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## Eco-anxiety: Biological Processes and Mental Responses to Environmental Crisis

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### Abstract

Eco-anxiety is an important issue and continues to be developed as a scientific study. However, in developing countries, the issue of eco-anxiety has not yet become a popular topic to discuss. In fact, the problem of the environmental crisis is an urgent matter that needs to be reviewed from various scientific disciplinary points of view. This article discusses various eco-anxiety studies based on a number of empirical studies that have been conducted. The literature review used is a narrative method with a qualitative approach. The results found that the mental response that emerged from eco-anxiety did not only have negative connotations, but there were also positive ones. The human body biologically experiences certain processes when suffering from eco-anxiety related to hormonal and physical change. The aspects of the mind that represent the concept of eco-anxiety are worry, care, and stressed. The feeling aspect is represented by worried, angry, and afraid. Meanwhile, behavioral aspects are represented by depression, pro-environmental, and stress. From the results of this review, further research is needed to find effective strategies to change a person's eco-anxiety into a more positive mental response and action towards the environment.

Keywords: biological process; climate change; ecology; eco-anxiety; environmental crisis; mental response

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## Introduction

The Intergovernmental Panel on Climate Change (IPCC) reports that climate change has increased the frequency and intensity of natural disasters such as floods, droughts, heat waves and forest fires in various parts of the world (IPCC, 2021). Since 2010, the issue of

climate change has begun to become a hot topic discussed and researched to be linked to the psychological impact of the environmental crisis (Pihkala, 2020). The American Psychological Association (APA) and EcoAmerica began to introduce the term eco-anxiety. Eco-anxiety is a term that is becoming popularly used in mental health studies related to individual anxiety regarding the phenomenon of environmental crisis.

Individual mental state significantly influences their physical health, when we experience emotions our brains trigger physiological changes throughout our bodies. Conversely, positive emotions and a healthy mindset can have a protective effect and contribute to overall well-being (Camilla, 2023). The mind-body connection is a powerful forces, the nervous system also plays a key role in this connection. By managing your thoughts and emotions, you can positively impact your physical health and vice versa (Park, 2012).

## 1. Materials and Methods

### 1.1. Methods

The literature review used is a narrative method with a qualitative approach. A review was carried out to find out what mental responses and biological process arise from the concept of eco-anxiety. The mental responses that emerge are analyzed using word cloud generators including aspects of thoughts, feelings and behavior. In the narrative method, no special criteria are needed to determine inclusion and exclusion categories. The results of the analysis of the mental aspects of eco-anxiety will then be linked to the biological processes that occur in the human body. In this study, new themes will be developed that are relevant for further research around the concept of eco-anxiety.

### 1.2. Journal Selected

The term eco-anxiety was introduced by Searle & Gow in 2010 as an individual's mental response to various climate change issues in the form of excessive worry, anxiety, or feelings of stress. Various eco-anxiety boundaries from 31 journals selected from 2010 till 2024 are summarized in the following table:

Table 1. Journal Selected

Writer	Title	Journal	Eco-anxiety boundaries
Searle, et al, 2010	Do cares about climate change lead to distress?	International Journal of Climate Change	Difficulties with climate change: care about adapting to climate change which

