



Beyond the binary of trapped populations and voluntary immobility: A people-centered perspective on environmental change and human immobility at Lake Urmia, Iran

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ABSTRACT

Empirical research on the links between environmental change and human (im)mobility has made considerable progress in the last decade. However, most attention is given to migration rather than understanding immobility, where human-centered perspectives are scarce and various regions remain critically understudied. This paper seeks to address these deficits. Methodologically based on 75 qualitative in-depth interviews and 8 focus group sessions with rural residents around desiccating Lake Urmia (Iran), the study takes individual perceptions of environmental degradation and lived experiences of immobility as its fundamental starting point. It investigates what (in)tangible losses occur and analyses what matters most in shaping the aspirations and capabilities to migrate or stay. The findings provide unique empirical evidence of the multifaceted dimensions along the spectrum of immobility, moving beyond the prevailing binary views of voluntary immobility and trapped populations. A key finding of this study is the elucidation of ‘ambivalent immobility’, comprising individuals whose (im)mobility aspirations are complex and contradictory: they want to stay, but also leave, constantly weighing their growing local dissatisfaction against their attachments to place and the psychological/economic costs of migration. Another novel contribution concerns ‘precarious immobility’, expanding our knowledge of how individuals understand themselves as trapped. Grounded in capability constraints and emotional distress exacerbated by environmental change, individuals from this group did not voice any (im)mobility aspirations. This distinguished them from the involuntary or acquiescent immobile residents in the study, who despite capability constraints either aspired to migrate or expressed a preference to stay. Thus, this paper highlights the complexity of aspirations in contexts of environmental degradation and underscores the need for more qualitative research to complement quantitative efforts to foster a more nuanced understanding of the diverse causes, dimensions, and consequences of immobility.

1. Introduction

Although research on the environmental change-migration nexus has refuted overly deterministic assumptions that all or most people living in affected regions will migrate, the various causes and dimensions of human immobility¹ are still under-researched in migration studies (Zickgraf, 2021). This can be attributed to a “mobility bias” within the

scholarly community (Schewel, 2019), where sedentarism is seen as the norm or natural state, and (environmental) migration as an aberration to be studied (Jónsson, 2011; Stockdale and Haartsen, 2018). However, in the context of environmental risks the study of immobility seems particularly relevant. It’s a legitimate concern that the most vulnerable individuals may be those who remain in regions exposed to climate change, facing the potential loss of their livelihoods or lives (Foresight,

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¹ Regarding terminology: We employ ‘immobility’ in accordance with other authors (e.g., Schewel, 2019; Zickgraf, 2021) as a more flexible umbrella term covering the various reasons and relative agency categorizing individuals who (currently) do not move. Immobility is not merely seen as the opposite of migration, but as a relational practice, acknowledging the complexities of staying behaviors and the diverse factors influencing them. Accordingly, the term ‘(im)mobility’ entails the entire range of immobility and mobility unified in a single spectrum. Similarly, we utilize ‘(im)mobility aspirations’ as an inclusive expression encompassing the range of desires associated with moving/staying.

2011; Black and Collyer, 2014).

Recently, there has been a growing body of research addressing the topic of environmental immobility (Farbotko and McMichael, 2019; Blondin, 2021; Pemberton et al., 2021). Most notably, Caroline Zickgraf (2018, 2019, 2021) has advanced the topic via various publications at the theoretical level, paving the way for a new research agenda. However, our understanding of environmental immobility still largely persists in a binary framing – either people choose to stay voluntarily, or they are forced to stay involuntarily (Zickgraf, 2021). Scientific evidence on the variety of manifestations of immobility within these poles is still scarce. There is a persisting lack of empirical studies that consider all complex forms and consequences of immobility. Thus, we know too little about the perspectives, (im)mobility aspirations and capabilities (Carling and Schewel, 2018) of those who stay in different settings affected by environmental change around the globe.

This paper aims to address these shortcomings and enhance our understanding of human immobility, notably by proposing new categories of immobility that shed light on previously unexplored dimensions of staying. The findings presented here are based on empirical, qualitative fieldwork conducted within a multi-year research project (2018–2023) on environmental change and (im)mobility at Lake Urmia (northwestern Iran). Once known as the world's second largest hypersaline lake, Lake Urmia has nearly dried up over the past 25 years due to climate change and water mismanagement in its catchment area (Schulz et al., 2020). The consequences of this 'environmental disaster' (e.g., Tabrizi et al., 2019) for the local population have hardly been empirically studied to date. The people living by the lake are primarily marginalized smallholders who depend on semi-subsistence farming and whose livelihoods are increasingly undermined by water scarcity, frequent saline dust storms, and related high out-migration from the villages (Authors' forthcoming). This makes the region of Lake Urmia a unique case study for investigating all forms and outcomes of (im) mobility. Our research combines theory and concepts from different disciplines – from (im)mobility studies, to disaster research, to environmental psychology. Methodologically, it is based on 75 qualitative in-depth interviews and eight focus group sessions with residents living in the immediate vicinity of the lake. To the best of our knowledge, this is the first study to take such a people-centered perspective to examine environmental (im)mobility in Iran, an under-researched region (Piguet et al., 2018).

2. Immobility in the context of environmental change

2.1. Empirical advances and shortcomings within the research field

The growing research endeavors on human immobility in environmental migration studies can be traced back to the influential Foresight report commissioned by the UK government (Foresight, 2011). As one of their key findings, the authors highlighted the potential risks of immobility in the context of climate change, introducing the concept of so-called "trapped populations", referring to people who perceive the need and desire to migrate, but are unable to do so. While the concept represents an important corrective to the dominant scholarly interest in migration, it has also received criticism for its limited focus on economic barriers, which ignores other factors that can impede movement (Zickgraf, 2021). Overall, while trapped populations have attracted much attention and remain an integral part of contemporary academic discourses on environmental (im)mobility (Black and Collyer, 2014; Nawrotzki and DeWaard, 2018), the concept has hardly evolved since its introduction due to a lack of empirical studies that critically examine their existence (Kniveton et al., 2018; Ayeb-Karlsson et al., 2018).

As a kind of countermovement, some researchers have started to investigate voluntary immobility. Notable case studies come from Adams (2016), Farbotko and McMichael (2019), Blondin (2021), and Wiegel et al. (2021). They illustrated that immobility can be a choice in contexts of environmental change and emphasized the relevance of

social, cultural, and psychological factors in (im)mobility decision-making. These studies revealed that a one-dimensional focus on trapped populations is misleading, and that the aspirations to stay should not be ignored, especially considering potentially politically motivated relocation programs (Farbotko and McMichael, 2019). Despite these findings and advances, however, what many of these studies have in common is that through their focus on voluntary immobility, they do not elucidate on what 'different kinds of staying' there are and if both voluntary and involuntary immobility can be found in similar contexts.

Furthermore, we criticize that the category of voluntary immobility itself has not been studied in a nuanced way so far. As Schewel (2015) argued, the question arises, whether the voluntary immobility of people *without* the capability to migrate is voluntary in the same way as the immobility of people who *can* migrate. Following de Haas (2014), who, influenced by Sen's (1999) capability approach, defines human mobility as the "capability (freedom) to choose where to live, including the option to stay" (de Haas, 2014, p. 2), this distinction is highly relevant. To highlight people who have a preference to stay but lack the capability to migrate (and thus a meaningful choice), Schewel (2015) introduced the category of 'acquiescent immobility'. This distinction seems particularly important in the context of environmental change, as the acquiescent immobile may be just as vulnerable as the involuntarily immobile (trapped populations). To date, empirical studies in contexts of environmental change have largely overlooked this dimension.

