Routledge
Taylor & Francis Group

Journal of Intercultural Communication Research

ISSN: 1747-5759 (Print) 1747-5767 (Online) Journal homepage: www.tandfonline.com/journals/rjic20

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To cite this article: Aigerim Alpysbekova (23 Feb 2026): Acculturation Through an Ecological Perspective and the Emergence of Eco-Acculturation Theory, Journal of Intercultural Communication Research, DOI: 10.1080/17475759.2026.2636010

To link to this article: https://doi.org/10.1080/17475759.2026.2636010

JOURNAL OF INTERCULTURAL COMMUNICATION RESEARCH
https://doi.org/10.1080/17475759.2026.2636010

Acculturation Through an Ecological Perspective and the Emergence of Eco-Acculturation Theory

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ABSTRACT

This article introduces Eco-Acculturation Theory, which incorporates climate, natural ecosystems, and environmental challenges into existing models of migrant adjustment. Drawing from my personal migration experience, particularly my adaptation to Miami's tropical climate and the natural disasters I encountered, I demonstrate how the environment influences psychological resilience and cultural identity. In so doing, this research proposes a fundamental shift in how adaptation is conceptualized, suggesting that migrants undergo simultaneous cultural and ecological transformations.

ARTICLE HISTORY
Received 14 February 2025
Accepted 17 February 2026

KEYWORDS
Acculturation; Eco-Acculturation; environmental adaptation; hurricane; resilience

Migration involves far more than cultural adjustment. It also involves a profound encounter with new ecological conditions. Although classical models of cross-cultural adaptation have outlined psychological or sociocultural processes, such as Berry & Hou's (2021) acculturation strategies, Kim's (2001) stress – adaptation – growth dynamic, and more recent critiques addressing power inequalities and uneven adaptation (De La Garza & Ono, 2015), these frameworks remain primarily culture-centric. Approaches that challenge cultural essentialism, such as Cultural Fusion Theory (Croucher & Kramer, 2017), and those emphasizing embodied experience (Oloruntobi, 2023), have pushed the field forward, but they still leave an important question underdeveloped: *How do migrants adapt to new environments not only culturally, but ecologically, bodily, emotionally, and climatically?* Emerging frameworks in ecocultural identity (Milstein and Castro-Sotomayor, 2020) and human – animal or interspecies interaction studies (Frohoff & Oriel, 2016) suggest that identity formation is shaped not only by social and cultural factors, but by multispecies and ecological relations, highlighting the need to consider environmental conditions as active agents in migrant adaptation.

Existing theories acknowledge identity change, psychological transformation, and sociocultural negotiation, yet they give limited attention to the ecological conditions that migrants must navigate such as heat, cold, storms, seasons, species, landscapes, and environmental hazards. This gap becomes evident when considering how the body serves as the first site of adaptation, a point emerging strongly within embodied adaptation scholarship (Oloruntobi, 2023). The current auto-ethnography extends these perspectives by proposing that ecological adaptation is not secondary but foundational, shaping

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psychological processes and identity formation in ways underexamined in the current literature.

Using autoethnography (Allen, 2015; Biwa, 2022; Rambo & Ellis, 2020), I explore my transition from the harsh continental winters of Kazakhstan to the subtropical ecology of Miami, Florida, including the lived experience of Hurricane Irma in 2017. This methodological approach allows me to trace the intersection of cultural adaptation and ecological encounters, highlighting how bodily responses, environmental learning, and climate-based identity develop through real lived experience.

Building on these observations, this article introduces the Eco-Acculturation Theory, a new conceptual model that explains how migrants navigate ecological shock, embodied environmental reactions, ecological learning, environmental resilience, and climate identity formation. This framework positions environmental adjustment as a core, rather than peripheral, dimension of adaptation which is critical not only for theoretical development but also for practical implications. Migrants settling in unfamiliar or hazard-prone regions must learn to adjust to new climate systems, environmental risks, and embodied challenges alongside cultural expectations. In an era of climate intensification, comprehending how ecological adaptation shapes migrant identity is essential for supporting resilience, belonging, and long-term well-being.

Adapting to New Climates as Part of Acculturation

Migrating to a new country means adapting to a different culture, language, and social norms. However, for me, it also meant learning to adapt to a completely different environment. Moving from Kazakhstan's freezing winters to Miami's intense heat and humidity forced me to adjust not just physically, but also in how I understood and interacted with my new environment. Miami's humidity was unlike anything I had experienced before and made clear how different the environment was. In Kazakhstan, I could manage the dry, freezing winters, sometimes as cold as −40°C, with warm clothing. But Miami's tropical heat was harder to deal with. It was exhausting and made everyday tasks more difficult. I also had to adjust to the regular threat of hurricanes, something I had never experienced in Astana, Kazakhstan. There, we prepared for cold and snow, but in Miami, hurricane season brought a different kind of risk.

When Hurricane Irma hit in 2017, it was my first experience with a natural disaster of that scale. It made me realize that adapting to a new place also meant learning to handle the stress of living in a disaster-prone area. The hurricane also challenged me emotionally and mentally. It shifted my relationship to both the physical environment and the community around me. I had to get used to the idea of always being prepared for emergencies. The effects of the storm lasted well beyond the event itself. It reshaped my identity as a migrant, in terms of *safety* and *belonging*. It made me question how to feel at home in a place where the environment is so unpredictable.