		Strategies and Management	can trigger stressed, anxiety and stress
Berry, et al, 2015	Worrying about climate change: Is it responsible to promote public debate?	BJPsych International Journal	Worry about climate change which affects aspects of mental health and well-being
Verplanken, et al, 2020	On the nature of eco-anxiety: How constructive or unconstructive is habitual worry about global warming?	Journal of Environmental Psychology	The habit of thinking about worrying about global warming which develops into pathological anxiety and pro-environment
Schneider & Leong, et al, 2020	Eco-reproductive cares in the age of climate change	Journal of Climatic Change	Care about climate change affecting reproductive planning considerations
Wilson, et al, 2020	Psychometric properties of the Intolerance of Uncertainty Scale-12 in generalized anxiety disorder: Assessment of factor structure, measurement properties and clinical utility	Journal of Anxiety Disorders	Tense, worried, anxious, depressed, stressed, angry, afraid, sad about climate change and feeling hopeless, powerless, helpless about climate change
Reyes, et al, 2021	An investigation into the relationship between climate change anxiety and mental health among Gen Z Filipinos	Current Psychology Journal	Climate change adaptation: impairment of the function of negative thoughts and feelings related to the perception of climate change which causes anxiety, stressed, loss of control over behavior or feelings; as well as psychological well-being: emotional bonds, positive impact, life satisfaction
Hickman, 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 Journal	Anxiety about the climate, worry and negative emotions related to climate change which have an impact on individual
Helm, et al, 2021	No future, no kids—no kids, no future?: An exploration of motivations to remain childfree in times of climate change	Population and Environment Journal	Care about climate change is influencing the increase in refusal to have children due to cares about the environment
Stanley, et al, 2021	From anger to action: Differential impacts of eco-anxiety, eco-stressed, and eco-anger on climate action and well-being	Journal of Climate Change and Health	Measurement of environmental emotions: environmental anxiety, environmental stressed, and environmental anger which can trigger individual and collective pro-environmental behavior
Ogunbode, et al, 2021	Negative emotions about climate change are related to insomnia symptoms and mental health: Cross-sectional evidence from 25 countries	Current Psychology Journal	Negative feelings related to climate which can develop into symptoms of insomnia, as well as behavior assessing personal mental health
Patrick, et al, 2022	Prevalence and determinants of mental health related to climate change in Australia. Australia and New Zealand	Journal of Psychiatry	Adaptation to climate change: impairment of the function of an individual's thoughts and feelings related to the perception of climate change which can trigger PTSD and pre-traumatic stress
Schwartz, et al, 2022	Climate change anxiety and mental health: Environmental activism as a buffer	Current Psychology Journal	Climate change adaptation: impairment of the function of negative thoughts and feelings related to the perception of

			climate change which can cause major depressive disorder, and symptoms of generalized anxiety disorder
Sciberras & Fernando, 2022	Climate change-related cares among Australian adolescents: An eight-year longitudinal study	Child and Adolescent Mental Health Journal	Worry and care about climate change are indications of depressive symptoms
Thomas, et al, 2022	A Guide to Eco-Anxiety: How to Protect the Planet and Your Mental Health; What We Think About When We Try Not to Think About Global Warming: Toward a New Psychology of Climate Action.	Journal of the American Academy of Child & Adolescent Psychiatry	A type of anxiety related to cares about the environment and the future of planet Earth
Gunasiri, et al, 2022	Hope, Coping and Eco-Anxiety: Young People's Mental Health in a Climate-Impacted Australia.	International journal of environmental research and public health	Care, stress, hopelessness, helplessness, and feelings of having no voice among the younger generation regarding the negative impacts of climate change
Agoston, et al, 2022	Identifying Types of Eco-Anxiety, Eco-Guilt, Eco-Grief, and Eco-Coping in a Climate-Sensitive Population: A Qualitative Study	International journal of environmental research and public health	Feelings of optimism and control, as well as a willingness to take action to address environmental problems
Kurth & Pihkala, 2022	Eco-anxiety: What it is and why it matters	Frontiers in psychology Journal	Emotional response to the threat of climate change
Passmore, et al, 2023	Eco-Anxiety: A Cascade of Fundamental Existential Anxieties	Journal of Constructivist Psychology	The experience of persistent feelings of anxiety regarding degradation of our natural environment.
Takshe, et al, 2023	Eco-anxiety: A Q method analysis towards eco-anxiety attitudes in the United Arab Emirates	Journal of Social Work Practice	A 'chronic fear of environmental doom'
Wang, et al, 2023	Coping with eco-anxiety: An interdisciplinary perspective for collective learning and strategic communication	Journal of Climate Change and Health	Anxiety in the form of negative, troublesome, and automatic physiological, cognitive, emotional, and behavioral reactions to climate change and ecological degradation
Lutz, et al, 2023	Eco-anxiety in daily life: Relationships with well-being and pro-environmental behavior	Current Research in Ecological and Social Psychology	Anxiety and worry about mounting environmental issues
Pihkala, 2023	Eco-anxiety as a dimension of European anxious experiences	Crisis and the Culture of Fear and Anxiety in Contemporary Europe	Various forms of anxiety which are significantly impacted by ecological problems.
Heinzel, et al, 2023	Anxiety in response to the climate and environmental crises: validation of the Hogg Eco-Anxiety Scale in Germany	Frontiers in Psychology	Anxiety about the crises' devastating consequences for life on earth, affects mental health worldwide.
Ribeiro, et al, 2023	Eco-anxiety, its determinants and the adoption of pro-environmental behaviors: Preliminary findings from the Generation XXI cohort.	Population Medicine	The mental distress resulting from extreme concern about environmental circumstances as well as the effects of climate change
Brophy, et al,	Eco-anxiety in youth: An	International Journal	Distress, worry, or concern related to the