Furthermore, in many studies emphasizing voluntary immobility, the slow-onset environmental changes examined do not appear to pose an everyday pervasive threat that severely affect livelihoods and various aspects of daily life. Perhaps related, there is a noticeable research gap in studies addressing environmental immobility within the context of high out-migration. Lastly, study designs rarely consider intra-household differences regarding (im)mobility aspirations and capabilities, leaving more subtle dimensions of (im)mobility poorly understood. Thus, despite recent advances, our knowledge of environmental immobility remains in the binary, with many questions being left unanswered.

2.2. A people-centered research approach to the study of human (im) mobility

Primarily, this paper's empirical exploration of immobility at Lake Urmia is grounded in Schewel's (2019) aspiration-capabilities framework, which offers researchers the tools to capture the often-overlooked heterogeneity in immobility (Fig. 1, adapted by the authors to reflect the prevailing terminology in environmental contexts).

Although the framework emerged from broader migration literature, it is ideally suited to disrupt the dominant binary narratives of immobility in environmental contexts (de Sherbinin et al., 2022). The approach considers immobility as a result of personal or structural constraints on mobility, as an expression of the aspiration to stay, and/or from the interaction of the two over time (Schewel, 2021). While the framework seems "refreshingly simple" (Carling and Schewel, 2018, p. 945) in explaining why some people migrate and others do not, it is nonetheless profound in that it allows for the engagement with a variety of internal and external forces at different levels that influence (im) mobility decision-making. While applying this framework, we remained open to exploring new understandings of (im)mobility emerging from possible frictions between the currently suggested categories and our empirical reality.

While scholars have acknowledged the analytical value of aspirations-capabilities in pluralizing the (im)mobility debate, the framework itself has been criticized for being primarily suited to study (im)mobility at the individual level and that it "does not ask what happens after" (Zickgraf, 2021, p.8). Our investigation therefore takes the aspirations-capabilities framework as a starting point and complements it with insights from other contemporary concepts and theories that allow for a multidimensional analysis of the meanings and consequences of staying processes through the stories and lived experiences of those

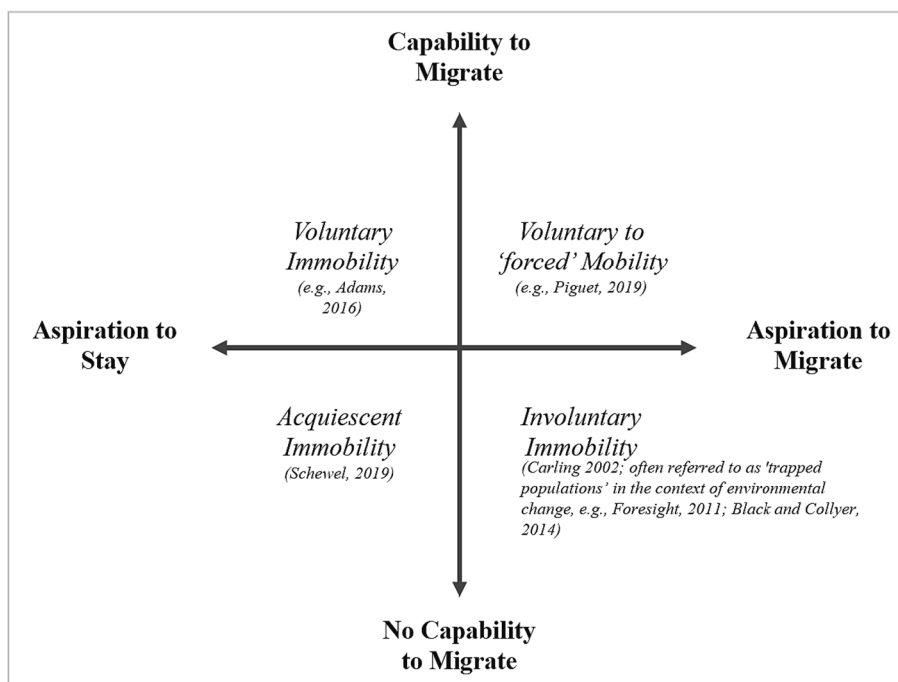


Fig. 1. Environmental (im)mobility categories based on the aspiration-capability framework (Schewel, 2019, edited by the authors) (Trapped populations are placed in the category of involuntary immobility but are strictly speaking distinguishable by the inclusion of the criterion of ‘need to migrate’ in the definition of trapped populations (Black and Collyer, 2014).).

wrapped up in them (cf. Tschakert and Neef, 2022). In adopting an ‘environmental and climate mobilities’ perspective (Beine et al., 2019; Wiegel et al., 2019), we acknowledge the relationality and diversity of (im)mobilities. Recognizing that (im)mobility outcomes, aspirations and capabilities may be greatly influenced by power dynamics and/or the (im)mobility of other household members (Hunter et al., 2015; Saktapolrak et al., 2016), our approach sought to unpack these dynamics within households whenever possible.

Moreover, several concepts were used to explore how the consequences of local environmental changes are related to immobility, the first concerning the role of risk perceptions. As various authors have argued (Parsons and Chann, 2019; Wiegel et al., 2021), people do not respond to objectively measured climate data. Rather, the perceptions of environmental change influence adaptation strategies and influence (im)mobility aspirations. By incorporating insights from the emerging field of the science of loss, which has gained traction in international policy discussions concerning Loss and Damage (L&D) resulting from climate change impacts (Ellis and Albrecht, 2017; Tschakert et al., 2019), our research aims to highlight local perceptions of both the economic and non-economic losses (e.g., physical or mental health). We also consider the potential adverse impacts of others’ mobility (e.g., high rates of out-migration) on the lives and wellbeing of those who remain. Exploring these losses reveals the subjective and place-specific experiences of loss and grief, which are often not measurable, but can significantly influence residents’ sense of place and shape their (im)mobility aspirations (Tschakert and Neef, 2022). While the consequences of loss of place have been rather absent in environmental (im)mobility research, they are studied in environmental psychology within the concepts of solastalgia and ecological grief (Albrecht et al., 2007; Comtesse et al., 2021). By including potential perceptions of loss of place in the analysis, and by considering the negatively experienced forms of place attachment (e.g., local commitments), we expand on other contemporary studies that mostly consider attachments to place as predictor for voluntary immobility (e.g., Blondin, 2021).

3. Research design and methods

3.1. Study region and context

A multi-site case study was conducted at Lake Urmia, northwestern Iran, a region currently experiencing severe environmental and social disruptions. Lake Urmia, once one of the largest salt lakes on earth and the largest inland lake in Iran, has been drying up at an alarming rate over the past 25 years (AghaKouchak et al., 2015; Feizizadeh et al., 2022). Its disappearance is symptomatic of the general water crisis in Iran, which manifests in the nationwide depletion of surface and groundwater resources and increasing salinization of soils (Ashraf et al., 2021). Field work took place in rural settlements close to the lake in the provinces of West Azerbaijan and East Azerbaijan (Fig. 2).

Until recently, Lake Urmia provided important cultural, aesthetic, recreational and economic ecosystem services to the entire region. Nearly 10 % of the country’s agricultural land lies in the Lake Urmia basin, making it one of Iran’s most important regions for agricultural and livestock production (Hassani et al., 2020). The basin maintains a semi-arid climate, meaning that agricultural activities are highly dependent on irrigation (Shadkam et al., 2016). Small-scale subsistence farming is the main livelihood of the inhabitants of the rural settlements around the lake (AghaKouchak et al., 2015). Over the past two decades, however, the combination of climate change and aggressive development of water infrastructure (primarily to expand irrigated farmland) has led to increasing water scarcity throughout the basin and almost complete drying of the shallow lake. The surface area of Lake Urmia decreased from over 5800 km² in 1996 to under 1000 km² in 2015, a decrease of over 80 %. During the same period, the lake lost 95 % of its water volume, lowering the water level by 7 m (Danesh-Yazdi and Ataie-Ashtiani, 2019). Although there has always been natural variability in the level of the lake, the current extreme decline is an unprecedented event within the last 4000 years (Hassani et al., 2020).