The hurricane also became part of my *cultural adjustment*. It was about adjusting to how people interacted with one another as well as about adjusting to how the environment also demanded a constant shift in behaviour and mindset. In Miami, I had to become part of a community that shared this understanding. I learned new ways to prepare for storms. For example, the way people immediately knew what to do when a hurricane was coming seemed almost

automatic. The government sent out alerts, there were updates on the radio, and officials even knocked on doors to make sure everyone had evacuated. That level of organization was new to me. In my home country, natural disasters were not part of our daily life, so I never had a chance to form any beliefs or expectations about them. What touched me most was how people looked out for each other, even strangers. A neighbour I barely knew asked for my contact info, just to check on me and my family later. That small gesture melted my heart. In this environment, survival was something we did together. I address Hurricane Irma in greater detail later in this article.

What makes this experience different is the realization that *environmental adaptation* does not just affect the body, rather, it reshapes the very way we understand our *identity* and *belonging*. We think of migration as a *cultural shift*, but we forget how powerfully the environment can transform our experiences. When the hurricane came, there was no space to think about being Kazakh or being a newcomer. It did not matter where anyone was from, everyone was just trying to stay safe. It felt as though identity did not protect anything; it could be forgotten in such moments. All that was left was being human, being part of something shared. That feeling was obscure, but also somewhat freeing. It made belonging feel less about fitting into a culture, and more about being connected to others in an authentic way. The heat, the humidity, the threat of hurricanes, they were lessons in resilience, identity, and what it means to adapt to a new life.

This resilience came from learning to follow and to ask for help. At times, it felt like being a newborn, trying to understand a world that did not make sense yet. I followed the news, watched what others were doing at the grocery store, and tried to keep up with the alerts on my phone. It was overwhelming, but also strange and exciting in a way, fear mixed with adrenaline. Through all of it, identity felt far away. I was just a person trying to make it through the day. What mattered was being human and being there for others. Resilience, I learned, was about letting go of control and surviving together. In these types of situations, migration becomes an *emotional and psychological survival*. The environment demands that we change in how we engage with the world, how we relate to others, and how we *redefine our sense of home*.

As climate change accelerates and natural disasters become more frequent, understanding how environmental factors shape migration and adaptation is more crucial than ever. It is not enough to only understand how people adapt socially and culturally; we must also acknowledge the psychological shifts that come with adapting to a new, and threatening environment. We must also acknowledge that environments are experienced differently depending on one's positionality, resources, and group memberships.

Migration is often portrayed as a process of cultural adjustment, learning new behaviours, understanding social norms, and acquiring language (Berry, 2005; Kim, 2015; Schwartz et al., 2010). Classical acculturation scholarship has therefore emphasized psychological and sociocultural transitions, from Berry's (2021) acculturation strategies to Kim's (2001) stress – adaptation – growth model, which conceptualizes adaptation as an ongoing communication-driven process (see Demes & Geeraert, 2014, for further discussion). However, there is a crucial, yet overlooked layer to migration: ecological adaptation (eco-adaptation). As migrants, we do not just adjust to a new cultural expectation; rather, we also enter new ecological systems that shape our bodies, senses, emotions, and everyday practices (Oloruntobi, 2023; Oommen & Oloruntobi, 2025).

When I moved to Miami from Astana, Kazakhstan, I quickly realized that adapting to the tropical climate was only the beginning. Beyond the humidity, my body and emotions were responding to an entirely new ecological lifeworld, including unfamiliar insects, birds, animals, trees, and weather. This reflects what embodied adaptation theorists describe as adjustment that begins in the body, before cognition or culture (Oloruntobi, 2023). Although I expected the heat, what challenged me were the constant encounters with species I had never interacted with so closely. I remember how, at first, I was overwhelmed by the diversity of species. Lizards darting across the porch, slipping behind furniture, and sometimes appearing inside the house produced a visceral reaction, a form of *ecological shock* that parallels, but is distinct from, *cultural shock*.

Classical theories do not account for this form of sensory and bodily disruption; however, the embodied approach to adaptation helps explain how affect, perception, and bodily regulation become central to the migrant experience (Oommen & Oloruntobi, 2025). In Kazakhstan, colder climates meant fewer everyday encounters with small reptiles. But rather than generalizing this as "Kazakh culture," I recognize that my own positionality, shaped by my urban upbringing, climate-specific habits, and learned attitudes towards nonhuman animals, influenced how I perceived these encounters. The unfamiliarity with species caused anxiety because my embodied expectations of "home" clashed with the multispecies environment I now lived in. This is what Differential Adaptation Theory (De La Garza & Ono, 2015) helps illuminate: adaptation is not universal, but is shaped by histories, power, positionalities, and embodied dispositions. This new reality made me question myself: *Was I the only one who found these creatures unsettling? Was I overreacting?* Then, I realized this was part of life in Miami. It was not just me who had to adjust; everyone here had learned to coexist with these species. Over time, my fear shifted to acceptance, and I began to understand how living in a new environment requires adjusting not only to the social culture but to the *ecological culture* as well.

