al., 2016). The PDO/IPO is also just one of many naturally occurring climate oscillations across the globe (Woods Hole Oceanographic Institution, n.d.). Given this, and with the United Nations Environment Program warning of the links between climate change and increased extreme weather events (Hagelberg, 2020), further research and investigation into this issue is needed.

*It is recommended* that the United Nations and Member States facilitate further research and investigation in regard to inadequate incorporation of climatic variability information (both natural

and climate change-related) in weather forecasting and reporting, with the aim of reducing current and preventing future human rights impacts.

**3. Inadequate protection of information archives from the impacts of climate change**

A knowledge management (KM) organisation's submission on climate change information and human rights could not be considered complete unless it also addressed the risks of climate change impacts on information itself.

Fire damage and water ingress, including from extreme weather events such as bushfires and floods, can cause irreversible loss or damage in information archives, with impacts on development, cultural, and other human rights. Examples include the National Museum of Brazil fire which destroyed the Museum's indigenous languages collection (Boyes, 2018), and flooding which has damaged irreplaceable Appalachian archives (Enking, 2022). These risks will increase with increased extreme weather due to climate change.

In response, researchers have begun to explore how archives should better address these risks, for example in the papers "American archives and climate change: Risks and adaptation" (Mazurczyk et al., 2018) and "Keeping the archives above water: preserving regional heritage in times of accelerated climate change" (Wessell & Thorpe, 2023). However, given the progressively increasing level of risk, faster globally coordinated action is needed. As it is a global issue, the United Nations and its Member States should lead this action.

*It is recommended* that the United Nations and Member States coordinate the development and implementation of a comprehensive climate change impact protection strategy for all information archives globally, the development of which should include further research and consultation, with the aim of preventing future human rights impacts.

**Prepared by**
**Bruce Boyes**
**Editor, Lead Writer, and a Director**
**RealKM Cooperative Limited**

**Bruce Boyes** (bruceboyes.info) is a knowledge management (KM), environmental management, and education professional who holds a Master of Environmental Management with Distinction and has over 20 years of experience in sustainability and environmental management. This includes research and work in regard to climate change and climatic variability. He is currently the editor, lead writer, and a director of the award-winning *RealKM Magazine* and a PhD candidate in the Knowledge, Technology and Innovation Group at Wageningen University and Research.

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