2023	integrative literature review	of Mental Health Nursing	climate change crisis.
Köse, 2023	The role of school counsellors in response to eco-anxiety	Journal of Psychologists and Counsellors in Schools	An emotional response to climate crises
Rodríguez, et al, 2024	Mental health during ecological crisis: translating and validating the Hogg Eco-anxiety Scale for Argentinian and Spanish populations	BMC Psychology	A shared experience by many people internationally, encompassing fear of environmental catastrophe and anxiety about ecological crises.
Orrù, 2024	Worry about the Future in the Climate Change Emergency: A Mediation Analysis of the Role of Eco-Anxiety and Emotion Regulation	Behavioral Sciences	Uncertainty about the future was hard to bear and they wrestle with feelings of helplessness in the face of global ecological problems
Di Fabio, 2024	The challenge of eco-generativity. Embracing a positive mindset beyond eco-anxiety: a research agenda	Frontiers in Psychology	Distress in relation to climate change and its effects
Er, et al, 2024	Nursing students' mental health: How does eco-anxiety effect?	International Journal of Mental Health Nursing	Anxiety experienced in response to an ecological crisis
Micoulaud-Franchi, et al, 2024	Eco-anxiety: An adaptive behavior or a mental disorder? Results of a psychometric study	Encephale	A complex construct that has been created to grasp the psychological impact of the consequences of global warming

## 2. Result

### 2.1. Environmental Crisis

The impact of climate change on natural disasters has become a serious threat throughout the world. Increased rainfall and changes in rainfall patterns cause floods to become more frequent and intense while decreased rainfall and increased evaporation cause longer and more severe droughts. Increasing air temperatures can cause heat waves, when this is combined with changes in rainfall patterns it cause forest fires (Malau, 2021). There is significant environmental damage such as carbon emissions, forest destruction, land degradation, depletion of water resources, ecosystem damage, and increased greenhouse gas emissions (Fernando, 2020).

What is worrying is that climate change is expected to continue to increase the frequency and intensity of natural disasters in the future. Climate change has also caused natural disasters to occur more frequently, intensely and widely, even in places that previously did not normally experience natural disasters. The impacts resulting from natural disasters are

also getting worse, resulting in an increase in the number of fatalities and various damages (Fang, 2019).

## 2.2. Thoughts that Represent Eco-anxiety

Thinking is a mental process that involves cognitive activities such as attention, memory, perception and problem solving (Heard, 2020). Thinking is a complex process that involves various mental skills to carry out analysis, synthesis, or evaluation of various information to make decisions or solve problems (Kaliský, 2022). An analysis of thought was carried out as follows:



*Figure 1. Word Cloud Aspect Thought*

The aspects of mind that represent eco-anxiety are worry, care, and stress. Worrying is thinking about something or responding excessively to things that haven't happened yet. Worry can be triggered by various factors, for example health problems, environmental problems, personal relationships, and work-related stress (Fahy & Maguire, 2022). Worry can have a negative impact on a mental health by making them depressed, anxious, or helpless. Worrying thoughts will grow worse and cause feelings of helplessness when we are faced with changing natural situations that cause uncertainty (Helm, 2018).