One day, I was confronted with a snake laying eggs right in front of our house. It was both terrifying and awe-inspiring. The shock and disgust at the same time, seeing that snake with eight white eggs stuck to her tail right in front of me, was an unsettling moment. In that moment, I realized: that's it, either I accept this reality or resist it and suffer. I chose to embrace it because I was living in a shared ecosystem. Such encounters resonate with interspecies interaction theory, which emphasizes how humans and animals mutually shape each other's behaviours and perceptions (Oriel & Frohoff, 2020). Growing up in Kazakhstan, snakes were not part of the environments I inhabited. They were exotic, creatures I only saw in zoos or occasionally during travel, never near homes or neighbourhoods. Because our winters were long and severe and our summers short, snakes simply did not appear in daily life. Even when I went hiking in Astana, I never saw any reptiles. The landscape is mostly open steppe, and to see snakes or lizards one had to travel to other regions with lakes or forest trails. As a result, my ecological upbringing taught me that snakes belonged to distant, wilderness spaces, not domestic ones. So, when I saw a snake laying eggs at my doorstep in Miami, my shock came from the collapse of a boundary between the "wild," which I believed was far away, and the "home," where nature was expected to stay outside. Cultural Fusion Theory (Croucher & Kramer, 2017) argues that migrants and environments mutually shape one another, producing hybrid practices rather than one-way assimilation. I have realized that I was

adapting to the ecosystem while the ecosystem was simultaneously reforming how I understood safety, belonging, and nature itself. This felt very different from what I was used to in Kazakhstan. When I lived back in my hometown, I did not interact closely with wild animals during their daily lives. When animals did appear, especially stray dogs, I often saw them as dangerous. I remember being chased by a large dog as a teenager, and my cousin was once bitten by a stray. Such encounters taught us to avoid certain areas, not to adapt to them. In Miami, however, I could not avoid the animals. They were everywhere, in all kinds of forms: in the yard, on the porch, even inside the house. At first, it felt as if they were invading, but over time, I realized: *I was the one who had entered their space*. That shift helped me see the environment differently, something to learn to live with. Over time, my fear began to transform into curiosity, and I slowly started to appreciate the diversity of the natural world I had entered because I had to.

One moment came when I was unpacking groceries and suddenly felt a soft, furry touch against my legs. Panicked, I screamed and rushed to the couch, and I realized that the creature was an opossum. This moment reflected the cultural dialogue (what animals are "dangerous" or "dirty"), embodied reaction (panic), and ecological learning (understanding local species). Embodied adaptation scholarship highlights how these micro-moments become key sites of identity transformation (Oloruntobi, 2023). My reaction in that moment was a reflection of my early experiences and cultural assumptions about animals. Growing up in Kazakhstan, small animals such as mice and rats were viewed as frightening, dirty, and potential carriers of disease. I remember my mother screaming when she saw a mouse in our hallway, and my cousin being bitten by a rat near a trash bin. These moments taught me that such animals were threats, not cohabitants of domestic space. In my upbringing, only pets such as cats, dogs, or birds were considered "safe" to be near humans. As a result, my body learned to interpret any unexpected contact with a small animal indoors as danger. When the opossum, the animal I have never seen in real life, brushed against my leg, my panic came from these learned associations rather than from the animal itself.

Through these encounters, I began to understand that adaptation was not only cultural, but it was also ecological. Ecological Systems Theory (Bronfenbrenner, 1977) helps to make sense of this because the ecosystem itself, the plants, animals, climate, and hazards, was actively forming my behaviours and emotions. Yet Bronfenbrenner does not entirely explain how migrants adapt to ecosystems that differ radically from their original environments. This theoretical gap is exactly where my proposed Eco-Acculturation Theory intervenes.

Traditional acculturation scholars have focused on cultural norms, identity strategies, and communication processes (Berry, 2021; Kim, 2001). Critical perspectives remind us that adaptation is unequal, formed by power and access (De La Garza & Ono, 2015). Fusion theories emphasize hybrid identities (Croucher & Kramer, 2016), whereas embodied approaches highlight sensory and affective dimensions (Oloruntobi, 2023). Recent work on nature-based integration suggests that engagement with landscapes and natural environments can support migrant inclusion and belonging (Trimbach et al., 2024). However, these approaches largely treat the environment as a context or facilitator of social outcomes rather than as an active force shaping identity. Eco-Acculturation Theory addresses this gap by theorizing how the physical and natural environment itself, through ecological encounters, embodied reactions, ecological learning, environmental

resilience, and climate identity formation, actively contributes to migrant adaptation and identity formation.

