

OPINION

Including mental health as part of climate change impacts and adaptation assessment: A critical advance in IPCC AR6

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Climate change impacts on society are more widespread, rapid, and severe than previously projected [1, 2]. Indeed, dubbed the “[atlas of human suffering](#)” by United Nations Secretary-General Antonio Guterres, the latest Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6), *Climate Change 2022: Impacts, Adaptation and Vulnerability*, documents the threats climate change poses to humanity [1]. These impacts and risks include climate change effects on our economy, infrastructure, livelihoods, culture, and physical health and, for the first time, also assesses and includes the devastating and pervasive climate change impacts related to mental health (Fig 1) [1].

The assessment of climate change impacts on mental health represents a critical and novel advancement in AR6 [1]. IPCC assessments provide critical evidence-based information for governments to make decisions and develop policies, and also underpin international negotiations at the annual UN climate change Conference of the Parties (COP). Since the new IPCC report includes mental health assessment, governments will now be entering COP27 in 2022 equipped with policy-relevant evidence of the risks that climate change poses to mental health. Bringing this science into the international policy arena is essential and comes at a pivotal moment in time. Therefore, we synthesize the key policy-relevant messages about climate change and mental health that emerged from AR6 and outline calls to action.

Climate change has already had severe and widespread mental health impacts

AR6 states with very high confidence that climate change has already negatively impacted mental health globally, and is expected to worsen with future climate change [1]. Adverse mental health outcomes assessed in AR6 included diagnosable mental disorders as well as sub-clinical outcomes that disrupt or impair normal functioning through impacts on mood, thinking, or behaviour [3]. Importantly, 15 out of 17 chapters in AR6 consider mental health, presenting evidence that clearly links climate change to increased suicide, suicide ideation, generalized anxiety, depression, acute traumatic stress, post-traumatic stress disorder (PTSD), strong emotional reactions (e.g. stress, anger, hopelessness, grief, anxiety), drug and alcohol use and abuse, family stress, domestic violence, and sleep problems. These mental health risks are often driven and/or exacerbated by inequity, injustice, and colonialism. Those identified at higher risk included rural populations [4]; children, youth, and elderly [3, 5–7]; women [3]; Indigenous Peoples [6, 7]; low and middle income countries [3]; as well as people with pre-



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	IPCC AR6 CHAPTER	PRESENT IMPACT	FUTURE RISKS	RESPONSE	ILLUSTRATIVE EXAMPLES
SECTORAL CHAPTERS	CHAPTER 2: TERRESTRIAL & FRESHWATER ECOSYSTEMS & THEIR SERVICES	✓			- Natural systems support mental health
	CHAPTER 3: OCEAN & COASTAL ECOSYSTEMS & THEIR SERVICES	✓	✓		- Ocean place-based attachment, "reef grief" - Past & anticipated ocean changes impact mental health - Tipping points create mental health risks
	CHAPTER 4: WATER	✓			- Water insecurity impacts mental health - Water insecurity impacts on mental health can drive migration - Anticipatory loss for Indigenous Peoples
	CHAPTER 5: FOOD, FIBRE, & OTHER ECOSYSTEM PRODUCTS	✓	✓	✓	- Cultural ecosystem services support mental health - Migration increases mental health risks - Urban and peri-urban agriculture provide mental health co-benefits
	CHAPTER 6: CITIES, SETTLEMENTS & KEY INFRASTRUCTURE			✓	- Nature-based solutions and urban agriculture have mental health co-benefits
	CHAPTER 7: HEALTH, WELLBEING & THE CHANGING STRUCTURE OF COMMUNITIES	✓	✓	✓	- Climate change impacts mental health via direct, vicarious, or anticipatory pathways - Current mental health supports are inadequate - Little research on climate-mental health adaptation
REGIONAL CHAPTERS	CHAPTER 8: POVERTY, LIVELIHOODS & SUSTAINABLE DEVELOPMENT	✓			- Extreme events impact mental health due to displacement, employment loss, disruption to social networks, and being placed in unfamiliar labour markets
	CHAPTER 9: AFRICA	✓		✓	- Extreme events impact mental health - Loss of livestock impacts farmers' mental health - Climate migration impacts mental health - Disease protection has mental health co-benefits
	CHAPTER 10: ASIA	✓	✓		- Climate and weather extremes increase depression, distress, anxiety, and suicide, as well as depressive disorders, PTSD, and mental health hospitalizations - Mental health risks will continue to increase
	CHAPTER 11: AUSTRALASIA	✓	✓	✓	- Directly & vicariously experiencing wildfires impacts mental health - Eco-grief and loss impact Indigenous Peoples - Adaptation gaps impact mental health
	CHAPTER 12: CENTRAL & SOUTH AMERICA				- Not discussed in the chapter
	CHAPTER 13: EUROPE	✓		✓	- Flooding increases PTSD, anxiety, and depression - Heat increases mental health hospitalizations - Impacts on reindeer affects Sami mental health - Green-blue spaces have mental health co-benefits
	CHAPTER 14: NORTH AMERICA	✓	✓	✓	- Slow onset changes and extremes impact mental health via direct, vicarious, or anticipatory pathways - Climate impacts on mental health are a key risk - Limited evidence of adaptation effectiveness
	CHAPTER 15: SMALL ISLANDS	✓			- Climate change has impacted mental health - Climate change impacts have been direct and anticipatory
SYNTHESIS CHAPTERS	CHAPTER 16: KEY RISKS ACROSS SECTORS & REGIONS	✓		✓	- Flooding impacts mental health - Urban greening has mental health co-benefits
	CHAPTER 17: DECISION-MAKING OPTIONS FOR MANAGING RISK			✓	Adaptation examples: - Place-specific infrastructure & nature therapy - Enhanced access to culturally-appropriate mental health resources
	CHAPTER 18: CLIMATE RESILIENT DEVELOPMENT PATHWAYS	✓			- Climate change has increased solastalgia
CROSS-CHAPTER PAPERS	CCP 3: DESERTS, SEMI-ARID AREAS, & DESERTIFICATION	✓	✓	✓	- Drought & desertification can impact mental health
	CCP 5: MOUNTAINS	✓			- Climate change has mental health impacts in mountain regions
	CCP 6: POLAR REGIONS	✓	✓	✓	- Slow onset changes and extremes impact mental health via direct, vicarious, or anticipatory pathways - Climate impacts on mental health are a key risk - Limited evidence of adaptation effectiveness