When we experience worry and stress, body goes into a state called "fight-or-flight" mode. This is a primal response triggered by nervous system to prepare for a perceived threat. This is a natural response, and it is characterized by a surge of hormones such as adrenaline

and cortisol. These hormones prepare the body to either fight the threat or flee from it by increasing heart rate, blood pressure, and respiration rate, and by diverting blood flow to muscle (Gallo, 2003).

During worry and stress adrenaline increases the heart rate, breathing rate, and blood pressure. It sends more blood to muscles, preparing to take action. Meanwhile cortisol as a stress hormone increases blood sugar levels to provide quick energy (Carpenter, 2007). It also suppresses non-essential bodily functions like digestion and the immune system. In physical changes, increased heart rate will deliver more oxygen and blood throughout body. Rapid breathing provides more oxygen to muscles, and muscle tension prepares the body for physical action (Zhang, 2018).

### 2.3. A feeling that Represents Eco-anxiety

The term feeling is often used interchangeably with the terms emotion and mood (Šimić, 2021). Emotions are related to feelings, and contribute to awareness and aspects of human feelings, thoughts and behavior (Izard, 2009). The analysis of feeling using a word cloud generator as follows:



*Figure 2. Word Cloud Aspects Feeling*

Feeling that represent the concept of eco-anxiety are worried, angry, and afraid. Worried can cause negative emotions such as angry, afraid, hatred, frustration and jealousy (An,

2017). Worried can be a combination of thoughts and feelings, reflecting the complex interplay between cognitive and emotional experiences in various domains.

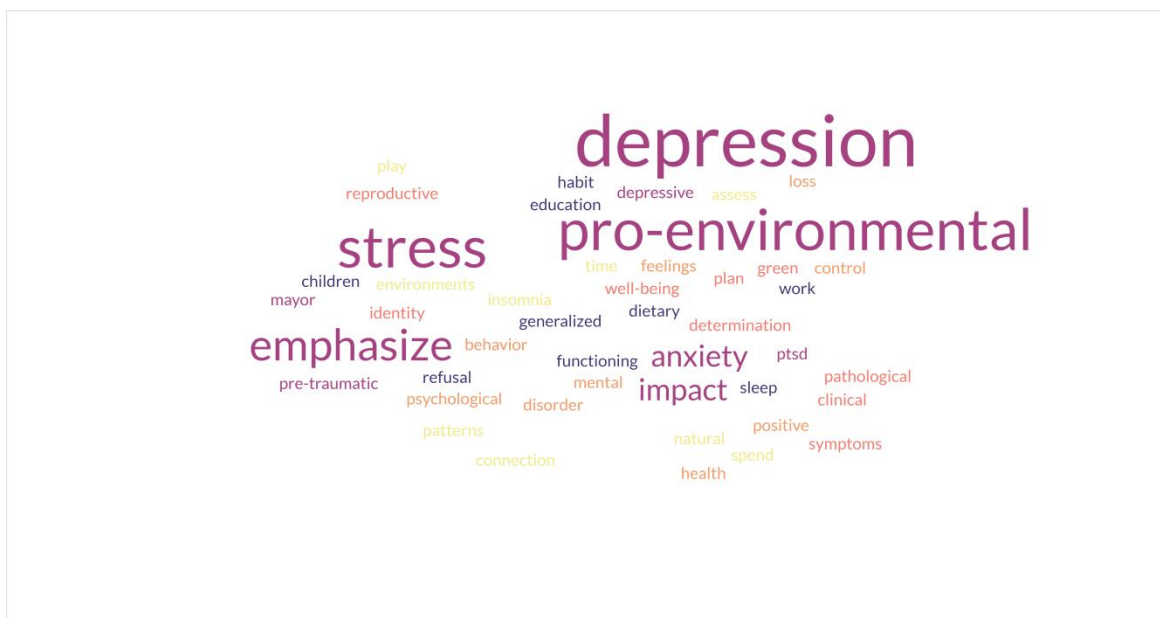
When experience anger, body undergoes a series of physiological changes similar to those experienced during stress or fear. Biochemical changes happen to release glucose (Leal, 2005). Body breaks down stored glucose to provide readily available energy for potential action. This may rise body temperature and start to sweat as body attempts to cool down. Muscle tension and blood vessel constriction can lead to headaches. Blood flow is diverted away from digestion, which can cause stomach upset or indigestion. Tunneling vision may occur as your focus narrows on the source of anger. The intensity of the physical response can vary depending on the severity of anger, not everyone experiences all of these changes, but some also experience trembling or shaking (Versluijs, 2023).