Ecological Acculturation Theory

I propose Eco-Acculturation Theory – a framework describing the psychological, emotional, embodied, and identity-based adaptation migrants undergo in response to new ecological environments (Figure 1) (Frohoff & Oriel, 2024; Milstein and Castro-Sotomayor, 2020; Trimbach et al., 2024). Eco-Acculturation Theory suggests that not only the culture, but also the physical and natural environment, serves as an active force forming migrant identity, and it unfolds through five ecological processes:

(1) Ecological Encounter (new climate, species, hazards)
(2) Embodied Ecological Reaction (bodily and affective responses)
(3) Ecological Learning (behavioural and cognitive adaptation)
(4) Environmental Resilience (emotional regulation and coping)
(5) Climate Identity Formation (ecological belonging or alienation)

Eco-Acculturation Theory also draws from Ecological Systems Theory (Bronfenbrenner, 1977), which highlights the interconnectedness of individuals and their environments. However, Eco-Acculturation Theory extends this model by arguing that migrants' adaptation is shaped not only by social contexts, but also by direct ecological encounters that activate embodied, emotional, and cognitive processes. In my case, the local ecosystem such as heat, humidity, hurricanes, and animals was directing my adaptation as powerfully as was communication with the host society. This framework also aligns with *climate adaptation theory*, which explores how people adjust to environmental challenges, particularly in the face of climate change and natural disasters (Adger, 2003). Migrants who move into climate-vulnerable regions must go through cultural adaptation

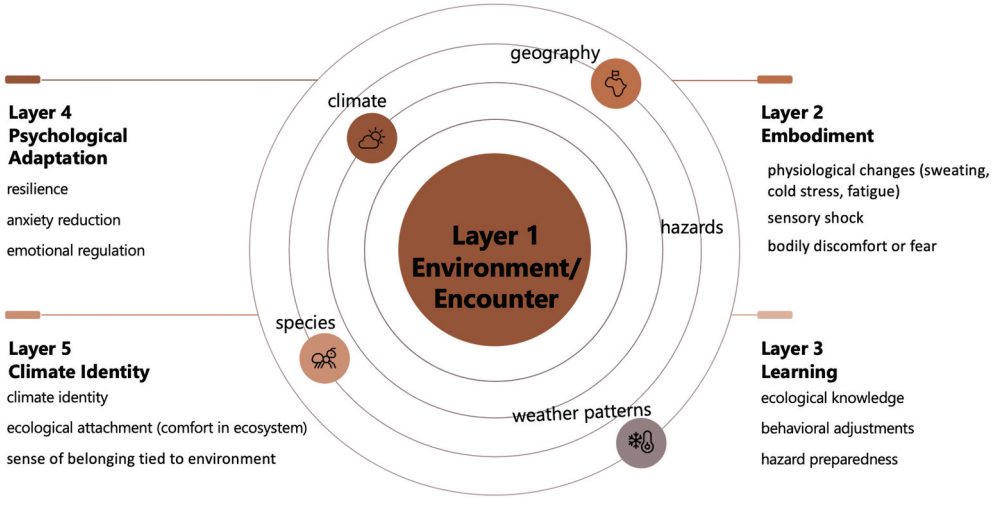

Figure 1. Conceptual model of ecological Acculturation Theory.

as well as environmental adaptation. The psychological burden of navigating both types of adaptation simultaneously functions as a compound stressor, a concept not explored in traditional acculturation theories. Migrants in areas prone to extreme weather events, such as hurricanes in Miami or wildfires in California, not only must cope with social and cultural adaptation but also must build resilience to environmental stressors. The psychological and emotional strain of dealing with a radically different ecosystem can complicate the acculturation process and may exacerbate the challenges migrants face.

Incorporating *environmental psychology* into this framework helps us understand how the physical environment influences behaviour, emotional well-being, and decision-making (Gifford, 2007). As I learned to cope with Miami's humidity, prepare for storms, and coexist with new species, my emotional regulation, risk perception, and ecological sense of place evolved. Over time, this reformed my identity.

Many migrants experience *climate* shifts but lack the language to describe them. They may feel unsettled, depressed, or disconnected because of culture shock as well as *ecological shock*. Yet these experiences are largely invisible in migration discourse. Through ecological acculturation, we might open space to analyse how nature such as air quality, temperature, storms, species, becomes an active agent in identity formation and adaptation. Through my own migration experience, I have come to realize that migration is not only about a new culture, but it is also about finding a place in a new ecosystem.

The Eco-Acculturation Theory (Figures 1 and 2) builds on and extends established cross-cultural adaptation research by proposing that migrants undergo a many layered, cyclical process which begins with a *Layer 1. Ecological Encounter*, the moment when unfamiliar climates, species, and hazards confront the migrant and generate immediate disruption at the bodily level. This starting point builds on but departs from Kim's (2001) stress-adaptation-growth model by arguing that environmental/ecological shock serves as the first trigger of adaptation. These disruptions initiate *Layer 2. Embodied Ecological Reaction*, where the body responds before cognition, with physiological changes such as sweating, cold stress, fatigue, and affective responses such as sensory shock, bodily discomfort, fear, aligning with Oloruntobi's (2023) argument that adaptation is fundamentally embodied.

