

The psychological impacts of climate change on agriculture-dependent communities: Challenges and PCK approach opportunity for sustainable development

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ABSTRACT

Climate change is a global phenomenon that affects the earth ecosystem, human well-being, and society's sustainable development, especially in agriculture-dependent human communities. This change in the environment has many consequences for physical and mental health, human rights, social justice, and economic stability. This phenomenon also intensify the risks and symptoms of mental disorders, such as stress, anxiety, depression, trauma, and suicidal ideation, among vulnerable communities and individuals. Accordingly, it is vital to mitigate/adapt to the impacts of climate change on mental health in agriculture-dependent communities. This article explores the causes and effects of climate change on mental health, as well as the opportunities, challenges, and strategies for reducing its psychological burden. It also consider the implications of climate change for sustainable development in agriculture communities and the role of policymakers, institutions and promising approaches regarding the mental health care requirement of these communities. Climate change is a complex problem that requires a multidisciplinary and collaborative approach from various stakeholders, such as teachers, scientists, practitioners, policymakers, and civil society. Instructive collaboration of these stakeholders can develop and put into practice effective pathways for mitigating/adapting the psychological impacts of climate change.

Keywords: Climate change, Agriculture-dependent communities, Adaptation, Mental well-being

INTRODUCTION

Human activities release greenhouse gases, causing Earth's climate to warm, impacting ecosystems, health, and global temperatures. Adaptation is necessary due to rising emissions from transportation, agriculture, industry, and livestock (Berrang-Ford *et al.*, 2011; Woolway *et al.*, 2020; BP, 2022). Climate change and global warming significantly impact inland, coastal, and polar regions, threatening communities' daily routines, food security, and ecosystem health, necessitating urgent mitigation and management efforts (Weiskopf *et al.*, 2020; Cavicchioli *et al.*, 2019). Climate change has sparked increased interest in adaptation research,

which has been historically overlooked. Mitigation focuses on reducing greenhouse gas emissions, while adaptation focuses on managing climate change effects. However, concerns remain about the speed and effectiveness of adaptation due to anticipated effects, vulnerabilities, and a lack of consideration for potential management options. Recent natural disasters have exposed flaws in preventative efforts (Berrang-Ford *et al.*, 2011).

EXPERIMENTAL RESEARCH

The PRISMA approach was used to conduct aim to bibliographic research on the "psychological impacts of climate change agriculture-dependent

Table 1. Some impacts of climate change

Number	Impacts	References
1	Energy use	(Li <i>et al.</i> , 2012)
2	Biodiversity redistribution	(Pecl <i>et al.</i> , 2017)
3	Droughts	(van der Wiel <i>et al.</i> , 2023)
4	Ecosystem properties	(Malhi <i>et al.</i> , 2020)
5	Air pollution	(Guzman <i>et al.</i> , 2022)

communities” using databases like Scopus, Web of Science, and Google Scholar from 1995–2024. The search strings included “climate change,” “psychological impacts,” and “sustainable development.” Only peer-reviewed journals and books were considered. The author reviewed the title and abstract of the articles to ensure their relevance to the study scope. The C-I-M-O (context-intervention-mechanism-outcome) framework guided authors in selecting the most relevant articles. After studying articles, snowball sampling was used to add other relevant cited articles.

RESULTS AND DISCUSSION

Climate Change Impacts

Climate change impacts various areas, causing drought, erosion, land degradation, health issues, economic instability, power availability, involuntary migration, and disrupting industry and agriculture sustainability, particularly in rural areas. particularly in rural areas, where the effects are often more severe due to limited resources and infrastructure (Abbass *et al.*, 2022). There are numerous impacts of climate change has been reported which some of them mentioned in Table 1.