The lake’s desiccation and increasing water scarcity are having disastrous effects on the social-ecological system. Thousands of square kilometers of former lake surface have turned into a salt desert. Salt

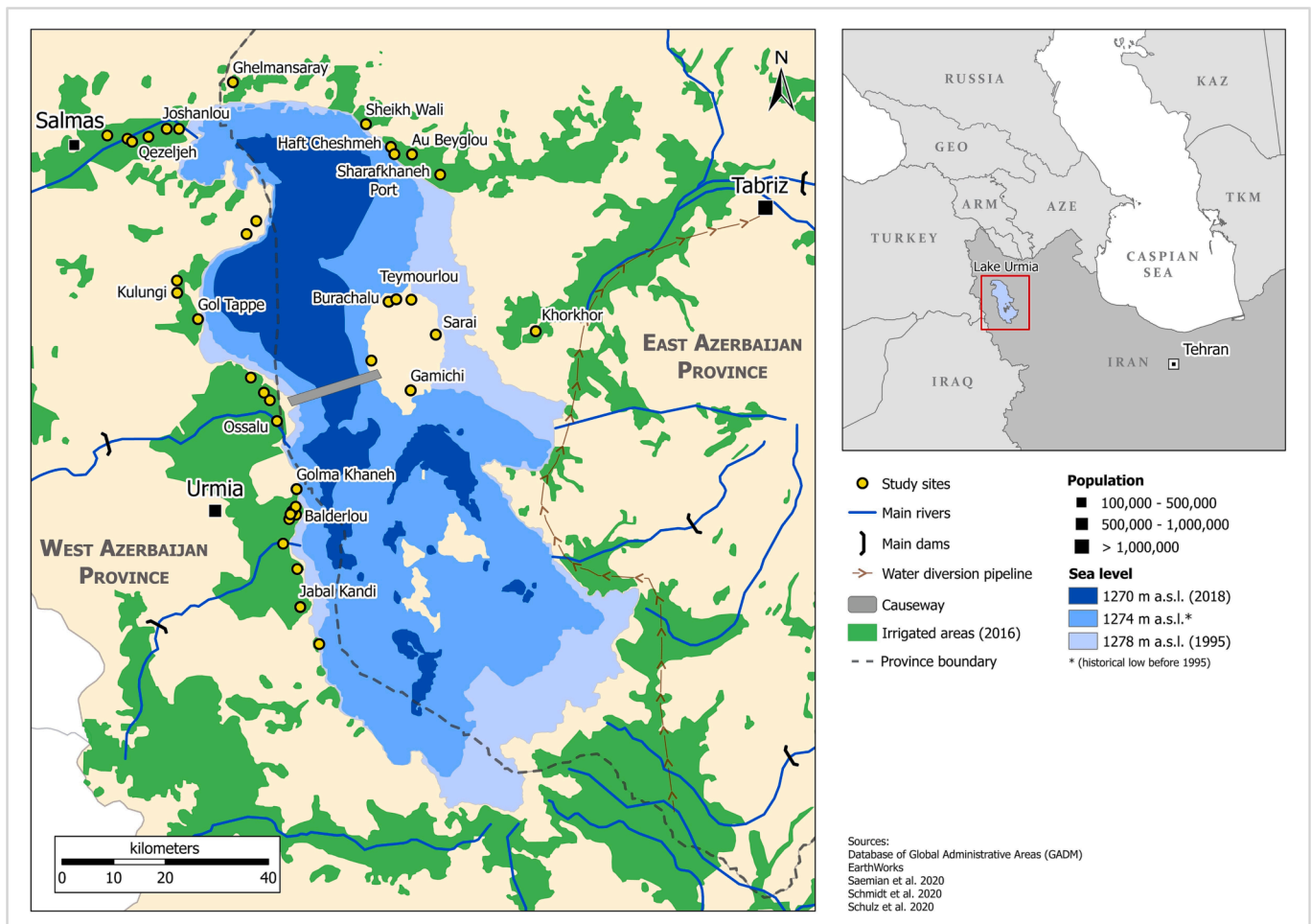


Fig. 2. Map showing study sites and key characteristics of the Lake Urmia basin.

storms pose a major risk to vegetation, farmland, livelihoods, and human health (Maleki et al., 2018). The Urmia Lake Restoration Program was launched in 2013 following pressure from the Iranian public. Its goal is to restore the lake to its 'ecological level' (1274.1 m) within a 10-year program, but so far it has failed to achieve this target. Even the aim of reaching the lake's 'health threshold', which is 1271.7 m and is supposed to ensure that 90 % of the potentially saline dust-emitting areas around the lake are covered with water, has not been met despite above-average precipitation in recent years (Danesh-Yazdi and Ataie-Ashtiani, 2019; Saemian et al., 2020). Meanwhile, the program's plan to regulate and reduce agricultural water withdrawals by 40 % have increased pressure on smallholder farmers around the lake, while inadequately addressing the excessive upstream water use (Ženko and Menga, 2019).

3.2. Research methods

Data were collected through empirical fieldwork, primarily through 75 semi-structured, in-depth interviews in 38 settlements in the immediate vicinity of Lake Urmia (Fig. 2). Due to the small size of many settlements with limited potential respondents and lack of prior research in the study area, it was a practical decision to visit several villages around the lake to gain insights from different regions. The selection of interviewees was based on convenience sampling. Respondents were approached in their homes, in public spaces, or while working on their fields. All adult members of the household present were invited to participate in the interview. Out of the 75 in-depth interviews, 20 involved the active participation of multiple household members,

resulting in over 90 individual reports on individual subjects such as (im)mobility aspirations. This also allowed for the examination of potential disparities or dynamics within a considerable portion of households. Overall, women were the primary (higher conversational shares) or sole interviewee in 21 interviews, men in 54 interviews (Table 1).

Participants ranged in age from 20 to 82, most of them being over 50 years old. Oversampling of older respondents was unintended, but proved to be valuable as it allowed to better capture environmental changes and livelihood dynamics over time. It also reflects the aging demographics in rural villages, from where many people have already migrated (Authors' forthcoming).

Recognizing potential biases due to the first author's background (Western European male), fieldwork was approached with a profound sense of humility and a deliberate focus on fostering a respectful research environment that prioritized equality, empathy, and cultural sensitivity. In this regard, the first author's collaboration with his female Iranian field assistant (co-author) proved to be integral to grasp on the ground realities. Serving as a cultural interpreter, gatekeeper, and translator, her involvement was an invaluable contribution to the successful completion of this research, as she acted as a vital bridge between the first author and the local communities. As a native of the city of Urmia, her deep understanding of the local culture and customs greatly enriched the methodological approach. Interviews – which lasted up to two hours – were conducted in the dominant local language (Azeri) rather than Farsi. This created additional trust between the participants and the research team, which was essential for eliciting deeply personal narratives from the participants. Importantly, she not only facilitated the seamless execution of daily research excursions, but also enabled

Table 1

Socio-demographic characteristics of primary respondents and their households.