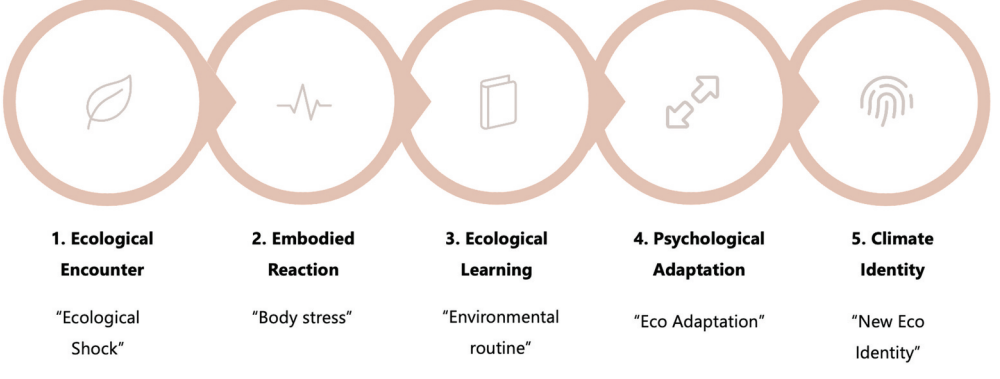

Figure 2. Conceptual sequence of ecological Acculturation Theory.

As migrants attempt to make sense of these reactions, they engage in *Layer 3. Ecological Learning*, developing practical environmental knowledge, hazard preparedness, and behavioural adjustments through observation, trial-and-error, and guidance from locals. This stage is shaped by unequal access to environmental resources and safety infrastructures between migrants and host nationals, where migrants have far less access to these resources and infrastructures than host nationals do. Migrants are therefore reliant on host nationals (and longer-term migrants) to help them adapt to the local climate and to climate-related emergencies. This principle echoes Differential Adaptation Theory's emphasis on structural inequalities (De La Garza & Ono, 2015). Migrants who do not have supportive relationships with host nationals may therefore be disadvantaged in adapting to the local climate, animal species, insect encounters, and other potential hazards.

Over time, ecological learning supports *Layer 4. Psychological Adaptation*, in which migrants experience anxiety reduction, improved emotion regulation, increased predictability, situational confidence, and ecological resilience as they become more competent navigating their environment. As these embodied, cognitive, and psychological processes accumulate, they converge into *Layer 5. Climate Identity*, a form of ecological belonging in which migrants develop attachment, comfort, and a sense of self tied to the species, and atmospheric qualities of place, resonating with Cultural Fusion Theory's emphasis on hybrid, co-constructed identities (Croucher & Kramer, 2016). Importantly, this pathway is cyclical rather than linear; seasonal shifts, environmental hazards, and unexpected ecological encounters can reactivate earlier stages, requiring migrants to renegotiate embodiment, learning, and emotional regulation.

Ecological acculturation is not necessarily limited to scenarios in which the climates are drastically different, such as Astana, Kazakhstan versus Miami. Even in situations where temperatures are similar, such as Russians moving to Canada, animals, plants, insects, and rainfall amounts may be different. Similarly, moving from hot climates in South America to Miami may still involve adjustment – hurricanes do not occur in most of South America, and the types of animals and insects are likely different. Alligators, for example, may be a new sight for people from Brazil or Colombia. Beyond unfamiliar species, these ecological differences became clear to me in Miami, where adaptation involved large-scale environmental events such as hurricanes.

Hurricane Irma

As I was settling into my new life in Miami, I encountered an environmental challenge unlike anything I had faced before – *Hurricane Irma*. The storm, a Category 5 hurricane, devastated parts of the Caribbean and the southeastern United States in September 2017, leaving widespread destruction in its wake. I had no frame of reference for this kind of disaster. In Kazakhstan, where I grew up, weather was relatively predictable, and natural disasters such as hurricanes were beyond my comprehension. This moment represents a *Layer 1. Ecological Encounter*, where migrants confront an unfamiliar natural force that challenges their existing schemas of safety and predictability.

Hurricanes, as Augusto et al. (2023) explain, are powerful cyclones driven by oceanic heat, with wind speeds exceeding 33 metres per second. They can cause catastrophic

damage, and Irma was no exception. The storm flooded coastal areas and left nearly 6.8 million people without power (Feng & Lin, 2021). This was my first encounter with such severe weather. *Layer 2. Embodied Ecological Reaction*. As the storm approached in the middle of the night, I woke up feeling anxious. My breathing became shallow and fast, my chest tense, and my palms sweaty. Thoughts of danger and even death ran through my mind. I felt hyper-alert, emotional, and on edge. All of these reactions happened in my body instinctively, before I could consciously think about the situation. Only now, looking back, can I observe the scene and recognize the stages my body went through.

South Florida has experienced numerous storms over the years – *Hurricane Andrew* in 1992, *Hurricane Wilma* in 2005, and more recently, *Hurricanes Milton* and *Helene* in 2024. Each has left a distinct mark on the region, but for me, Irma was the first real test of my ability to adapt to Florida's intense natural environment. Yet Miami is not the only part of the United States where environmental challenges demand adaptation. Tornado Alley in the Midwest and the Plains faces violent tornadoes in the spring; the West Coast experiences unpredictable earthquakes; California endures wildfires each summer; and the Midwest struggles with polar vortexes bringing extreme cold during the winter. From the perspective of Eco-Acculturation Theory, these region-specific hazards serve as recurring ecological encounters that continually reactivate and reshape adaptation pathways for migrants.

For me, living in Miami, Irma was a moment of realization that adapting to the environment was an essential part of becoming part of a new community. Migrants across the United States must engage with environmental challenges unique to their regions, which can affect their ability to settle in and feel secure. Hurricanes, tornadoes, earthquakes, wildfires, flooding – these all create an additional stress in the process of acculturation. In ecological terms, such stressors function as catalysts for *Layer 3. Ecological Learning*, forcing migrants to acquire new environmental knowledge, risk-assessment skills, and preparedness behaviours that are crucial to daily survival.