Climate change significantly impacts psychological health, causing uncertainty and fear among individuals and communities, affecting natural resource availability and quality, and causing profound and multifaceted effects (Palinkas and Wong, 2020). Climate change impacts can lead to increased stress, anxiety, and depression, impacting individual’s and communities’ security, identity, values, and beliefs, and potentially increasing mental health problems (Cianconi *et al.*, 2020). Climate change indirectly impacts psychological health by disrupting social and cultural ties, exposing individuals to violence, discrimination, and human rights violations, making it a pressing issue requiring urgent action which has impacts environmental

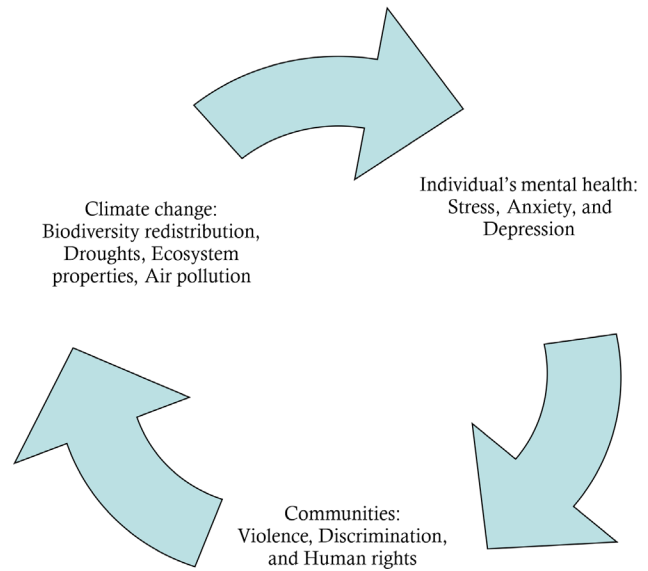


Fig. 1. Climate change, individuals mental health, and communities relation

degradation and might intensify the climate change (Fig. 1).

Climate Change’s Impacts on Human

Climate change negatively impacts human health, leading to mortality, infectious diseases, and deteriorating health outcomes. Mitigation measures include reducing emissions, enhancing resilience, and improving health services. It also affects socio-psychological health, including eco-anxiety, depression, and trauma (Rocque *et al.*, 2021). The psychological impacts of climate change can manifest in various ways, such as eco-anxiety, feelings of powerlessness and hopelessness, grief, and loss. Climate change negatively impacts human health, leading to mortality, infectious disease cases, and system outcomes. Research shows a negative correlation, suggesting adaptation measures like reducing emissions and improving health services. It also affects socio-psychological health, such as anxiety, depression, and trauma. More attention is needed for effective solutions (Benevolenza and DeRigne, 2018).

SOCIAL LIFE CONSEQUENCES

Climate change is a global phenomenon causing significant environmental and human health impacts, affecting air, water, and soil quality (Okur and Örcen, 2020). Climate change, characterized by heatwaves, precipitation changes, and harsh

weather, negatively impacts agriculture, water availability, job opportunities, land suitability, health, and human rights violations, especially for low-income and poor populations (Benevolenza and DeRigne, 2018).

Climate change leads to human migration, environmental degradation, conflict, and economic hardship, affecting vulnerable groups like the poor, minorities, and low-income countries, necessitating climate action for human rights and social justice (Weiskopf *et al.*, 2020; Berrang Ford *et al.*, 2011). Short-term climate changes significantly impact society, while long-term anthropogenic changes affect social, economic, and political structures, necessitating optimal adaptation strategies based on scientific evidence, local knowledge, and stakeholder participation (Stehr and Von Storch, 1995). Ecosystems are vital for climate systems, influencing carbon, water, and biogeochemical cycles. Sustainable management can enhance human resilience and support adaptation to environmental change. Complex responses, such as habitat heterogeneity and genetic variability, can provide resilience. Strategic protection enhances resilience and ecosystem services (Malhi *et al.*, 2020). Cross-disciplinary research and institutional organizations have to adapt to tackle climate change and biodiversity crises. Nature-based solutions require recognizing biophysical limits for human well-being and sustainable development. As nations revise climate policies, scientists should collaborate on climate solutions addressing biodiversity and planetary health (Seddon *et al.*, 2020).