Item	n = 75
Age category (in years)	
<25	1
25–50	25
>50	49
Gender of respondent	
Male	54
Female	21
Education	
No school	32
Primary school	13
Secondary school	23
Beyond secondary school	7
Primary source of household income	
Agriculture (farming and/or livestock)	59
Industrial Sector	3
Pension Salary	4
Remittances	3
Other	6
Agricultural activities as part of livelihood	
Farming	66
Livestock	39
No agricultural activities	4
Average family size in place	3.02
Migration prevalence	
Households with migrant(s)	48
Non-migrant households	27

interviews with women, which would have been otherwise unfeasible due to cultural constraints. When respondents described traumatic experiences, we conveyed trust and compassion and allowed for pauses. Given the sensitive nature of the interviews, which potentially touched on political issues, we chose not to record them, prioritizing participant privacy and trust. Drawing on the co-author's profound English abilities (M.A. English literature), interviews were translated in real time and transcribed into meticulous notes by the first author. To ensure that no subtleties were lost, we thoroughly reviewed all transcriptions after each interview, ensuring the accuracy of our findings.

Our unusual team-composition often sparked curiosity, and while we always emphasized the voluntary nature of participation, most requests were quickly accepted. All respondents provided informed consent to participate in the study. We strongly believe that the respondents were open and honest, feeling fortunate to have someone listen to them with interest and understanding. Often, respondents invited us in their homes for the interview, but sometimes we accompanied them to different settings of their daily lives, allowing us to catch “*the stream of perceptions, emotions, and interpretations that informants usually keep to themselves*” (Kusenbach 2003, p. 464). On foot, in car, or sitting on a tractor, we joined respondents to their farm or to beloved places with which they maintained close relationships. These field trips helped to understand what ‘living at Lake Urmia’ means in the context of ongoing environmental changes that threaten livelihoods and cherished places, ultimately shaping residents’ (im)mobility aspirations and capabilities.

The introductory question “*How have you perceived environmental change at Lake Urmia over the last 10 to 20 years?*” was used to encourage life history storytelling (cf. Ayebe-Karlsson et al., 2016), offering sufficient space for individual descriptions of lived experiences over time. A soft to neutral interview style (Lamnek, 2005) was maintained throughout the interview to create a comfortable atmosphere that encouraged participants to freely share their views. Via open-ended questions, respondents were inquired about 1) their individual perceptions of Lake Urmia’s drying and local environmental change, 2) associated tangible and intangible losses, 3) adaptation strategies/barriers, 4) reasons for (im)mobility, and 5) their current (im)mobility aspirations and capabilities. To preserve participants’ anonymity, their names are not disclosed in this paper.

The in-depth interviews were contextualized through group discussions in eight villages, covering perceptions of life in the locality, reasons for staying, and prospects for the future of the village. All interview data were entered into MAXQDA for thematic coding and analysis. Local environmental disturbances experienced by the research team (e.g., salt storms), noticeable characteristics of interlocutors (e.g., respiratory problems) or aspects such as the condition of local infrastructures were recorded in notes and photographs.

4. Results

4.1. Lived experiences and perceptions of environmental changes among the immobile

All respondents reported suffering from one or more consequences of Lake Urmia’s water crisis. Fig. 3 shows the complex multi-risk scenario posed by interconnected slow-onset processes and sudden-onset-events present in our case study. In the following, residents’ perceptions of L&D are highlighted to illustrate the socioeconomic and health context in which (im)mobility aspirations arise.

4.1.1. Economic impacts of environmental changes on rural livelihoods

Environmental change significantly impacts the rural economy around Lake Urmia, where agriculture is the primary source of income. About 80 % of the respondents reported living completely or partially from the yields of crops and/or livestock, with the majority observing a decline in farm productivity over the last 20 years. Water scarcity, which prevents extensive and regular irrigation of farmland and thus causes crop failures, was cited as the most common reason. Many farmers reported that wells have dried up completely or have become too salty to be used for irrigation purposes and to feed livestock. Local perceptions of hotter summers, prologued droughts and decreasing precipitation coincide with scientific findings (Arkian et al., 2018). Many farmers emphasized the perceived loss of the lake’s climate-regulating function, which manifested itself in unprecedented heat waves, especially during the last decade.

The consequences of salinization, diseases and pest infestations were given as other major reasons for decreasing income. As thousands of square kilometers of hypersaline lake have turned into desert, dust storms are frequent in the region, spreading salts and other toxic elements over surrounding fields and villages. Especially in the east of Lake Urmia, due to the prevailing west-east wind direction, this reduces soil fertility and causes trees to dry. In some of the visited villages, salinization problems are considered as an even greater issue than water scarcity. More than half of the households with livestock reported difficulties in feeding their animals in the past, usually owing to the continuous degradation of grazing land. When farmers’ fodder production is insufficient, food must be purchased at a high price. Against the backdrop of Iran’s rapid inflation in recent years, this poses major challenges for many farmers, who often reported selling livestock in the past to get quick cash to sustain their livelihoods. As one of the respondents explained, “*the money I have to spend to feed my cows is not covered by the income from selling milk and cheese (...). We used to get help from neighbors so we could eat.*” Most smallholder households hardly generate any surpluses and are therefore unable to invest money in possible adaptation strategies. Loans to finance a shift in agricultural production or technical improvements such as drip irrigation are inaccessible to most farmers and were associated with prohibitively high interest payments.

Lastly, the drying of the lake has led to the near disappearance of tourism, which used to serve as an additional source of income for many villagers until the early 2000s. In numerous villages, we witness the relics of better times: stranded tourist ships that lie for miles in the former lake, crumbling tourist villas, and the once-popular swan boats rented out by locals. An elderly woman from a coastal village described: “*When I was little (...), everything was full of people, there were vacation*