When the warnings about Irma started pouring in, I had no idea how to prepare. I thought the media hype was exaggerated. However, as I watched people empty grocery store shelves of water, canned food, and batteries, I began to understand the gravity of the situation. Coming from Kazakhstan, I thought I had experienced some of the most extreme weather on Earth. Freezing temperatures, heavy coats – that was my norm. When I first heard about hurricanes, I thought, *how bad could it really be?* It forced me to re-evaluate what danger is and what it means to be prepared.

We evacuated to Kissimmee, outside of Orlando. For migrants, adapting means dealing with both a new culture and new environmental risks. This stage marks the transition into *Layer 4. Psychological Adaptation*, where emotional regulation, resilience-building, and anxiety reduction emerge as migrants gradually gain familiarity with environmental threats. As Bernales et al. (2019) suggest, newcomers often underestimate local threats, increasing both vulnerability and stress. The experience was quite emotional. The winds, the pressure, and the unknown situation triggered fear. In Resilience Theory, the capacity to adapt to adversity develops through repeated exposure (Yong & Lemyre, 2019). Such experiences strengthen resilience, a key component of *Layer 4 in Eco-Acculturation Theory*. As the storm intensified, the noise felt unsettling, unlike anything I had heard before. Yet as hours passed, I began learning what it meant to prepare for the unknown.

This progression from shock to comprehension mirrors the movement from embodied reaction to ecological learning. When the storm passed, I witnessed strong community responses: neighbours sharing supplies, boarding windows, exchanging updates. This taught me that American culture, especially in disaster-prone regions, is formed by environmental embeddedness. Migrants who lack these networks face greater difficulties. Here, ecological learning is socially mediated, illustrating how environmental and cultural systems create adaptation, which is a central claim of my proposed theory.

The storm created unexpected bonds across cultures. My friends from other countries such as Colombia, Vietnam, and Russia kept checking on me. This reflects early development of *Layer 5. Climate Identity*, where belonging emerges not only from social integration but from shared ecological vulnerability and collective environmental experience. As I recovered from Hurricane Irma, I realized that I had adapted to that experience. The storm taught me how to be resilient and how to *live with the unknown*, which is the essence of ecological acculturation.

Post-Hurricane Reflection

During Hurricane Irma, I encountered firsthand how environmental disruptions influence the psychological adaptation and identity formation of migrants. Stepping onto the hotel balcony the morning after the storm passed, I was met with a scene of devastation: fallen trees, shattered streets, and a sky that seemed to mourn. The destruction left me in shock. In Kazakhstan, I experienced extreme cold – sometimes −40°C in winter – but that is part of daily life, something I was used to. It does not change the landscape in such a violent way. In Kazakhstan, preparing for −40°C winters was predictable. Winter arrived slowly, steadily, and everyone knew what to expect: extreme cold, tons of snow, and wind. This upbringing conditioned me to understand weather as harsh but predictable, something you prepare for months ahead. Because of this, the suddenness and unpredictability of a hurricane felt foreign to me. Irma felt that something out of a movie – beautiful in its force, but unsettling. That moment made me feel that I was living in a different reality. In that moment, I realized I was learning to live in a completely different ecological reality.

Many newcomers face emotional turmoil when confronted with their new environment. Natural disasters such as hurricanes or wildfires can force migrants to reconsider their sense of security, challenging their ability to adapt to both physical and cultural environments. The intensity of these events such as the loud noise, the pressure in the air, and the visible destruction, can overwhelm the body before the mind understands what is happening. Fear sets in quickly, the body becomes alert, and emotions feel scattered and hard to control. For migrants, this reaction is even stronger because the environment is still unfamiliar, and the routine is not yet established.

Even after returning to Miami, the destruction was jarring. Palm trees that once stood were now uprooted. In these moments, I realized how crucial our perception of the environment is our response to disaster. The environment plays a pivotal role in how we process fear, make decisions, and adapt. Slowly, I began learning how to read this new environment: which areas flooded, how storms moved, and how long recovery took. This knowledge became a part of my new life.

Adapting to the storm went far beyond surviving. I had to quickly figure out how to live without basic comforts such as electricity or air conditioning in hot weather conditions. In those moments, I discovered that resilience was the ability to stay calm and think clearly in unpredictable situations. The way we perceive and respond to environmental stress can shape how well we adapt. Facing challenges instead of resisting them helps calm the mind, make better decisions, and feel more in control. Cooking meals over a fire was surprisingly enjoyable, and it made me realize that I was finding my own way to adapt.

Reflecting on my experience, I see how unprepared I was for the challenges posed by the storm. For many newcomers, similar obstacles such as language barriers, financial strain, and a lack of familiarity with local emergency systems, make it even more difficult to navigate the crises. From my own experience and the research of scholars such as Guo et al. (2020) and Liu and Chen (2014), I recognize the importance of community and institutional support during such moments, and I have identified several key obstacles that newcomers face during such crises. These obstacles contribute to disparities between individuals and groups in terms of their abilities to prepare for, manage, and recover from disaster events.