CLIMATE CHANGE AND HUMAN WELL-BEING

Climate change refers to the long-term global temperature and precipitation changes caused by human activities (Woolway *et al.*, 2020). Climate change seriously impacts human psychological health, affecting both direct and indirect aspects of our lives (Doherty & Clayton, 2011) e.g., climate anxiety and dissatisfaction in children and young people (Hickman *et al.*, 2021), eco-anger, eco-anxiety and depression (Stanley *et al.*, 2021), suicidal ideation, and suicide completion (Burke *et al.*, 2018), and ecological grief (Benham and Hoerst, 2024).

Well-being is an individual's inherent worth, encompassing beneficial aspects that align with their best interests. Psychological aspects of well-being include mental and emotional states that contribute

to healthy functioning. Emotional well-being (EWB) is defined as the ability to produce and experience positive emotions while adapting to negative ones. Climate change, a complex phenomenon involving interacting variables and ecosystem changes, can lead to mental health impacts such as increased stress, anxiety, depression, and trauma, putting human social relationships and mental health at risk. Natural disasters can exacerbate these issues (Langeland, 2022; Cianconi *et al.*, 2020; Park *et al.*, 2022; Hayes, *et al.*, 2018). Climate anxiety and emotional impacts on mental health are crucial for resilience and adaptive capacity in the face of climate change. Emotional reactions, such as eco-anxiety, powerlessness, grief, and loss, pose new threats to health and highlight the need for psychiatric care (Benevolenza and DeRigne, 2018; Clayton, 2020).

MANAGING CLIMATE CHANGE'S IMPACT ON MENTAL HEALTH

Climate change's psychological impact on vulnerable populations and those with preexisting mental illnesses is a concern. These groups are more susceptible to adverse effects due to lower adaptive capacity, environmental stressors, and existing psychological challenges, leading to increased stress, anxiety, and depression (Doherty and Clayton, 2011).

Climate change significantly impacts human well-being and mental health. To minimize its impact, it's essential to enhance awareness, provide psychological support, strengthen networks with climate change values, conserve natural environments, and participate in climate action. These measures can reduce anxiety, boost motivation, and promote social connectedness, while also reducing emissions and supporting vulnerable populations (WHO, 2022). Additionally, they contribute to the overall well-being and resilience of communities.

CLIMATE CHANGE AND MENTAL HEALTH: DESIRES AND POLICIES FOR AGRICULTURAL COMMUNITIES

Climate change's psychological health impacts require further research to develop effective strategies for mitigation and adaptation. Policymakers and institutions play a crucial role in addressing these impacts by developing and implementing policies and actions that prevent, reduce, and deal with the psychological effects of climate change on

individuals and communities. Some possible approaches include integrating climate considerations with mental health programs, promoting mental health literacy and resilience, building upon global commitments like the Paris Agreement, and developing community-based approaches to reducing vulnerabilities. Additionally, closing the funding gap for mental health and psychosocial support is essential for ensuring accountability and transparency (Doherty and Clayton, 2011; The Mental Health Impacts of Climate Change | RANZCP, n.d.).

Urban areas, situated along coasts or low-lying areas, are highly vulnerable to climate change hazards like sea level rise and flooding, leading to economic and social challenges like energy shortages, infrastructure damage, and food scarcity (Gasper *et al.*, 2011). Historical economic evolution should guide responses to modern climate change and its future consequences. Research in the future explores mechanisms, policy interventions, and adaptation success. A quantitative understanding of investments' impact on economic and social possibilities is crucial for effective policy design (Carleton and Hsiang, 2016).