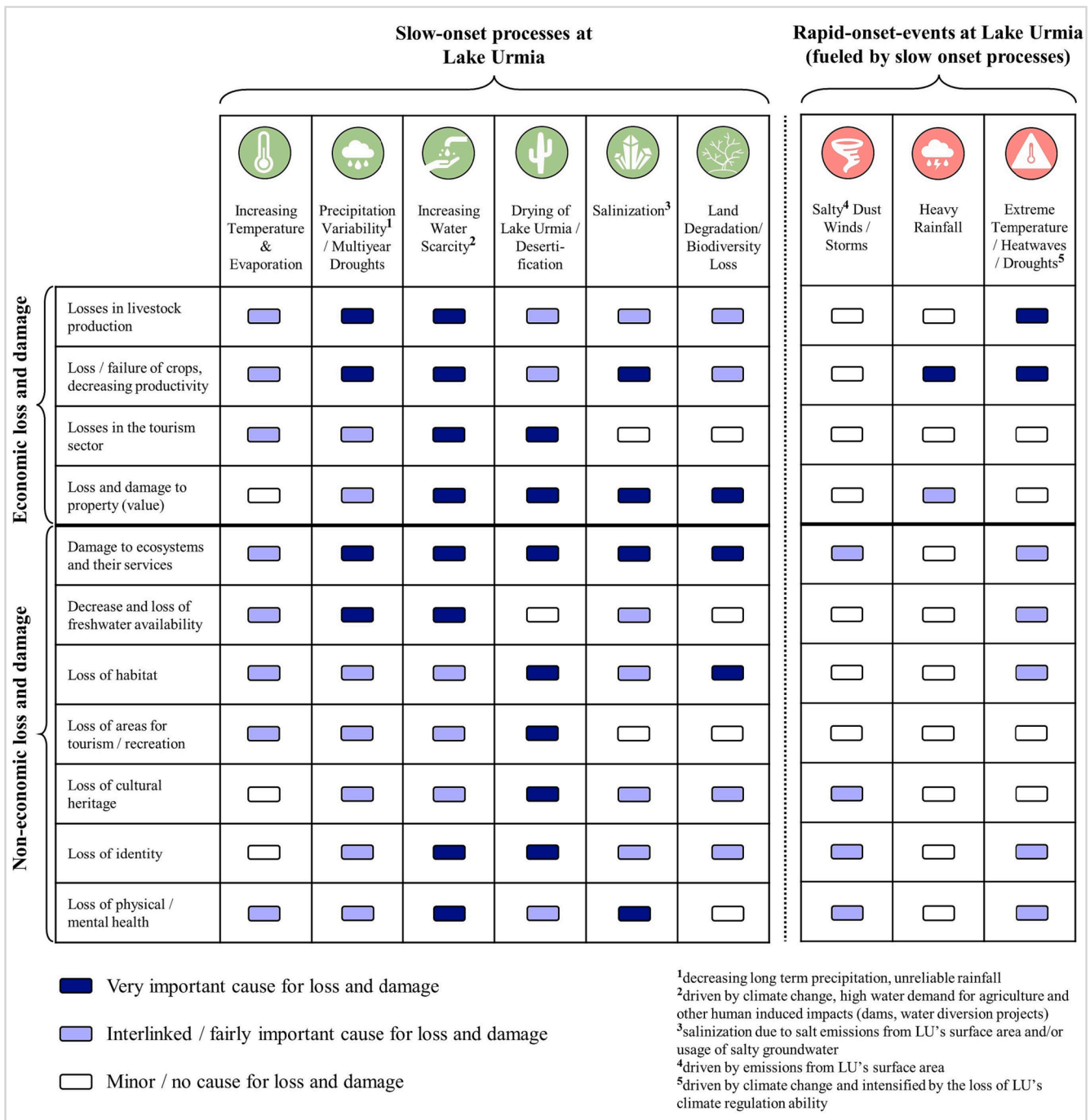


Fig. 3. Overview of slow-onset processes and sudden onset-events at Lake Urmia and their respective L&D to rural livelihoods (We used MAXQDA to analyze interview data on observed environmental changes and related experiences. Balancing frequency and severity assessments during classification ensured no vital issues were overlooked. Emotional expressions during interviews influenced non-economic categorizations (e.g., anger, sadness).

houses everywhere (...). Locals sold their fruits and vegetables, meat and ice cream to the tourists. That was a good income for many (...). Now the lake, tourists, and money are gone. Our lands are dried up and worth nothing.” Following two decades of environmental degradation, many respondents have depleted their savings, with declining farm incomes further exacerbating rural poverty.

4.1.2. Non-economic impacts of environmental change

The physical well-being of the immobile are severely undermined by environmental changes. In numerous of the visited villages, residents reported water scarcity and salt storms as chronic threats to their

physical health. A third of the interviewed households described having no access to safe drinking water. “I am thirsty right now because there is no water (...). Many people here are getting problems with their kidneys because of this salty water from the wells”, an elderly woman told us. In some villages, respondents reported how people travel by car to mountain rivers to fetch water. Regarding salt storms, various studies have shown that particulate pollution at Lake Urmia leads to cardiovascular diseases such as hypertension and anemia (Samadi et al., 2019; Tabrizi et al., 2019), as well as various skin, eye, and respiratory diseases (Mohammadi et al., 2019). These findings are consistent with our perceptions during fieldwork and numerous reports from our interviewees, whose

narrations occasionally demonstrate how health impacts can have cascading effects on people's lives: "Last year I was working in the fields near the lake and got sick. We went to a doctor in Tabriz, he said I contracted a severe respiratory illness from the toxic air (...). This year I can't work; I have no energy anymore. Now we spend so much money on workers and my health that we can't send our son to university. We struggle so much, and now I can't even breathe", a woman explained. Generally, we often come across the assertion that women are more adversely affected in terms of health consequences than men. Some respondents mentioned that on windy days they have to stay indoors, yet the wind still found ways to penetrate dust into their houses.

Moreover, we observed different ways in which environmental degradation affects the psychological wellbeing of rural villagers. These include concerns about the physical health of respondents and their family members, especially given their own poverty and the absence of good healthcare in the villages. Furthermore, the decline in agricultural income, compounded by feelings of powerlessness and lack of control over the unfolding processes, intensify place-based distress (Solastalgia). "There is nothing we can do" and "We have lost everything" are two of the most frequently repeated phrases in the in-depth interviews, illustrating the gravity of many respondents' perceived hopelessness. The impossible separation of living and working environment intensify feelings of despair for farmers, who often recounted instances of depression suffered by themselves or family members. Sadness over the loss of the lake and the disappearing flora and fauna was also pervasive in the stories and memories shared during our interviews. Often, participants would show us old pictures of themselves at the lake and reminisce about the old days. Overall, villagers' place identity and biophysical ties at Lake Urmia are increasingly eroded by environmental change, leading to a gradual perceived loss of sense of place.

4.2. Impacts of out-migration on the immobile

While environmental change is recognized as a potential driver of migration, it is only one of many interrelated factors (Ionesco, 2016). At Lake Urmia, however, as stated by our respondents, environmental degradation undoubtedly constitutes an important reason for out-migration (Authors' forthcoming). Undocumented in publicly available statistics, many of the visited villages are virtually abandoned. In some villages, interviewees indicate that the number of residents has dropped by 50 % and more in the past 20 years. Three in four households reported that at least one person in the family had migrated from the village, usually to the nearest city (Urmia/Tabriz).

In most villages, high rates of out-migration are becoming increasingly problematic. Public transportation and rural-urban links have been discontinued in many places. Investments into village infrastructure, including water supply, road construction, healthcare, and education, are perceived as insufficient. In some villages, doctors only visit every few weeks. Schools are often closed due to lack of demand. Some respondents indicated that they did not have enough money to pay for taxis to send their children to distant schools. "Many young girls stay at home and weave carpets (...). Without education, you are left like a blind person", a woman from Khorkhor told us. Additionally, residents worry about decreasing job opportunities, scattering communities, and the loss of cultural identity. "Life here has become dull (...). Nothing exciting happens anymore, like weddings. When people come back, it's only to bury their dead", a man from Jabal Kandi regretted. The remaining rural population is demographically aging, making it increasingly difficult for immobile residents to cope with the daily challenges they face.

Out-migration of community members was perceived negatively by most respondents, regardless of how (see 4.3) they were immobile. Interestingly, this includes households with migrants, of which only a quarter reported receiving regular remittances. These were usually spent directly on buying food or other necessities of everyday life. Family separation was often linked to the absence of labor and represented an additional emotional burden. With only occasional visits from their

children and families, especially elderly respondents reported feelings of isolation and sadness: "It is a great misfortune for us that our son is gone (...). When I get older, who will take me to the doctor at night (...)? All parents want their children to be close to them", a man sadly expressed.

4.3. Understanding the reasons for immobility at Lake Urmia

For most respondents, there usually was not *the one* rationale, but a variety of motivations and reasons behind their immobility. These are presented in Table 2 and are supported by a selection of direct quotes from our field research. The subsequent sections offer context for these rationales, demonstrating how certain reasonings align with immobility categories from Fig. 4.

Immobility was defined in this study as an individual's permanent residence confined to a specific village. The topic of (im)mobility aspirations was introduced with the question "Have you thought about leaving the village in the future?" Acknowledging that these aspirations can be understood as a continuum where only individuals with a firm conviction to leave or stay give decisive answers (Carling, 2014), we asked follow-up questions to fully capture the characteristics of individual aspirations and to clarify potential ambiguities. Fig. 4 quantifies the (im) mobility aspirations and outcomes of rural villagers at Lake Urmia into distinct categories. However, as Schewel (2019) emphasizes, aspirations and capabilities are constantly evolving. Instead of rigid categorizations, these outcomes should be viewed as ideal snapshots at the time of our research.