(1) **Language Barriers**: One of the most immediate obstacles was the difficulty in understanding critical information. During the hurricane, there were numerous warnings and emergency alerts, many of which were in English. For me, it was incredibly difficult to understand evacuation procedures, safety measures, or updates on the storm's progression. This lack of clear communication can be catastrophic in times of crisis, where understanding what to do is literally a matter of life and death.
(2) **Limited Access to Reliable Information Sources**: In the days leading up to and during the storm, many newcomers struggle with limited access to reliable information. Power outages, broken communication networks, or unfamiliarity with local news sources can leave people stranded without vital updates.
(3) **Unfamiliarity with Local Emergency Systems**: Every locality has its own emergency procedures-evacuation routes, shelters, or temporary aid stations-but migrants, especially those who are new to the area, may not be familiar with these systems. During the storm, we were unsure about the best evacuation routes or even where the nearest shelters were. This lack of knowledge felt stressful, as we tried to figure out how to navigate the city in the midst of the chaos. Moreover, without prior experience, we did not know where to go for help or which services were available in our area. This unfamiliarity can delay timely actions, putting newcomers at greater risk.
(4) **Financial Constraints**: Financial stress can serve as a significant barrier for migrants. Preparing for a disaster can be expensive, whether it is buying emergency supplies, paying for evacuation transportation, or securing temporary accommodation. In my case, although we were fortunate to have the means to escape to Kissimmee, many others in our situation lacked the funds to leave or could not afford the necessary preparations, such as purchasing food or gas. For

low-income migrants, these financial constraints may force them to make difficult decisions that affect their safety and well-being

(5) **Concerns About Legal Status**: For migrants with uncertain legal status, seeking help during a disaster can be fraught with fear. Many newcomers worry that reaching out to emergency services, shelters, or even medical facilities might expose them to legal or immigration-related consequences. This fear can deter them from evacuating or seeking assistance when they most need it. The psychological state of living in constant fear of deportation, even in a crisis, can worsen the stress and anxiety experienced during a natural disaster.

(6) **Lack of a Support Network**: One of the most important sources of resilience during a disaster is a strong support network. Having friends, family, or community members to turn to can provide not just practical help (such as a place to stay) but emotional support as well. For many migrants, however, this support network is either absent or far away. During the hurricane, I was fortunate enough to have friends and family who checked in on us regularly. But for many others in my situation, being alone in a crisis can exacerbate feelings of isolation and helplessness.

(7) **Cultural Differences in Disaster Preparedness**: Cultural differences also play a role in how migrants perceive and respond to natural disasters. In some cultures, there may be a lack of awareness about the severity of hurricanes or how to properly prepare for them. Additionally, some newcomers might not understand local safety practices, such as the importance of staying indoors during a hurricane or how to securely reinforce windows and doors. These cultural gaps in disaster preparedness can lead to ineffective responses, increasing vulnerability to injury.

(8) **Barriers to Accessing Healthcare**: The aftermath of a hurricane presents new health challenges, whether due to injuries sustained during the storm, lack of access to clean water, or the spread of diseases in flooded areas. Migrants may face additional barriers to healthcare during and after such events, whether due to a lack of health insurance, unfamiliarity with local healthcare systems, or language barriers when seeking medical care. These health risks can worsen the physical and psychological toll of the disaster, especially when compounded by stress and trauma.

These challenges underscore the importance of community engagement and governmental support to maintain the safety of migrants during crises. For me, the presence of a support network – friends who checked in regularly – made a significant difference. However, for many others, this support is not readily available. Local governments and community organizations must step up, providing multilingual communication, shelter resources, and financial aid to assure that migrants are not left behind in times of need.

Ecological stress does not replace cultural stress; it layers on top, amplifying it. During an approaching hurricane, cultural challenges, such as language barriers, social integration, and understanding local systems, interact with environmental stress, creating additional pressures that affect both survival and adaptation. When Irma hit, I was not thinking about whether I was adapting "well" to American life; I was wondering where to hide, what to do if the roof flew off, whether I should have evacuated. I did not even know what consequences to expect. This kind of uncertainty disrupts the slow process that

acculturation requires. How do you manage language barriers when your immediate priority is survival? These stresses show how cultural and environmental adaptation go hand-in-hand rather than one taking precedence over the other.

Although traditional acculturation frameworks convey powerful concepts in terms of how migrants navigate new cultural norms, languages, and social expectations, these models focus primarily on social and cognitive dimensions of adaptation. What these frameworks tend to overlook, however, is the role of the physical environment in shaping migrant experiences. Eco- Acculturation Theory does not displace these models, but it expands them by adding a fifth layer, which is *Climate Identity*. Climate identity captures long-term emotional attachment to place and the sense of belonging that forms through repeated interaction with local climate, and risks. Reflecting on my journey, I can now see how much my identity has shifted – not only culturally, but environmentally. Before the hurricane, I was a foreigner adjusting to a new culture, managing language stress, navigating food habits, and blending Kazakh and American lifestyles. My weekends were filled with home country movies and traditional dishes, whereas my weekdays followed more American routines. My focus was mostly on cultural adaptation.