Climate change is a global issue that significantly impacts human well-being, including health, rights, social justice, and economic stability. It poses a significant risk to sustainable development in agricultural communities, particularly those with indigenous populations and low-income populations. Climate change can affect livelihoods, food security, and natural disasters, leading to reduced productivity, increased food prices, malnutrition, and hidden hunger. It can also cause psychological distress, trauma, and suicidal ideation, disrupting social and cultural ties and exposing them to discrimination, violence, and human rights injustice.

Climate change is a global issue affecting the environment, human well-being, health, and economic stability. It impacts water, air, soil quality, sustainable agriculture, and mental well-being. Climate change alters weather patterns, increases natural disasters, and threatens natural resource availability. It causes uncertainty, fear, and malnutrition, reducing agricultural productivity and increasing food prices. Mental well-being is also affected, leading to stress, anxiety, depression, trauma, and suicidal ideation. Mitigation, adaptation, and management are essential for

addressing these impacts. Research, education, awareness, and action are needed to minimize environmental and psychological impacts. Policymakers and institutions play a crucial role in combating climate change. A multidisciplinary, collaborative response is needed to ensure a resilient, sustainable, and healthy future for societies (Cianconi *et al.*, 2020).

Pedagogical Content Knowledge (PCK) Approaches for Mitigation of Effects, and Changes in Agriculture-Dependent Communities

Pedagogical Content Knowledge (PCK) is an educational framework that emphasizes the importance of teachers having a deep understanding of both the content they are teaching, such as climate change and global warming, and the pedagogical strategies most appropriate for teaching these topics (Favier *et al.*, 2021). PCK involves integrating knowledge with suitable teaching methods that resonate with students' mindsets. When the PCK applied to environmental education, it requires teachers/instructors to address the emotional and psychological impacts of climate change and global warming, providing students with proper tools to engage in positive environmental actions (Favier *et al.*, 2021; Teed and Franco, 2014). This PCK approach in education is essential for developing informed and engaged individuals who can understand complex environmental issues and participate in sustainable practices. PCK combines deep knowledge of environmental issues with effective teaching strategies, considering students' mindsets, misperceptions, and learning challenges. Experiential methods like project-based learning can enhance understanding and inspire innovation by involving students in real-world climate change problem-solving. Incorporating successful climate change mitigation projects into education encourages critical thinking and problem-solving skills, empowering students to become informed/awared citizens capable of fighting climate change issues in their communities (Favier *et al.*, 2021).

CONCLUSION

Climate change is a global issue affecting both the environment and human well-being, posing threats to vulnerable populations and those with pre-existing mental illnesses. Mitigating its impacts is crucial, and policymakers and institutions play a vital role in addressing the mental health impacts. A

multidisciplinary and collaborative response is needed to create a more resilient, sustainable, and healthy future for agricultural societies struggling with climate change, aiming for sustainable development.