4.3.1. Voluntary immobility and acquiescent immobility

As illustrated in Fig. 4, only around one in four of our respondents conveyed the aspiration to stay and no aspiration to migrate, thereby expressing either their voluntary immobility (desire to stay, capability to migrate) or acquiescent immobility (desire to stay, no capability to migrate). Despite being exposed to progressive environmental changes and increasing socio-economic challenges, this subset of interviewees was satisfied locally, giving a wide range of reasons for their preference to stay. While adaptation in place and associated livelihood security can shape the aspirations to stay (e.g., Blondin, 2021), most interviewees at Lake Urmia indicated having no or only limited options to adapt. Some farmers reported increasing their reliance on livestock, starting to diversify their crops by replacing them with more drought- and salt-resistant species, and/or switching from flood to drip irrigation. This meant decreasing their vulnerability to environmental disruptions and reducing perceived migration pressures. None of the respondents, however, attributed their preference to stay solely based on successful local adaptation or economic incentives.

Many voluntary and acquiescent immobile residents aspired to stay because they were attached to their community and did not want to leave behind their family, friends, or property. Older residents in particular, who had lived in the village their entire lives, emphasized their strong cultural, religious, and emotional roots to their familiar surroundings. Despite significant out-migration, many communities retained a strong sense of belonging among their remaining population, often characterized by mutual assistance in daily life. Phrases such as "we're all in this together" and "we help each other whenever we can" were frequently expressed during the interviews. The idea of giving up one's familiar life at an advanced age seemed unimaginable to many villagers and inhibited the development of migration aspirations. Similar to the findings of Blondin (2021) in the Pamir Mountains, respondents occasionally revealed negative views of city life, which further reinforced their aspirations to stay. Perceptions of challenges in the city included lower levels of security, individualism, noise, and the need to earn money compared to the simpler rural lifestyle.

A minority of younger residents also showed strong emotional ties to their homeland. In a village on the former lakeshore on the eastern side of Lake Urmia, we met a couple who had returned after moving to the city years ago: "We moved away because of the toxic air, like many others:

Table 2
Reasons for staying expressed by interviewees.

Reasons for Immobility	Illustrative quotes
Factors influencing the aspiration to stay	Expressed primarily by voluntary, acquiescent, and ambivalent immobile respondents, across all ages and genders.
Family ties (<i>May be perceived positively/negatively</i>)	"I don't want to leave my parents alone. They're the reason we are still here."
Community ties (<i>Compromised by out-migration, strong among elderly residents</i>)	"My friends and the community in the village mean everything to me (...). You say your problems in the prayer room, and everyone helps. The clergyman even uses the microphone to call attention to other people's problems (...)."
Attachment to land/property, Place Identity	"Some people can go to the city, but I prefer to stay in the village (...). The older you get, the more you like the place where you were born and raised."
Biophysical bonding (although visibly eroding)	"At night we would sit outside and listen to the waves of the lake. We could go swimming in front of our house and watch the ships go by. Sometimes those white sea birds were here, making such beautiful noises."
Commitment to the village: 'Voice' / 'Loyalty'	"We want to make this a better place. We also help other farmers to change their crops (...). We started a telegram channel with many farmers (...), our Safran project started this year."
Immobility as chosen livelihood strategy (often related to migration of family members)	"I prefer village life. Many people here are like me and have children who send money every few months. We and my son, we help each other. Of course his migration was influential for us."
Adaptation to environmental changes	"Farmers here switch from almonds, apple, peach, just about anything to pistachios to save water. And pistachios also cope better with the salt."
Children are still in school	"We just wait for our son to finish elementary school, then we have to leave, because here is nothing for us."
Negative imaginations of life in the city (compared to rural life)	"There is lots of suffering in the village, but I also like it here, to make a living in the city is much harder."
Capability constraints	Expressed primarily by the involuntary, acquiescent, and precarious immobile (upon inquiry), across all genders and age groups.
Financial constraints/costs associated with migration (primary 'trapping' factor)	"Whoever is still resident of this village does not earn well and has no means to leave. We are stuck in this desolated place (...)."
Lack of social network/help from others to facilitate migration)	"So many residents have moved away, today this is a small place (...). I want to leave too and marry a woman. But I don't have anyone to help me (...)."
Life course, (perceived) physiological immobility	"Those who remain here now are old and cannot leave (...). Who would take us, who would accept us?"
No job in different location / No alternative location	"It is impossible to find a good job (...). You need 5 million Tomans income to finance life in the city."
Internal constraints on decision making	Low capacity to aspire most conveyed by older respondents from the precarious/acquiescent immobility category. Other factors primarily expressed by the ambivalent immobile.
Hope that environment situation will improve/removal of the driver of dissatisfaction	"If these droughts continue, everyone will have to leave. But this year had better rainfall. I have hope." "When the lake recovers, maybe people will come back."
Risk aversion	"We can't go anywhere without selling everything we own, including our lands. People here don't have money; they only

Table 2 (continued)

Reasons for Immobility	Illustrative quotes
Low 'capacity to aspire' /low self-efficacy (fueled by emotional distress and perceived helplessness)	<i>have what they eat. We would have to start from zero.</i> "Move away from here? (laughs). How can I think about that (...). Most people here are illiterate, have no education (...)." "All we can do is sit and cry (...). I'm just waiting to be put into a grave."

out of 5.500 people, only 500 remained in the village. But in the city, we realized that we could not let go (...). We wanted to come back and help (...). We have all the knowledge that is needed. What we lack (...) are the financial means to start more projects that can improve the lives of many farmers". Today, the woman is a member of the village council and helps farmers to switch their crops to more profitable ones. She writes letters for illiterate people in the community and sends them to their migrated children. She represents a small group of respondents who prefer to stay to show solidarity, to take responsibility, and, in Hirschman's (1970) words, to express their 'voice'. Like many others, the couple shares the hope of a better future for the village, where more people will return. Their conscious decision to stay, despite increasing environmental risks and the possibility of building a new life elsewhere, represents voluntary immobility in its purest form, which we rarely encountered during our interviews.

The threshold between voluntary and acquiescent immobility, i.e., whether an interviewee who expressed their preference to stay had the capability to migrate, was not always possible to clearly discern (see Fig. 4).

Whether older people in particular would be able to migrate was controversially discussed in group discussions. Statements ranged from "no one can leave" to "but everyone has to leave" to "only the young will all be gone". One elderly man explained: "If the environment gets any worse, we'll all have to leave. But how are we supposed to leave? We have no money, no one helps us!" – A narrative that kept recurring throughout our fieldwork. Many of the respondents indicating their preference to stay described themselves as lacking the resources to migrate anyway, including the ability to find work and earn a living elsewhere. Many residents expressed that it would be simply easier for them to stay, despite increasing difficulties to live a good life locally. Some participants conveyed that if they were in a life-threatening situation, they might find shelter with their migrated children. In some cases, remittances or food provided by migrated children during visits have already helped alleviate the daily struggles of participants, enabling them to live a more tolerable life in their village.

4.3.2. Aspirations to migrate and stay: 'Ambivalent Immobility'

A striking finding that emerged from our in-depth interviews was that more than a third of our respondents experienced deep ambivalence about their (im)mobility aspirations. In particular, prime-age individuals, such as young parents, emphasized their growing need and aspirations to migrate, but explained their current immobility with simultaneous individual desires or obligations to stay, rooted in various social, emotional, and (still) economic ties to their current location. Psychological factors, such as internal constraints, like fear of the risks of migration or hope for better times, also played a significant role in hindering the realization of migration aspirations and plans (see Table 2), despite growing dissatisfaction with their current village life. To better capture these indecisive (im)mobility aspirations, we propose the category of 'ambivalent immobility'.

