



# Uncertain futures: climate change and international student mobility in Europe

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## Abstract

The rapid growth of international student mobility has attracted much research on the many benefits it offers to students, higher education institutions, and societies in general. However, studies on the costs and potential tribulations caused by mobility are comparatively rare, despite increasing evidence of such costs inherent in the marketization of higher education. Furthermore, the few existing studies are predominantly framed in terms of consumerism and the commodification of education, but they give less attention to mobility in the context of wider social issues. The climate crisis is foremost among such social impacts, with the extensive air travel inherent in global mobility patterns causing significant damage, combined with curricula, pedagogies, and institutional strategy that are either ambivalent or contradictory on the climate crisis. This paper examines international student mobility in European higher education to better understand how the environmental costs of higher education can be conceptualized in policy and practice. It contrasts policies and practices that promote international student mobility in Europe—in which mobility has aspects of what are commonly referred to as “public goods”—with initiatives that promote mobility to Europe, which illustrate a historic and ongoing entanglement between European colonialism, higher education, and climate change. It concludes with reflections on possibilities for greater sustainability in international student mobility in Europe.

**Keywords** Higher education · Internationalization · International student mobility · Climate change · Europe

International student mobility has been discussed widely in the literature on higher education internationalization: it is often viewed as a key aspect of international or higher education or even exemplifying key aspects of globalization more generally (Gürüz, 2011; Rizvi, 2005). Much of this literature implicitly views mobility as benign or inherently beneficial, and it is accompanied by evidence of the numerous benefits of international student mobility to students, higher education institutions, and entire countries (Clarke et al, 2009; Norris & Gillespie, 2009; Roy et al, 2019; Zimmermann et al, 2021).

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However, a smaller but growing body of literature elaborates several key critical perspectives on international student mobility: identifying the racist and colonial perspectives inherent in international student recruitment practices (Shahjahan and Edwards, 2022; Stein & Andreotti, 2016), the ways in which international mobility features in processes of social reproduction (Findlay et al, 2012; Shaw & Thomas, 2006; Tran, 2016), and inequality both between and within nation states (Shields, 2013, 2016; Souto-Otero et al, 2013). In this critical literature, the ways in which international student mobility relates to global climate change—a fundamental and existential challenge to human societies generally—have received relatively little attention. This is ironic and somewhat surprising because climate change presents such a serious challenge to the high levels of social and economic globalization that make international student mobility possible in the first place.

Existing studies highlight the fundamental contradiction between current models of international student mobility and environmental sustainability or environmental justice: foremost, the extensive air travel that makes international student mobility possible illustrates the immense global disparities in consumption of resources and environmental impacts (Gill, 2020; Shields, 2019). For example, according to the International Civil Aviation Organization (ICAO), a single passenger's roundtrip air travel from Los Angeles to Berlin will release about 816 kg of CO<sub>2</sub> into the atmosphere, while a flight from Barcelona to Copenhagen would release 313 kg. These journeys are typical of what might be taken for students travelling to or within Europe for international study, but the emissions are much higher than the total annual emissions of an average individual in 55 countries, including Rwanda (87.8 kg), Bangladesh (513 kg), and Cambodia (687 kg, World Bank, 2022). While air travel contributes only 2.1% of global carbon emissions, there are few viable alternatives for the types of mobility it offers, meaning that is essentially required for much of international student mobility as we know it today. This dependency was highlighted during the COVID-19 pandemic: when commercial flights were grounded, some universities chartered flights for their international students, demonstrating that international student mobility as we know it seems inextricably bound to air travel (Baker, 2020). Furthermore, the number of international students globally has grown at a rapid pace: for example, degree mobile students (international students who physically cross a border to complete a full degree abroad, rather than studying abroad for a single year): grew from 1.9 million in 1999 to 6.1 million in 2019, suggesting a trends towards increasing air travel into the future.

The reliance on air travel for international student mobility sits awkwardly with many universities for two reasons. First, universities are increasingly keen to demonstrate their contributions to sustainable development, with initiatives such as the *Times Higher Education* Impact Rankings, which is linked to the Sustainable Development Goals (SDGs) and the Sustainability Accord—a collective initiative for universities to support the SDGs—illustrating the importance of this mission. Furthermore, enrolment of international students is integral to the financial models of many universities, particularly those in internationalised and neoliberal higher education systems. One report estimated that international student tuition fees accounted for 17.3% of UK university budgets in the 2018–19 academic year, and around 45% of the budgets at the research-focused Russell Group of universities (Dolton, 2020). While other models of mobility, such as exchange through the Erasmus program, are financially-driven and there is considerable heterogeneity in how European Universities are funded, current models of international student mobility are nevertheless essential to the financial models of many universities, which raises questions of how they can effectively respond to climate change when they are also dependent upon

the unsustainable consumption of fossil-fuels and emission of greenhouse gases that cause global climate change.