LEGEND: ✓ Assessed with high or very high confidence ✓ Assessed with low confidence ✓ Discussed but not assessed
 ✓ Assessed with medium confidence ✓ Assessed with limited evidence ✓ Not discussed or assessed

Fig 1. Illustrative examples of the links between climate change and mental health from the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6), *Climate Change 2022: Impacts, Adaptation and Vulnerability*.

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existing physical and mental health conditions [7], living in highly exposed areas, reliant on climate for livelihoods (e.g. farmers) [6], or in occupations responding to climate change (e.g. first responders) [3].

Globally, complex, compound, and cascading mental health risks have emerged from weather and climate extremes (e.g. heatwaves, droughts, floods, storms, fires) [1, 3]. Illustrative examples can be found around the world. For example, in Africa, extreme heat has increased negative mental health outcomes and suicide and other weather extremes have increased anxiety, post-traumatic stress disorder, and depression [8]; in Asia, storms, floods, hurricanes, and cyclones have increased PTSD and depressive disorders [9]; in Australasia, wildfires have led to mental health challenges [4]; in Europe, flooding has negatively impacted mental health outcomes [5]. In addition to events like these, drought and desertification can also impair mental health [10]. These mental health outcomes are rooted in the economic, social, infrastructure, health, and food system disruptions caused by the weather and climate extremes. Evacuation during extreme events negatively impacts mental health during the event and for months after the event due to displacement, employment loss, disruption to social networks, death of friends and family, and navigating unfamiliar labour markets [11]. For example, in 2017, Tropical Cyclone Debbie displaced 31,000 people and 6 months after the event, adverse mental health outcomes were more common among those who experienced health and social care disruptions [4]. In another example, after a flooding event, people in the UK experienced PTSD, anxiety, and depression not only due to the flooding event itself, but also from subsequent disputes with insurance and construction companies [5].

Slow-onset climate changes, including warming temperatures, sea-level rise, coastal erosion, and sea-ice decline, have increased mental health challenges. For example, higher ambient temperatures are associated with increasing suicide, anxiety, depression, acute stress, and increased hospital admissions and emergency room visits for mental health conditions in Asia, Europe, and North America [3, 5–7, 9]. Slow onset climate changes, including sea level rise, coastal erosion, loss of sea ice, wildfires, permafrost thaw, and coral reef survival, impact landscapes, cultural practices and identity, and cultural heritage sites, and can lead to feelings of ecological grief, solastalgia, and ‘reef grief’, including for Indigenous Peoples globally and those who rely on or are deeply connected to particularly places and landscapes, such as farmers, fishers, and researchers [3, 4, 6, 7, 12].