Acknowledging ambivalent immobility aspirations among individuals allows scholars to delve deeper into the complex dynamics of human decision-making amidst environmental change. Ambivalent immobility, perhaps more than any other category of immobility, illustrates the multidimensional factors that shape (im)mobility decision-making, emphasizing the need to consider psychological (cf. Ayebe-

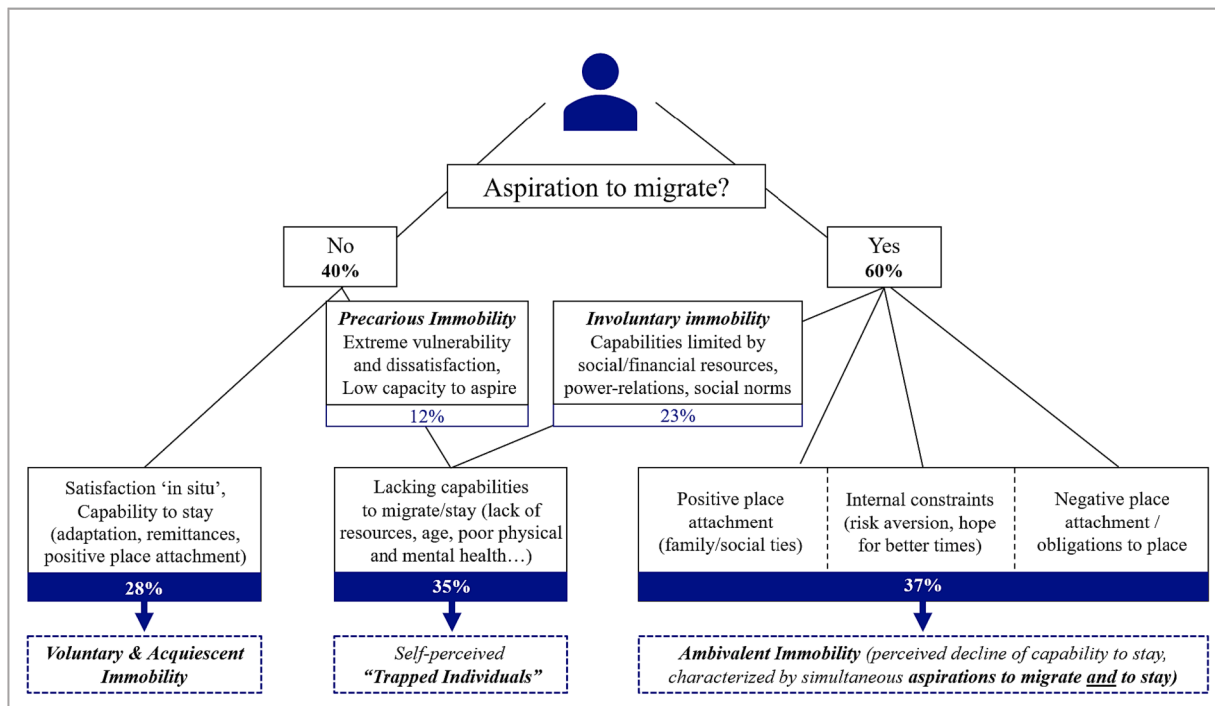


Fig. 4. Reasons for and different states of immobility among rural residents of Lake Urmia.

Karlsson et al., 2020) and emotional dimensions alongside more tangible factors. It represents a complex psychological state that reflects the interplay of diverse factors such as personal life aspirations, societal influences, cultural ties, economic considerations, and environmental disruptions. Consequently, this complexity tends to complicate and/or delay respondents' decision to migrate, which is particularly relevant in the face of progressive environmental challenges. However, many ambivalent immobile respondents conveyed a maturing intention to leave in the next years. Some said they were quasi 'on the move', looking for a suitable job in the city or waiting for their children to finish school before leaving.

While our definition of ambivalent immobility refers to situation in which an individual simultaneously conveyed their conflicting (im) mobility aspirations, we sometimes observed unequal (im)mobility aspirations on the household level. "All five of my husband's brothers have moved away with their families. I often wonder: why not us? (...) My husband's father had an accident, and someone had to stay and take care of him, his land and cattle – that was us. All his brothers (...) have a better life in Tabriz or Tehran and perfect schools for their children", a woman from Sheikh Wali regretted. Her husband ultimately made the decision to stay, against her aspiration to leave. Often, staying as a family was not the result of a harmonious decision, but an expression of prevailing power disparities. This observation relates to Adams's (2016) finding that when it comes to personal obligations to family members, people weigh their own satisfaction against the satisfaction of others. It also demonstrates how 'family aspirations' (Rodriguez-Pena, 2023) may interfere with individual aspirations and capabilities.

4.3.3. Self-identifying 'Trapped Individuals': Involuntary and precarious immobility

A notable proportion of our interviewees demonstrated characteristics consistent with the 'classical' understanding of trapped populations (involuntary immobility). For these individuals, two decades of progressing crisis have triggered a turning point in their relationship with their locality, which fosters a strong desire to migrate, but has not translated into action due to capability constraints (see Table 2). Environmental change has depleted many respondents' financial reserves to

support migration, while participants also emphasized the lack of networks that could help them find a place to live and a job in the city. The primary reasons for migration aspirations among individuals from this category differed depending on life stage. Older residents, in particular women, who described themselves as involuntarily immobile related their aspirations to move mainly to increasing health risks and feelings of isolation in the village. Younger interviewees emphasized the declining place utility (see Adams and Neil Adger, 2013), due to declining agricultural prospects and high out-migration. Their wish to migrate was often rationalized as a pursuit to find better employment, which was deemed necessary for marriage and starting a family. In particular, female respondents expressed additional difficulties in migrating from their village, citing cultural constraints stemming from social expectations and gender norms. Many women explained that they are 'forced' to stay in the village until they get married, only then can they leave.

Another distinct group of respondents literally voiced feeling 'trapped' locally, but did not express any migration aspirations, thus challenging the conventional notion of trapped populations. Their reactions to the prospect of migration ranged from surprise to sadness and bitter laughter. Although migration is widespread in the villages, this group of respondents had never contemplated engaging in it. This group was mostly comprised of elderly (50 +), poor and illiterate individuals across genders, who had spent their lives in subsistence agriculture and who are now confronted with the collapse of their identity, reinforcing their subjective immobility and inability to cope. While the acquiescent immobile respondents described — to varying degrees — their desire to stay and ability to realize a good life in place, these respondents were extremely dissatisfied locally, expressing their lacking 'capability to stay'.

Against this backdrop, we propose the category of 'precarious immobility'. It describes the ways of being immobile in a dangerous and perceived hopeless situation that no longer allows for (im)mobility aspirations. We believe that precarious immobility is an important contribution, as it illustrates how internal and external constraints on the capability to migrate can shape (im)mobility aspirations to the extent that such aspirations do not arise at all. One farmer's statement,

“Our memories and wishes for a good life died with the dying of the lake”, metaphorically represents the difficulties of these residents to imagine a better future, whether in their current location or elsewhere.

At the root of these psychological barriers are the increasing economic and non-economic losses, perceived social and economic marginalization, advanced age, and the lack of control towards the ongoing socio-environmental transformation processes. Their lack of migration aspirations is not a manifestation of a preference to stay (Table 3), but the result of their low self-efficacy (cf. Wiederkehr et al., 2019), which reduces their ‘capacity to aspire’ (cf. Appadurai, 2004; Czaika and Vothknecht, 2014). While we share Schewel’s (2015) concern that such assertions are potentially problematic and paternalistic, it is important to highlight them as they help contextualize immobility outcomes.