When experience fear, body goes into a primal survival mechanism triggered by nervous system. This response prepares to either confront or escape a perceived threat. What is different from anxious is saliva production can decrease, leading to a feeling of dryness in mouth. Hearing become sharper while other senses like taste and smell may diminish (McCormack, 2021). Digestion and the immune system slow down to conserve energy for the immediate situation. We might experience stomach upset or butterflies. While the amygdala becomes more active, triggering the fight or flight response. The prefrontal cortex, responsible for logical thinking and decision making, may become less active. This can lead to impulsive reactions rather than well thought out responses (Stanton, 2020).

#### **2.4. Behavior that Represents Eco-anxiety**

Behavior refers to a series of individual actions and behavior in response to events or changes in the life environment. Behavior can be positive or negative, can be observed and measured, so it can be studied objectively and scientifically (N & Sam, 2013). An analysis of the behavioral aspects as follows:





*Figure 3. Word Cloud Aspect Behavior*

The behavior that represents eco-anxiety is depression, pro-environmental, and stress. Stress has a big influence on mood, feelings, behavior and health (Schneiderman, 2005). Stress changes eating habits, sleep patterns, concentration, and social interactions. Chronic stress can develop into depression, anxiety, and other serious mental problems. Stressed people experience changes in behavior, withdrawing from social interactions, decreased motivation or productivity. Stressed can also cause emotional dysfunction, such as sadness, irritability, apathy, and feelings of being overwhelmed (Thomas & Morris, 2003).

Depression is a complex mental health condition that affects not only mood but also physically. Depression linked to imbalances in brain chemicals called neurotransmitters, particularly serotonin, norepinephrine, and dopamine. These chemicals play a crucial role in regulating mood, motivation, sleep, and appetite. A decrease in these neurotransmitters can contribute to symptoms of depression. Cortisol, often called the stress hormone, can become elevated in depression. This can disrupt sleep patterns, weaken the immune system, and contribute to feelings of fatigue. Changes in sex hormones, such as estrogen and testosterone, can also occur in depression, affecting energy levels, mood, and sleep (Pereira-Morales, 2019).

A persistent feeling of tiredness and lack of motivation is a common symptom of depression (Stanton, 2020). Even simple tasks can feel overwhelming. Difficulties falling asleep, staying asleep, or waking up too early are prevalent. Some people experience a loss

of appetite and weight loss, while others may have increased cravings for unhealthy foods and weight gain. Unexplained aches, pains, headaches, or stomachaches can occur without a clear physical cause. Depression can suppress the immune system, making you more susceptible to infections and illnesses and changes in bowel habits, constipation, or diarrhea.

### **3. Discussion**

In thinking, worry and stressed are actually a form of individual care for the environment. It can be a source of stress and worry, especially when we feel overwhelmed by the environmental problems. The importance of addressing the root causes worry to reduce negative impacts and encourage positive actions needed to be emphasized.

Motivating someone to take action can overcome the source of their worry (Sikka, 2022). To reduce worried thoughts, start by taking positive actions such as reducing energy consumption, recycling, and using public transportation (Innocenti, 2023). Strategies to overcome worries include problem, emotion, or meaning focused (Fahy & Maguire, 2022). When thoughts are focused on positive things, we can act and feel emotions positively too, so that it will make an efforts to protect the environment (Jones & Todd, 2023).