REFERENCES

- Abbass, K., Qasim, M., Song, H., Murshed, M., Mahmood, H. and Younis, I. (2022). A review of the global climate change impacts, adaptation, and sustainable mitigation measures. *Environmental Science and Pollution Research International*, 29, 42539-42559. <https://doi.org/10.1007/s11356-022-19718-6>
- Benevolenza, M.A. and DeRigne, L. (2018). The impact of climate change and natural disasters on vulnerable populations: A systematic review of literature. *Journal of Human Behavior in the Social Environment*, 29, 266-281. <https://doi.org/10.1080/10911359.2018.1527739>
- Benham, C. and Hoerst, D. (2024). What role do social-ecological factors play in ecological grief?: Insights from a global scoping review. *Journal of Environmental Psychology*, 93, 102184. <https://doi.org/10.1016/j.jenvp.2023.102184>
- Berrang Ford, L., Ford, J. and Paterson, J. (2011). Are we adapting to climate change? *Global Environmental Change - Human and Policy Dimensions*, 21, 25-33. <https://doi.org/10.1016/J.GLOENVCHA.2010.09.012>
- British Petroleum (BP). (2022). Statistical Review of World Energy 2022 | 71st edition.
- Burke, M., González, F., Baylis, P., Heft-Neal, S., Baysan, C., Basu, S. and Hsiang, S. (2018). Higher temperatures increase suicide rates in the United States and Mexico. *Nature Climate Change*, 8(8), 723-729.
- Carleton, T.A. and Hsiang, S.M. (2016). Social and economic impacts of climate. *Science*, 353(6304). <https://doi.org/10.1126/science.aad9837>
- Cavicchioli, R., Ripple, W., Timmis, K., Azam, F., Bakken, L., Baylis, M., Behrenfeld, M., Boetius, A., Boyd, P., Classen, A., Crowther, T., Danovaro, R., Foreman, C., Huisman, J., Hutchins, D., Jansson, J., Karl, D., Koskella, B., Welch, D.M.M., et al. (2019). Scientists' warning to humanity: microorganisms and climate change. *Nature Reviews Microbiology*, 17, 569-586. <https://doi.org/10.1038/s41579-019-0222-5>
- Cianconi, P., Betro', S. and Janiri, L. (2020). The impact of climate change on mental health: A systematic descriptive review. *Frontiers in Psychiatry*, 11. <https://doi.org/10.3389/fpsy.2020.00074>
- Clayton, S. (2020). Climate anxiety: Psychological responses to climate change. *Journal of Anxiety Disorders*, 74, 102263.
- Doherty, T.J. and Clayton, S. (2011). The psychological impacts of global climate change. *The American Psychologist*, 66(4), 265-276. <https://doi.org/10.1037/a0023141>
- Favier, T., Van Gorp, B., Cyvin, J.B. and Cyvin, J. (2021). Learning to teach climate change: students in teacher training and their progression in pedagogical content knowledge. *Journal of Geography in Higher Education*, 45(4), 594-620.
- Gasper, R., Blohm, A. and R uth, M. (2011). Social and economic impacts of climate change on the urban environment. *Current Opinion in Environmental Sustainability*, 3(5), 272-277. <https://doi.org/10.1016/j.cosust.2010.12.009>
- Guzman, P., Tar n-Carrasco, P., Morales-Suarez-Varela, M. and Jim nez-Guerrero, P. (2022). Effects of air pollution on dementia over Europe for present and future climate change scenarios. *Environmental Research*, 204, 112012.
- Hayes, K., Blashki, G., Wiseman, J., Burke, S. and Reifels, L. (2018). Climate change and mental health: risks, impacts and priority actions. *International Journal of Mental Health Systems*, 12(1), 1-12.
- Hickman, C., Marks, E., Pihkala, P., Clayton, S., Lewandowski, R.E., Mayall, E.E., et al. (2021). Climate anxiety in children and young people and their beliefs about government responses to climate change: a global survey. *The Lancet Planetary Health*, 5(12), e863-e873.
- Langeland, E. (2022). Emotional well-being. In *Encyclopedia of Quality of Life and Well-Being Research* (pp. 1-3). Cham: Springer International Publishing.
- Li, D.H., Yang, L. and Lam, J.C. (2012). Impact of climate change on energy use in the built environment in different climate zones – a review. *Energy*, 37(1), 201-215. <https://doi.org/10.1016/j.energy.2012.03.044>
- Malhi, Y., Franklin, J., Seddon, N., Solan, M., Turner, M.G., Field, C.B. and Knowlton, N. (2020). Climate change and ecosystems: threats, opportunities and solutions. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 375(1794), 20190104. <https://doi.org/10.1098/rstb.2019.0104>
- Manning, C. and Clayton, S. (Eds.). (n.d.). Threats to mental health and wellbeing associated with climate change. In *Psychological Perspectives on Climate Change* (pp. 217-244). <https://doi.org/10.1016/B978-0-12-813130-5.00009-6>
- Palinkas, L. and Wong, M. (2020). Global climate change and mental health. *Current Opinion in Psychology*, 32, 12-16. <https://doi.org/10.1016/J.COPSYC.2019.06.023>