After months of living in close contact with an unpredictable environment, I realized that adaptation was not only cultural; I was learning to live in a new ecosystem. The fear I felt during storms, and the gradual acceptance of local creatures, reshaped my sense of self. These experiences illustrate the formation of Climate Identity, the fifth layer of Eco-Acculturation Theory, integrating ecological experience into migrant identity. I went through what I now think of as *environmental or ecological acculturation* – a process of psychological and emotional adaptation to the natural world itself.

I developed what might be called a *climate identity* – I now feel physically and emotionally connected to warm, sunny places. After living in Miami, San Diego, and now Austin, I struggle with cold weather in my home country. It affects my mood, my energy, even my sense of belonging. I also respond differently to the natural world. Where I once felt fear or disgust at creatures in the house, I now react with calmer.

Identity shifts not only through culture but also through climate, weather, and the emotional bonds formed with place. Environmental and cultural stress forces adaptation while opening parts of the self previously unknown. Over time, I gradually adapted to new ecological rhythms such as heat, storms, humidity, and unfamiliar species, illustrating the central role of environment in shaping migrant identity. Reflecting on Hurricane Irma, I recognize that the experience taught me more than survival; it highlighted the interconnectedness of social resilience and ecological adaptation. Migrants must adjust to new environments physically, emotionally, and psychologically, and in disaster-prone regions, thriving depends on learning to live with environmental challenges. At the same time, it is essential to recognize that natural disasters do not impact everyone equally. The construct of social vulnerability (Clark-Ginsberg et al., 2024) suggests that individuals and families with fewer resources, less stable support networks, and more stressful lives will likely be less able to prepare for natural disasters and to recover from them afterwards. Social vulnerability refers to differences between and among migrants and migrant groups (where some groups are more advantaged than others), differences between and among host nationals and host-national groups (for the same reason), and differences between migrants and host nationals (where migrants are often less advantaged than host nationals). My own experience with Hurricane Irma suggested

that I was in a fairly advantaged position. I was working on my master's degree and I were able to evacuate. After the hurricane, many people in Miami did not have power or Internet for weeks.

My Ecological Identity Transformation

Growing up in Kazakhstan, my identity was rooted in both cultural and ecological traditions. I belong to the Orta Zhuz, one of the three main tribal confederations of Kazakh society, specifically the Argyn tribe and the Karakesek clan (E-history, 2013). In my upbringing, knowing one's ancestry, tracing back seven generations, was crucial for understanding kinship ties, values, and social responsibilities such as hospitality, respect, and communal care. Seasonal changes shaped life as well: preparing for freezing winters meant stocking coal, preserving food, and ensuring warm clothing. The land, weather, and seasonal cycles were inseparable from my sense of belonging.

When I moved to Miami, this framework was disrupted. The heat, humidity, hurricanes, and ecosystem challenged my embodied sense of self. Stepping onto the hotel balcony after Hurricane Irma, I confronted uprooted palm trees and shattered streets. That shock marked the beginning of ecological acculturation, where identity is shaped by adaptation to a new environment (Bronfenbrenner, 1977; Gifford, 2007). Daily interactions with the environment such as feeding birds, observing coyotes, or navigating heat and humidity, reformed my psychological responses. Tasks such as cooking without electricity or preparing for hurricane evacuation became practices in resilience and emotional regulation, representing the fourth layer of my ecological acculturation model: psychological adaptation.

The ecological layer of adaptation did not erase my Kazakh roots; rather, it layered on top of them. Just as my Kazakh upbringing taught me to prepare for harsh winters, my life in Florida taught me to prepare for hurricanes. Over time, I developed what I call a *climate identity*, an embodied, psychological, and emotional connection to the environment, where comfort, sense of belonging, and ecological attachment become integral to *who I am*.

Observing others reinforced this perspective. A friend's aesthetic, music, and home décor both reflected their environment and expressed their identity, illustrating how surroundings and self, shape each other. My own transformation was subtler, emerging in values, emotional responses, and daily engagement with the ecosystem. I became more attuned, responsible, and capable of adapting to uncertainty. Simple tasks, such as reporting road hazards or observing animals, became part of my embodied relationship with place. Reflecting on this process, I see now how ecological acculturation complements cultural adaptation, rather than replacing it. Migrants do not adapt to social norms or language; they also adapt to environments, hazards, and climate. Identity also shifts through engagement with place, weather, and ecological systems. For me, the sun, tropical storms, local species, and subtropical landscapes are now intertwined with who I am, just as my Kazakh heritage remains a foundation.

Conclusion

Surviving Hurricane Irma was a lesson in resilience in terms of psychological and emotional adjustment to a drastically changed environment. Eco-Acculturation Theory

helps explain how migrants' perception of their environment – their mindset and emotional responses, shapes their ability to cope with climate adaptation challenges. The framework suggests that adaptation unfolds across several layers: initial environmental encounters, embodied reactions, learning new ecological knowledge and behaviours, psychological adjustment, and finally the development of a climate-based sense of identity. Through mindset shifts and a positive perception of the world around them, migrants can cultivate resilience and ultimately forge a stronger sense of identity and belonging in their new home.

Disclosure Statement

No potential conflict of interest was reported by the author(s).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

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