Given this important gap in our understanding and the focus of the special issue, this critical essay seeks to better understand environmental and social justice with respect to international student mobility in Europe. We begin by situating European mobility within global flows of degree–mobile students and introduce two conceptual perspectives to better understand it, which are rooted in two approaches to environmental justice (Schlosberg, 2007, Authors). The first perspective is anthropocentric in that it views nature and the environment as a resource that should be fairly distributed to serve the ends of human well-being. We apply this perspective by analyzing European mobility as a public good, with greater levels of public involvement than other forms of mobility, and benefits that may extend to non-participants, non-students, or even a global “public.” In contrast, the second perspective is biocentric, meaning that it understands nature as an agent with its own inherent claims to justice. Our analysis from this perspective focuses on the nexus between climate change, European colonialism, and higher education, understanding mobility as part of a broader agenda of epistemic soft power that perpetuates colonial regimes. We use these two perspectives to understand several important initiatives related to international student mobility in Europe: the Erasmus program, Erasmus Mundus, the European Higher Education Area (EHEA), and online exchanges through Erasmus + Virtual Exchange. We conclude with a discussion that posits online education as an alternative and consider paths to greater sustainability and climate justice in student mobility in Europe.

## Locating Europe in global student mobility flows

With a history of international student mobility dating back to mediaeval times (Rivza & Teichler, 2007), Europe is deeply connected in contemporary patterns of international student mobility. In order to fully analyze and understand the implications of European international student mobility for climate change, it is necessary to first understand student mobility within global context, including patterns of mobility (i.e., sending and receiving countries) and types of mobility (i.e., the different ways in which mobility is incorporated into higher education).

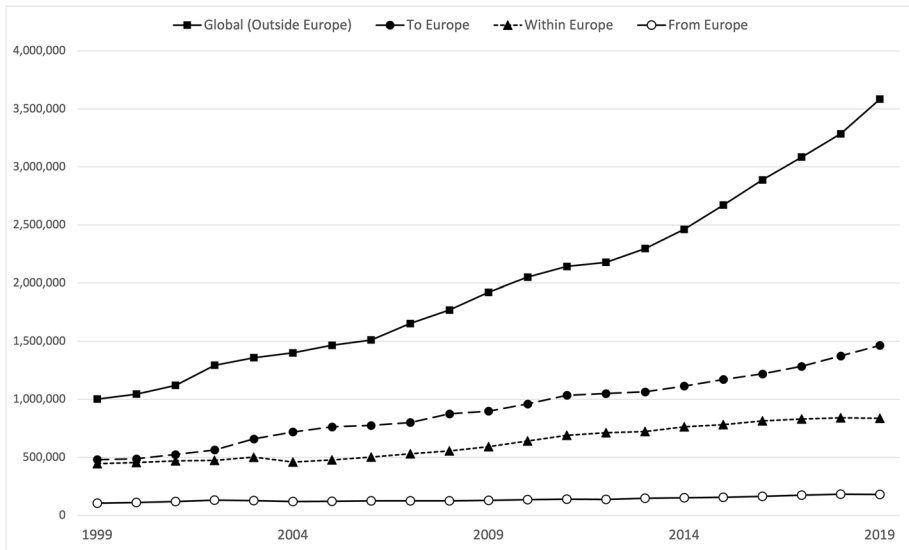
Broadly speaking, international student mobility in Europe can be considered in three geographic patterns:

Mobility *to* Europe (from non-European countries)

Mobility *from* Europe (to non-European countries)

Mobility *within* Europe; in which the country of study and country of origin are both in Europe

Figure 1 places European flows of internationally degree–mobile students (i.e., those seeking a full degree abroad rather than studying abroad) within the global context of accelerating growth in international students. Several key trends are noticeable: first, while student mobility has grown both to Europe and within Europe, it has been outpaced by the growth in international mobility in other areas of the world (i.e., “outside Europe” mobility in Fig. 1), which is likely due to growth of mobility to and from new areas such as East and Southeast Asia (Shields & Edwards, 2010). Second, degree mobility *to* Europe (i.e., students from non-European students studying in Europe) is the largest form of



**Fig. 1** Numbers of degree-mobile students between 1999 and 2019. The categories are mutually-exclusive, for example “To Europe” does not include students counted in “Within Europe”

degree-mobility in the European space (with 1.46 million students in 2019), although degree-mobility *within* Europe is of a comparable magnitude (with 835,751 students in 2019). Finally, mobility of European students outside Europe is comparatively low: just 179,000 students from Europe undertook degree mobility outside Europe, less than a quarter of those who stayed within Europe.