A different thing occurs in feeling, where all represent negative towards eco-anxiety. It happens because climate change and environmental threats create uncertainty about the future, giving rise to feelings of worry and anxiety (Kurth & Pihkala, 2022). Individuals have less control over the environment and the impact of their actions, causing feelings of stress and anxiety (Stanley, et al, 2021).

We easily feel negative about negative phenomena due to the presence of the human reptilian brain, amygdala. It is responsible for basic human functions such as survival instincts and processing emotions (Naumann, 2015). The reptilian brain has a built-in negativity biases, it will be more likely to respond to negative stimuli such as an environmental crisis than environmentally friendly activities.

The reptilian brain is also responsible for processing emotions, including negative feedback that may be threatening. The fight or flight response that occur can cause stress and anxiety as a mental response to the perceived threat of an environmental crisis.

Therefore, rather than responding by running (flight), it would be better if the individual responded by fighting (fight).

In behavioral aspect, high levels of eco-anxiety can cause fatigue as well as apathy towards the environment. Empirical findings show that eco-anxiety can actually thwart pro-environmental behavior (Kurth&Pihkala, 2022). Eco-anxiety can negatively impact pro-environmental behavior and cause environmental paralysis through its negative impact on self-efficacy (Innocenti, 2023).

In contrast, eco-anxiety motivates pro-environmental behavior such as reducing energy consumption, recycling, and using public transportation (Innocenti, 2023). Increasing levels of eco-anxiety in individuals can indicate greater involvement in pro-environmental behavior (Jones & Todd, 2023). Eco-anxiety associated with increased symptoms of stressed, anxiety, and depression, but increased eco-anxiety is also predicted to increase greater engagement in pro-environmental behavior (Jones & Todd, 2023).

It can be concluded that eco-anxiety can have a positive or negative impact on pro-environmental behavior. These conflicting findings require further study to gain new understanding. It is necessary to carry out scientific studies to find strategies to change eco-anxiety into more pro-environmental behavior. In addition, climate anxiety is also positively related to pro-environmental behavior and environmental activism (Ogunbode, 2022). Research on scientists working in the environmental field including biologist also needs to be carried out.

Participating in pro-environmental actions can have a surprising range of positive effects on body. Many pro-environmental actions involve physical activity, like volunteering for a clean-up project, planting trees, or cycling instead of driving. This physical activity can strengthen muscles and cardiovascular systems, improve balance and coordination. Boost metabolism and help with weight management, and reduce risk of chronic diseases like heart disease, diabetes, and some cancers. Activities that promote cleaner air and water can have a direct impact on physical health. This can mean lower risk of respiratory problems like asthma, and reduced exposure to toxins and chemicals that can harm body.

#### **4. Conclusion**

Climate change and natural disasters pose serious threats to people's mental health(Cianconi, 2023). Eco-anxiety is a valuable mental response in facing the threat of an environmental crisis. When experiencing certain mental processes the body will also respond biologically. Absolutely, our bodies respond significantly to our mental state. There is a constant two-way communication between the mind and body.

The aspects of the mind that represent the concept of eco-anxiety are worry, care, and stressed. The feeling aspect is represented by worried, angry, and afraid. Worried can be a combination of thoughts and feelings, reflecting the complex interplay between cognitive and emotional experiences in various domains.Meanwhile, behavioral aspects are represented by depression, pro-environmental, and stress.Each aspect that emerges from this analysis can be developed as an indicator for developing eco-anxiety measurement instruments.

Eco-anxiety not only gives rise to negative mental responses, but also positive ones.It also has both positive and negative impacts on pro-environmental behavior.These conflicting findings require further study to gain new understanding and discoveries. Further research is needed to find effective strategies to change a person's eco-anxiety into a more positive mental response and action towards the environment.

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