- Park, C.L., Kubzansky, L., Chafouleas, S.M., Davidson, R., Keltner, D., Parsafar, P., Conwell, Y., Martin, M.Y., Hanmer, J. and Wang, K.H. (2022). Emotional well-being: What it is and why it matters. *Affective Science*, 4, 10-20. <https://doi.org/10.1007/s42761-022-00163-0>
- Pecl, G.T., Araújo, M.B., Bell, J.D., Blanchard, J., Bonebrake, T.C., Chen, I.C., Clark, T.D., Colwell, R.K., Danielsen, F., Evengård, B., Falconi, L., Ferrier, S., Frusher, S., Garcia, R.A., Griffis, R.B., Hobday, A.J., Janion-Scheepers, C., Jarzyna, M.A., Jennings, S., et al. (2017). Biodiversity redistribution under climate change: Impacts on ecosystems and human well-being. *Science*, 355(6332). <https://doi.org/10.1126/science.aai9214>
- Rocque, R.J., Beaudoin, C., Ndjaboué, R., Cameron, L., Poirier-Bergeron, L., Poulin-Rheault, R.-A., Fallon, C., Tricco, A. and Witteman, H. (2021). Health effects of climate change: An overview of systematic reviews. *BMJ Open*, 11. <https://doi.org/10.1136/bmjopen-2020-046333>
- Seddon, N., Chausson, A., Berry, P., Girardin, C.A.J., Smith, A. and Turner, B. (2020). Understanding the value and limits of nature-based solutions to climate change and other global challenges. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 375(1794), 20190120. <https://doi.org/10.1098/rstb.2019.0120>
- Stanley, S.K., Hogg, T.L., Leviston, Z. and Walker, I. (2021). From anger to action: Differential impacts of eco-anxiety, eco-depression, and eco-anger on climate action and wellbeing. *The Journal of Climate Change and Health*, 1, 100003.
- Stehr, N. and Von Storch, H. (1995). The social construct of climate and climate change. *Climate Research*, 5(2), 99-105.
- Teed, R. and Franco, S. (2014). Increasing teachers' confidence and pedagogical content knowledge through a workshop and follow-up program on climate change. *Journal of Geoscience Education*, 62(4), 587-597.
- The mental health impacts of climate change | RANZCP. (n.d.). *RANZCP*. <https://www.ranzcp.org/clinical-guidelines-publications/clinical-guidelines-publications-library/the-mental-health-impacts-of-climate-change>.
- van der Wiel, K., Batelaan, T.J. and Wanders, N. (2023). Large increases of multi-year droughts in north-western Europe in a warmer climate. *Climate Dynamics*, 60(5-6), 1781-1800.
- Weiskopf, S., Rubenstein, M.A., Crozier, L., Gaichas, S., Griffis, R., Halofsky, J., Hyde, K., Morelli, T., Morissette, J., Muñoz, R., Pershing, A., Peterson, D., Poudel, R., Staudinger, M., Sutton-Grier, A., Thompson, L., Vose, J., Weltzin, J. and Whyte, K. (2020). Climate change effects on biodiversity, ecosystems, ecosystem services, and natural resource management in the United States. *The Science of the Total Environment*, 1, 137782. <https://doi.org/10.1016/j.scitotenv.2020.137782>
- Woolway, R., Kraemer, B.M., Lenters, J., Merchant, C.J., O'Reilly, C. and Sharma, S. (2020). Global lake responses to climate change. *Nature Reviews Earth & Environment*, 1, 388-403. <https://doi.org/10.1038/s43017-020-0067-5>
- Woolway, R., Kraemer, B.M., Lenters, J., Merchant, C.J., O'Reilly, C. and Sharma, S. (2020). Global lake responses to climate change. *Nature Reviews Earth & Environment*, 1, 388-403. <https://doi.org/10.1038/s43017-020-0067-5>
- World Health Organization-WHO. (2022). Mental health and climate change: policy brief.