However, it is also important to keep in mind two important caveats: first, degree mobility is not the only form of international student mobility and arguably not the most significant form of mobility in the European space: credit mobility (for credit-bearing study less than a whole degree program, for example a semester or year abroad) is also particularly important in Europe. In particular, the Erasmus program (a form of credit mobility) involved approximately 350,000 students in credit mobility in 2019 (European Commission, 2021a). Second, changes to mobility caused by the COVID-19 pandemic are likely to seriously disrupt the trends shown in Fig. 1. While full data are not yet available for the relevant years, it is reasonable to assume a significant drop in numbers of mobile students, although the prevailing trends may continue following the relaxations on travel and border restrictions.

### Conceptual perspectives on international student mobility and climate change

To better understand international student mobility in relation to climate change and environmental justice, we draw upon two conceptual literatures. The first is rooted in an anthropocentric view of nature, including the climate, and a distributive view of justice. These perspectives entail that nature is viewed primarily as a resource to be fairly allocated in order to maximise human wellbeing (Schlosberg, 2007). It is reflected in many ongoing policy discussions and debates on climate change, which focus on the accounting of

emissions and the relative responsibilities of individuals and countries (Caney, 2014). We apply this perspective to European international student mobility through the concepts of public goods and global public goods in higher education, considering the ways in which higher education and international student mobility might maximise benefits to human societies, in particular beyond the students and universities directly benefiting from the mobility.

The second perspective embeds a biocentric view of nature, meaning that nature is an agent in its own right and that it has inherent rights to justice, including the right to exist, thrive, and regenerate (Borràs, 2016). From this perspective, the appropriation of nature as a resource (i.e., the anthropocentric perspective) is an anomalous feature particular to Western epistemic and social models, which have sought to usurp and replace indigenous knowledge systems that recognized and protected the rights of nature. Our application of this perspective to European international student mobility draws upon an insightful and growing literature that critiques colonialism and racism in international higher education, drawing attention to how the knowledge it values serves the interests of colonial powers and how internationalisation often embeds racist assumptions or biases. While these two perspectives actually contradict each other in their fundamental views of nature, they nevertheless both point to a need for greater consideration of the impacts of international student mobility on the climate.

### International student mobility, climate change, and public goods

Public goods were first defined by Samuelson (1954) as “collective consumption goods” in the sense that “each individual’s consumption of such a good leads to no subtraction from any other individual’s consumption of that good” (p. 387). Public goods are now canonically referred to as being (1) *non-rivalrous*, meaning that benefits to one individual do not detract from benefits to another and (2) *non-excludable*, meaning that an individual cannot be prevented from the benefits or enjoyment of the good, nor can they generally opt-out from these benefits (e.g., Robertson et al, 2012; Seo, 2017).

Much literature has also enthusiastically applied the concept of public goods to higher education, not only in terms of the benefits to individuals and society as a whole but also asserting the quintessentially public character of higher education institutions (Calhoun, 2006; Marginson, 2011). Thus, the focus is often much more on public benefits that arise from higher education, and in that sense it is closer to a (wide) set of positive externalities (Tilak, 2008), meaning benefits that are obtained even from those who are not direct beneficiaries (i.e., students). For example, employers could benefit from higher education through a skilled workforce, and all members of society might benefit from greater national productivity. Furthermore, Tilak (2008) argues that the non-rivalrous nature of higher education is dubious: application to nearly all higher education institutions is limited, meaning that “consumption” (or access) by one individual necessarily limits the ability of another to the same benefit.

While education’s status as public good is often taken for granted (Robertson et al, 2012), the complicated relationship to the private benefits it confers receives less attention. However, conceptual analyses suggest that public and private interests are not antithetical to one another, and some more extreme analysis the public good of education is little (or no) more than the sum of its private benefits (Levin, 1987). Therefore, the discussion of the “public good” in higher education is better considered as the general “public interests” of higher education or its public character: the idea that it serves interests of a wider

constituency is supported by public funds or other public assets (e.g. institutional recognition) and that it operates according norms and a concept of fairness that are in the wider social interest. With regard to the last point, the public nature of higher education often entails compensating for or mitigating wider social inequities, in particular by facilitating access for socially disadvantaged groups, in the aims of contributing to the “good” of a just society through social mobility (Robertson et al, 2012).