Adverse mental health outcomes can emerge, even if someone has not personally or directly experienced climate change impacts. For example, people have experienced mental health challenges from vicariously experiencing climate change by witnessing climate change impacts on the environment and people on the news, or seeing friends and family experience climate change [3, 4, 6]. Furthermore, even learning about climate change itself can affect mental health [3]. The perceived threat of climate change can also lead to climate anxiety and to anticipatory loss and grief related to climate change. For example, in the Arctic, Honduras, Tuvalu, Fiji, Solomon Islands, and other Pacific Islands, Indigenous Peoples’ fears of future cultural loss and ocean changes have led to worry, anxiety, sadness, and grief [3, 12–14].

Adaptation options are available, but planning and implementation remain inadequate

While AR6 catalogues wide-ranging and dire mental health impacts, it also assesses available response options to reduce risks. Adaptation strategies that reduce mental health risks include universal access to mental health care; mental health responses integrated into pre- and post-extreme event responses; surveillance and monitoring of mental health impacts during climate and weather extremes; place-specific mental health infrastructure and nature

therapy; culturally-appropriate and climate-specific mental health resources; inclusive attention to impacts on diverse communities; and mental health training (e.g. psychological first aid training for first responders) [3, 5–7]. For example, during the 2019–20 Australian wildfires, the federal government provided free mental health counselling, extended hours for mental health services, and programs designed specifically for youth [3]. While adaptation strategies within the health sector are critical, many adaptation strategies that reduce mental health risks occur outside of the health sector. Therefore, broader integration of mental health considerations into adaptation strategies is key, including integrating mental health considerations into climate resilience planning; improving coordination between governments; and developing multi-sectoral initiatives that enhance overall social and economic wellbeing, including improvements in education, housing, safety, and social protection and support [3]. For example, temporary shelters were installed in advance of a flooding event in China, and those displaced people who accessed the shelters had significantly lower rates of anxiety, depression, and PTSD [3]. Advanced warning for flooding in the UK was associated with reduced mental health impacts [5]. In the Arctic, rainwater harvesting programs to improve water security was also found to improve mental health [3].

While climate change adaptation efforts have increased, clear gaps remain. Adaptation responses to-date have been inequitably distributed, are not projected to keep pace with climate change, and are predominately in planning stages and not widely implemented [1]. At the current rate of implementation, this adaptation gap is projected to grow [1]. For mental health adaptation in particular, there has been substantial neglect and lack of investment, especially compared to the mental health impacts already experienced [3]. Mental health adaptation efforts require improved funding, increased accountability, improved access to mental health care and programming, and coordinated planning and implementation among key actors, agencies, and governments [1].

Adaptation strategies will become less effective with greater levels of warming; therefore, to reduce mounting mental health risks, drastic emission reductions alongside bolstered adaptation actions are needed. If we are unable to limit global warming to 1.5°C, our capacity to effectively support mental health will increasingly become challenged, with fewer and fewer effective options available. There are, however, mental health co-benefits for many mitigation strategies. For example, urban and peri-urban agriculture (e.g. roof top gardens) [5, 8, 15], urban green and blue spaces [3, 5], and active urban transport (e.g. walking and bicycling) [3, 5] provide mental health co-benefits via improved food security, physical activity, improved air quality, social cohesion, and wellbeing.

A climate resilient future is possible if we act now

AR6 shows that we are not on track to achieve a climate resilient future, and that widespread mental health responses are urgently needed now. Given the mental health risks identified in AR6, alongside the inadequate scale, pace, and distribution of current adaptation efforts, climate action is undeniably and urgently needed. Ambitious emissions reductions and stronger adaptation measures that integrate and mainstream mental health considerations must be implemented now and must involve everyone. A climate resilient future is predicated on mental wellness and will therefore depend on the actions we take now: every decision we make today will take us closer to or further away from a climate resilient future [1]. In the lead up to COP27, governments have IPCC AR6 in-hand and are therefore equipped with evidence that makes it clear that mental health matters in the context of climate change. The choices made at COP27 and the choices we all make in the next decade will determine our future and our mental wellness.

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