5. Discussion and conclusion

The aim of this study was to investigate why and in what ways rural residents at Lake Urmia remain immobile despite increasingly deteriorating living conditions. The results provide unique evidence of the multicausality of immobility and the nuanced ways of being immobile in the context of environmental change, going far beyond the prevailing binary views of voluntary vs. involuntary immobility. For the first time, all forms of immobility discussed in theory (e.g., Zickgraf, 2021) (voluntary, acquiescent, involuntary immobility) were empirically identified in the context of a qualitative case study. In addition, our study has revealed new understandings of immobility; ‘ambivalent immobility’ and ‘precarious immobility’ have the potential to alter discourses on environmental immobility in academia.

The residents’ perceptions illustrate how the water crisis at Lake Urmia manifests in significant socio-economic hardships, affecting local (im)mobility aspirations and capabilities. Increasing environmental changes cause economic losses and threaten the physical health of rural villagers. Local well-being is further compromised by low adaptive capacity, and the consequences of high out-migration, posing growing challenges to immobile residents of all ages and genders to live a good life locally. A striking finding compared to other empirical studies is therefore the limited presence of residents who have deliberately chosen to remain immobile. Thus, our study provides an important corrective to the current academic emphasis on widespread voluntary immobility in contexts of environmental change (e.g., Farbotko and McMichael, 2019; Blondin, 2021). Immobility at Lake Urmia was rarely truly voluntary in the sense of de Haas (2021), wherein people have the capability to migrate, and their immobility is an expression of a conscious choice. Elderly residents often expressed a rather lukewarm preference for staying, accepting their (acquiescent) immobility. This finding complements the views of Mata-Codesal (2018) and Schewel (2019), who rationalize that the preference to stay may be the result of a lack of perceived realistic alternatives. It also aligns with van Praag (2021), who argued that an advanced life course makes people less likely to develop migration aspirations.

A key outcome of this study is the elucidation of ‘ambivalent immobility’, a dimension that has not been considered in the literature on environmental (im)mobilities. The aspirations of the ambivalent

immobile at Lake Urmia are complex and contradictory: they want to leave, but also stay, weighing their growing local dissatisfaction against individual place attachments and the risks of migration. In the future, scholars could also discuss ‘ambivalent (im)mobility’, recognizing that migrants can also aspire to stay. These observations extend the findings of Zickgraf (2019), whose analysis of the (im)mobility strategies of Senegalese fishermen from Guet Ndar was the first to challenge the prevailing either/or reading of (im)mobility aspirations. A recovery of Lake Urmia and improving living conditions may encourage the ambivalent immobile to suspend their migration aspirations, while progressing degradation could contribute to certain tipping points (Dandy et al., 2019) being crossed, leading to migration. However, Adams (2016) rightly points out that negative and positive attachments/commitments to place may be just as important in life-threatening situations as they are under more tolerable circumstances. Thus, it should not be assumed that all currently ambivalent immobile will migrate if the situation worsens.

Our different readings of ‘being trapped’ are another crucial finding of this study, making an important contribution to discussions around trapped populations. On the one hand, almost one in four respondents identified as involuntarily immobile. This is rare empirical evidence for the existence of trapped populations in contexts of high out-migration, as recently called for by DeWaard et al. (2022). On the other hand, some respondents *literally* reported feeling trapped, while not voicing migration aspirations. They are in a self-perceived hopeless situation that constrains the development of any (im)mobility aspirations. These ‘precarious immobile’ residents expand our knowledge of how people may perceive and understand themselves as trapped. Referring to Ayeb-Karlsson (2020), we argue that psychosocial factors (loss of identity, feelings of solastalgia) exacerbate the subjective immobility of these people, who were among the most vulnerable and worst affected by environmental changes.

One of the implications of this study therefore is to question the concept of trapped populations in its current form (Black and Collyer, 2014). First, it ignores the different forms of ‘feeling trapped’, a feeling that does not always involve migration aspirations. Second, speaking of trapped populations *literally* renders entire communities involuntarily immobile, whereas our findings illustrate that communities are not homogeneous entities (cf. Tebboth et al., 2019). Even within a household, there may be different (im)mobility aspirations and capabilities (shaped by power dynamics), or differently perceived states of immobility. Generalizing about *one* trapped population obscures the entire spectrum of immobility observed in this study. A step forward might be to speak of *trapped individuals* in the context of environmental crises.

Limitations of our study include an overrepresentation of male and older participants within the sample, biasing the results regarding (im)mobility aspirations and capabilities in our study. Nevertheless, we consider the inclusion of numerous perspectives of women despite cultural constraints a considerable achievement. While our results cannot be generalized due to their unique regional context, they are significant in that they further accommodate a nuanced understanding of immobility with insights from an understudied region. We call for more qualitative work in diverse environmental change settings around the world to further advance our understanding and to test whether the new categories proposed here can be evidenced in other contexts. While the aspirations-capabilities framework (Schewel, 2019) proved fruitful in guiding this research, our findings also reveal its limitations. The newly identified categories of ambivalent and precarious immobility do not fit neatly into the established coordinate system of the framework, highlighting the need for future modifications (cf. Mallick and Schanze, 2020) and the relevance of other holistic frameworks (e.g., Tschakert and Neef, 2022). Furthermore, while these categories of immobility serve as useful analytical tools for researchers and hold potential real-world implications (Zickgraf, 2021), as they can inform policy interventions tailored to different immobile groups, immobile individuals may not perceive themselves as fitting into these specific categories.

Table 3
Differentiation of immobility types under capability constraints.

	Acquiescent Immobility	Involuntary Immobility	Precarious Immobility
Aspiration to migrate?	No	Yes	No
Capability to migrate?	No	No	No
Aspiration or preference to stay?	Yes (see Schewel, 2015, p. 27-28)	No	No

Therefore, these categories should be used with caution. It is further crucial to recognize that they represent a snapshot of respondents' ways of staying, which are influenced by evolving aspirations and capabilities, particularly in the context of environmental change. In light of this, we recommend that future research explores how individuals transition across (im)mobility categories (cf. [Rodriguez-Pena, 2023](#)) and conduct longitudinal studies to capture this dynamic nature.

At Lake Urmia, it is worrisome that more than half of the respondents (acquiescent, involuntary, and precarious immobile) did not have the freedom of choice to move or stay. Even today's voluntary and ambivalent immobile residents are potentially at risk of losing their capability to migrate if environmental conditions further deteriorate. Without institutional support, those who stay in place are likely to face increasing economic hardship and health issues in the future. Therefore, it is imperative to improve access to drinking water and healthcare in rural areas around the lake. Sustaining livelihoods also requires improving access to education, information and credit, and promoting effective adaptation strategies to support resilient agricultural practices in the face of water scarcity. However, given the frequent saline dust storms, intensified efforts to restore Lake Urmia are vital to improve the livelihoods and long-term well-being of the immobile. These efforts would help mitigate potential conflicts between the desire to stay and diminishing capabilities to do so, and promote agency in (im)mobility decisions-making among residents across the entire spectrum of immobility observed in this study.

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CRediT authorship contribution statement

Sebastian Transiskus: Conceptualization, Methodology, Resources, Investigation, Formal analysis, Project administration, Supervision, Validation, Visualization, Writing – Original Draft, Writing – Review & Editing. **Monir Gholamzadeh Bazarbash:** Methodology, Resources, Investigation.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Respecting the privacy and confidentiality of participants, I am unable to share my research data/code at this time.

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