However, the “public good” aspect of higher education—even in this broader sense—becomes complicated when thinking of international student mobility, as mobility by definition involves multiple societies and therefore multiple “publics.” However, the concept of a “global public good,” which applies to public goods that “are made broadly available across populations on a global scale” (Kaul et al, 1999). The broader notion of a “global public” also raises the difficult question of “whose public goods?” (Marginson, 2018). This question becomes particularly pertinent to issues of equity and compensation: given limited spaces at elite universities, how should the relative admissions cases of different parties (for example well-qualified international students paying higher tuition fees versus disadvantaged but equally qualified domestic students) be assessed? Such questions lack clear answers partly because the “public” whose interests a single institution represents is ill-defined, and with it clear directions on how opportunity should be fairly distributed.

Perhaps because of these difficult questions, literature tends to view the benefits of higher education in individual (private) terms, with access to increased human capital and the signalling power of elite international qualifications often discussed in the literature (Gürüz, 2011; IOM, 2008). Even where benefits to the global public are evident—for example, in a greater social cohesion and intercultural dialogue—they are often discussed more as benefits to the individual, for example intercultural competencies or increased employability (Clarke et al, 2009; Norris & Gillespie, 2009).

Finally, a complete analysis of international student mobility as a public good needs to also take into account its environmental costs and impacts. This consideration is lacking in most literature on international student mobility, perhaps because mobility is considered primarily in terms of non-material phenomena—ideas, knowledge, and communication—leading to minimal consideration of its material basis and conditions, which are relegated as tangential or inconsequential to the main features of mobility. An undesirable consequence of such views is that it decouples the benefits of mobility from its environmental costs, further leading to over-optimistic aspirations for individualised freedom, progress, and modernity promised by physical mobility (Cresswell, 2006).

A related concern is the uneven distribution of the environmental costs of international student mobility borne by different populations, particularly those in the global south who are most vulnerable to climate change (IPCC, 2022). Existing literature on international student mobility does not take into account the intertwined and co-constitutive relationship between that transport, mobility, environment, and climate (Verlinghieri & Schwanen, 2020). In particular, as Sheller (2018) argues, mobility injustice and environmental injustices are two faces of the same problem, entwined with the uneven distribution of access to transport, energy, and fundamental life necessities.

In contrast, the environment holds a central place in many discussions of public goods; for example, clean air is often cited as a classic example of a non-excludable, non-rivalrous good (Marginson, 2011), and discussions of environmental policy are often framed in terms of the public good (Seo, 2017). However, this too positions the natural environment primarily as a resource that exists for the benefit of humans and human societies, a position that is contested in growing literature on post-humanism and a related critical deconstruction of colonial knowledge structures.

## Post-human and decolonial perspectives

While analysis of the public benefits and costs of mobility is insightful, the conceptual notion of the “public good” in relation to climate change is also problematic and contentious in that it primarily positions the natural world as a resource (of “good”) to be used for the aim of human well-being. This anthropocentric approach view of nature contrasts with that of many (non-European) societies, in which nature is viewed as an agent having inherent rights, in essence personhood (Schlosberg, 2007). This perspective is increasingly prominent in environmental policies around the world: for example, New Zealand recently passed a law granting legal personhood to the Wanganui River and with legal representation through two representatives, one from the government and the other from an indigenous community (New Zealand Legislation, 2016).

In analyzing the impact of European student mobility on the environment, the entanglement between European Colonialism, climate change, and higher education is also an important consideration. European colonialism was an expansive geopolitical force for over 400 years, at some point controlling about 84% of the earth (Hoffman, 2015), causing significant death and suffering, and leaving a legacy of exploitation and inequity (Koch et al, 2019; Sen, 2021; Tharoor, 2016). The oppression and exploitation of non-European peoples was legitimized by a socially constructed racial hierarchy that would later be supported and further inscribed through racial pseudosciences, much of which was undertaken in European higher education institutions and those established in European colonies (Brattain, 2007; Langkjær-Bain, 2019; Walters and Jansen, 2022). These colonies then became a valuable source of materials and resources required for the rise of the industrial economy and accompanying increase in fossil fuel consumption and carbon emissions.

According to Rizvi (2011), international education during the colonial period functioned as a “social technology” (p. 694) that served multiple purposes. On the one hand, it met colonial powers’ demand for skilled labor by training the “indigenous elite” to manage and control the colonised society; on the other hand, it also enabled the graduates of European universities to obtain a higher professional and social class after returning to their home after study. Access to higher education located in higher administrative centres thus became educational “pilgrimages,” promising individual elites’ some limited social mobility within the colonial hierarchy while also securing the power of the colonizers. Higher education institutions, therefore, played a critical role in not only establishing but also imparting the Western idea of modernity and civilization, facilitated by unidirectional and asymmetrical mobility (Rizvi, 2011). Such patterns are also reported in many studies documenting the history of international student mobility, such as Legrandjacques (2021) on British India 1850s–1940s and Laqua (2017) on French Indochina in the aftermath of the First World War.

Thus, from a decolonial perspective, the historical accumulation of carbon dioxide and other greenhouse gases is symptomatic of these deeper, unjust relationships (Mahony and Endfield, 2018). To successfully respond to climate change therefore requires not only reducing carbon emissions and the carbon present in the atmosphere but also addressing the historical injustices that created these emissions (Stein, 2019). This approach to sustainability would reflect what Sriprakash et al. describe as a “reparative future,” one which is constructed by “asking ongoing and difficult questions with the past.” (p. 3).

## Intra-European mobility: the Erasmus program

Erasmus (European Community Action Scheme for the Mobility of University Students) is a student exchange scheme launched in 1987 to further student mobility within the European Union (née European Community). Student participants in the scheme are granted financial support covering travel, additional living abroad expenses and occasionally language courses, functioning under the framework of Inter-university Cooperation Programs. The program has been closely integrated in the Bologna Process and the resulting European Higher Education Area (EHEA). It provides strong support and impetus for student mobility within Europe, focusing on promoting cooperation between European countries with shared cultural values, political interests, and higher education systems (Blumenthal et al., 1996). This is different from many other study abroad programs that tend to elevate mobility globally, where the priority is experiencing cultural differences rather than commonalities.

Underpinning the Erasmus project is the premise that meaningful educational activities abroad will foster students' educational leadership, cultural awareness, and intercultural competence (Maiworm, 2001). This cohort of students with intra-Europe international experience would then develop into a body of pan-European workers who are capable of crossing political and economic borders with ease, ultimately furthering European integration (Parey & Waldinger, 2011).

Since its inception, Erasmus has seen approximately 11.7 million participants, enabling a significant flow of student mobility within Europe (European Commission, 2021a, p. 18). Much research has been drawn to examine the benefits Erasmus has offered to mobile students and the wider society. At the individual level, increased intercultural competence has been found consistently in mobile students (Jacobone & Moro, 2015). At the aggregate level, however, a consensus is much harder to reach on who is benefiting from the scheme and how.

When comparing the benefits that Erasmus offers to mobile and non-mobile students (i.e., those who don't undertake mobility in their higher education) different opinions emerge in the research community. For those who consider Erasmus as a prime mechanism to promote European shared values and regional pace, mobile and non-mobile individuals are portrayed in a collaborative and symbiotic relationship, mutually and reciprocally enjoying the boons of mobility and integration (Pépin, 2007). Others, who propose that mobile students as comparatively advantaged, state that the benefits of the program are unequally distributed across the two groups, which may entrench inequalities and privilege (Ballatore & Ferede, 2013; Cairns, 2017; Deakin, 2014). However, on a collective level, the social and benefits of Erasmus has contributed socially, by promoting the knowledge exchange and European citizenship education, and economically, by cultivating the highly skilled labour force for its position in a knowledge-based economy.

Thus, in contrast to the focus on individual benefits attributed to student mobility generally, the Erasmus program exhibits a level of "publicness" as described in literature on higher education and the public good (Calhoun, 2006; Marginson, 2011). Additionally, it is funded by the public and run through a series of state institutions (both the European Commission and national governments), and it takes into account wider issues of social justice by seeking equitable representation in participation (e.g., across race and gender). Additionally, it seeks to create positive externalities: an intentional feature of the program is to benefit non-participants and European societies generally in a way that most other forms of mobility do not. Finally, Erasmus harnesses and enhances existing European policy



frameworks that remove administrative and financial obstacles to mobility, fully leveraging their potential to support higher education.

However, through its reliance on air travel, the program also indirectly conflicts with longer-term policy objectives at both the national and European level. Notably, the European Green Deal's target of becoming a carbon-neutral continent by 2050 (European Commission, 2019). In addition, the social costs of climate change are not contained within Europe but distributed globally, with a recent IPCC report noting "across sectors and regions the most vulnerable people and systems are observed to be disproportionately affected" (IPCC, 2022, p. 9). From a global perspective, therefore, the combination of public benefits and costs is much more complicated. This public aspect of the program also creates both a mandate for action on climate change.

### Erasmus and responses to climate change

In light of growing awareness of the urgency of climate change and responses in other areas of European policy, in particular the European Green Deal (European Commission, 2019), the environmental impact of Erasmus is receiving increasing attention. The program agenda for the 2021–27 period promises to "lead by example, by encouraging participants to use lower-carbon transport as an alternative to flying" and build "knowledge and understanding of sustainability and climate action, so that Europeans acquire the world-leading competences needed to create sustainable societies, lifestyles, and economies" (European Commission, 2021b, p.2). This proposed intention is complemented by program and grass-root initiatives to reduce the environmental costs of Erasmus while retaining its quintessentially "public" benefits.

The Green Erasmus project is one example of such a program: financially supported by the Erasmus+ program of the European Commission, the project is run by a consortium that includes HEIs, the Erasmus Student Network, the European Students' Union, and other organizations. Its activities focus on raising awareness of sustainable travel options among students and staff and understanding sustainable behaviours of students participating in Erasmus mobility.

With respect to understanding sustainable behaviours, the project undertook a survey of more with more than 7000 responses from students who had undertaken Erasmus mobility. This is an important study, as it offers much-needed evidence on how mobility can influence behaviours beyond the impact of air travel (Green Erasmus Partnership, 2022). While the study confirmed that a large share (approximately 70%) of Erasmus students rely on air transport to and from their study destination, responses also show an increase in sustainable behaviours during the period of mobility, for example less transport by car, more walking, and purchasing used rather than new items. Most interestingly, the study highlights an "attitude-behaviour gap" that means "high levels of concern on environmental issues and a sense of responsibility do not always translate into action" (Green Erasmus Partnership, 2022 p. 25), although the report also found that respondents who indicated they were "very concerned" about climate change were less likely to use air transport to and from their mobility destination.

In contrast, Erasmus by train is a student-led initiative that started in January 2020, which seeks to address the program's climate impact by utilizing rail travel rather than air. This has significant environmental benefits, as a 1000-km rail journey will release just 3% of the CO<sub>2</sub> (approximately 4.5 kg) as a flight of the same distance (approximately 153 kg—DBEIS, 2022). The initiative's founders acknowledge the economic forces behind the

preference for air travel, which counters both Erasmus participants' willingness to travel sustainably and the European Green Deal's goal of making Europe the first climate neutral continent by 2050. To alleviate the twofold contradiction, Erasmus by train undertakes advocacy to support rail travel, offers information to help students plan international travel by rail, and seeks to provide free interrail tickets for Erasmus participants by collaborating with interrail and by lobbying relevant authorities at a university, regional, national, and European level (Erasmus by train, 2021).

Both these initiatives to some extent draw upon the “public” aspect of the Erasmus program in developing response to unsustainable aspects of mobility. The public aspects include funding of mobility as well as the institutional structures and relationships that enact it. Interestingly, it is these same (mainly public) institutions and relationships that provide an entry for climate action in mobility. Whether such responses would be possible in the framework of purely private mobility (i.e., without government coordination and any costs paid by individuals) is doubtful; a conclusion which is supported by the lack of similar initiatives in other parts of the world.

## Europe and the world: Erasmus Mundus and the European higher education area

Other approaches to promote international student mobility in Europe focus on its relationship to countries outside Europe. Two key policy initiatives are particularly salient at the European level: the Erasmus Mundus program and the European Higher Education Area. Both primarily aim to increase mobility flows to Europe (rather than from Europe), but they use different mechanisms and institutional structures to do so.

The European Higher Education Area (EHEA) is the outcome of the Bologna Process, which started in 1999 and was enacted through a series of regular ministerial meetings. At its heart, the EHEA aims to enhance degree comparability between its 49 member countries, which extend well beyond conventional geographical definitions of Europe to include Kazakhstan, Turkey, and Azerbaijan (EHEA, 2022). Specifically, it establishes a three-cycle qualifications framework (bachelors, master's, and doctoral degrees), which in some cases align or replace nationally specific qualifications with the standardized three-cycle model. It also links these qualifications to a common system of academic credit: the European Credit Transfer System (ECTS). By establishing a common system of qualifications and credits, the EHEA aims to provide a platform for mobility, including student mobility both within and across cycles (i.e., credit mobility and degree mobility), as well as enabling greater career mobility between member states in the EU's integrated labour market (Hartmann, 2008). Furthermore, it enhances the attractiveness of European countries as destinations for student mobility from non-European countries by offsetting North American dominance as a destination for international study and pre-empting increasing competition from East and Southeast Asia (Robertson & Keeling, 2008).

The Erasmus Mundus program was started in 2004, and as the name implies, it brings a global dimension to the Erasmus program. Its primary mechanism for doing so is through funding consortia of European higher education institutions to establish cooperative master's programs by providing scholarships for students anywhere in the world to study on these programs (Dale, 2016). There are currently 163 master's programs available through the Erasmus Mundus programs, with funding of €176 million awarded in 2020. A key goal of the program is to support the consolidation and competitiveness of European higher education, building upon the common qualifications framework of the EHEA to create programs of study offered by multiple European

institutions working collaboratively (Papatsiba, 2014). Because the programs are available to both scholarship-funded and students funded by other means (e.g., self-funded), they have a strong market orientation with a possibility to operate with public support after the scholarship funding ends.

Interestingly, environmental considerations and the challenges of climate change in particular receive little attention in documents relating to either the EHEA or Erasmus Mundus. The involvement of non-European countries suggests that mobility through Erasmus Mundus would have a higher environmental footprint due to distances travelled. However, the number of mobile students is likely much lower: the Statistical Annex to the Erasmus + Annual report (European Commission, 2021a) cites 313,534 mobile students within Europe versus 15,982 from countries outside Europe to European countries. The majority of these come from countries and regions close to Europe, e.g. the Western Balkans (2070), Southern Mediterranean Countries (2299), and the Russian Federation (1045), with fewer coming from origins far away such as Asia (1022) and Latin America (481) and Sub-Saharan Africa, the Caribbean and Pacific (1167—which are reported as one group and cannot be disaggregated).

Thus, the practical impact of the Erasmus Mundus program on the total impact of international student mobility on climate change is low. For example, UNESCO Institute for Statistics (2022) reports 748,532 degree–mobile students from Asia studying in the United States, many times the number who undertook mobility through the Erasmus Mundus program and creating a significantly larger impact on the climate. Similarly, it is hard to argue that the period of the formation of the EHEA (1999–2010), notably changed numbers of degree–mobile students in member countries, given the prevailing global trends indicated in Fig. 1.

Instead, the impact of inter-regional (i.e., inter-continental) initiatives that promote mobility (among other objectives) on climate change and environmental justice is much more on the symbolic, educational and the normative levels. In this sense, the ways in which the programs “lead by example” are quite limited; for example, only two of the 163 Erasmus Mundus programs available in 2022 relate to climate change, while 13 relate to sustainability more broadly. Furthermore, efforts focus far more on positioning Europe as a destination for mobile students (from within and beyond Europe), with comparatively little focus on mobility from Europe to the rest of the world.

In contrast, the efforts to position Europe as a center of knowledge production, even at the expense of the climate, demonstrate the colonial outlook discussed in critical studies on internationalization (Shahjahan & Edwards, 2022; Stein & Andreotti, 2016). For example, the Bologna Declaration (1999, p. 2–3) claims the following:

The vitality and efficiency of any civilisation can be measured by the appeal that its culture has for other countries. We need to ensure that the European higher education system acquires a world-wide degree of attraction equal to our extraordinary cultural and scientific traditions

The text thereby constructs Europe as a “civilization”—omitting both the heterogeneity within the continent as well as historical interactions between European and non-European societies. The civilizing force of Europe is the attractiveness of European higher education, echoing the “civilizing mission” that was inherent in much European colonialism (Conklin, 1997; Gillborn, 2005). Furthermore, it celebrates the “extraordinary traditions” or European science while omitting any mention of the unparalleled exploitation that is concomitant to its history and does not make mention of the many things that Europe might learn from *other* higher education systems.

The EHEA therefore embeds a set of colonial aspirations that reproduce many features of European colonialism, particularly positioning knowledge as a basis for cultural supremacy (Said, 1978; Alemu, 2019; França et al., 2018; Sall and Ndjaye, 2008). While this is not the only motivation behind the EHEA, it neglects other possible approaches to its engagement with the non-European world, for example positioning the program as a form of mutual learning and focusing on the ways Europe might benefit from engagement with other cultures rather than its own exceptionalism. The same ideologies are often linked to the causes of the climate crisis itself (Barber, 2021; Mahony & Endfield, 2018).

## Prospects for online mobility and exchange

Online education has been recently discussed as a ‘greener’ and more sustainable provision of HE for mitigating travel-associated impacts on the climate. Previous research comparing different learning and teaching models in UK higher education institutions revealed that online and blended learning modes exert strikingly lower environmental impact than campus-based systems regarding energy consumption and carbon emission (Caird & Roy, 2019; Caird et al., 2013, 2015; Lane et al., 2014). Researchers from other national contexts also discovered the environmental benefits of innovating pedagogical designs by fully or partially incorporating online learning. Little and Cordero (2014) demonstrated how the growth of hybrid courses could mitigate transportation-associated CO<sub>2</sub> emissions on US campuses, and Versteijlen et al. (2017) revealed the effects of online education in reducing CO<sub>2</sub> emissions by reducing students’ and staff’s needs for travel in the Netherlands.

Since the outbreak of COVID and the subsequent migration to online learning in many countries, more scholarly attention has been drawn to measure the carbon (dis)benefits of online provision of higher education. Mixed results have been reported on the degree to which shifting to online, or hybrid learning could reduce the overall carbon footprint of HEIs, depending on different GHG measurement methods and HEIs contexts, although the study does not take into account emissions from international mobility (Filimonau et al., 2021). However, the literature consistently suggested that online learning may well lower the carbon footprint of staff and students otherwise commuting mobility, especially related to the aviation sector, which has been found disproportionately significant across contexts (Yañez et al., 2020; Gamba et al., 2021).

European activity in this space also has also sought to develop sustainable ways of international engagement in higher education. The Erasmus+ Virtual Exchange (EVE) pilot initiative was launched by the European Commission (EC) in 2018, aiming to expand the reach and scope of the Erasmus+ program through online collaborative learning and to provide a more inclusive approach to internationalization by reducing barriers to participation across socio-economic backgrounds. The first three years of the program involved 28,450 youth in EU member states and those in the Southern Mediterranean region in virtual exchange programs, and the review of the pilot program identified several benefits to participants, including intercultural competences, tolerance, and skills working in diverse teams (Helm & van der Velden, 2019, 2020).

Since the program was not designed specifically to respond to concerns about climate change, there is no specific measure to compare the climate impact. Nevertheless, climate change is embedded in the interactive program, improving the participants’ understanding of how it relates to different societies and empowering them to become agents of transformation. This aspect of the program is strengthened considering the virtual exchange

brought together people from a wider range of socio-economic backgrounds than mobility programs, including those for whom mobility is politically and economically impossible (Helm & van der Velden, 2020). Nevertheless, it is these vulnerable groups that face underserved high climate risks.

The extent to which online exchanges complement or substitute in-person mobility remains to be seen. Proponents of physical mobility would likely point to the unique educational experience of immersion in another culture, and the benefits it can bring in confidence, communication, and interpersonal skills. On the other hand, growing evidence suggests that virtual mobility may provide the solution to meet the increasing demand for communication in the aftermath of COVID, while responding to the growing public awareness of the negative externalities of physical mobility (Caballini et al., 2021). As sketched in the 2020 edition of the ‘New Horizons’ report, two primary forces will dramatically transform the higher education system in the late 2020s: ‘the dangers posed by climate change and the advances in digital technology’ (Educause, 2020, p. 36). While envisioning sustainable mobility in the context of climate change, it would be unwise to leave the role of technology out of the picture.

## Ways forward: enhancing climate justice in European student mobility

Our analysis of international student mobility in Europe shows a complex picture that might inform discussions on higher education and environmental justice more broadly. On the one hand, mobility within Europe has a greater “public” dimension than is often associated with international student mobility at the global level. The Erasmus program in particular has brought opportunities for mobility to large numbers of students, and one could plausibly argue that creates spillover benefits to non-mobile students through intercultural exchange and the development of an integrated European labour market. While this mobility has costs to the climate, the “public” nature of mobility also creates the platform for a response, through initiatives such as Green Erasmus and Erasmussus by train.

However, analysis of the colonial entanglements of European higher education and climate change problematizes the seeming neatness of the European mobility space. Initiatives such as the European Higher Education Area and Erasmus Mundus posit implicitly asymmetric mobility with other parts of the world and focus more on the attractiveness of European knowledge and learning than on potential mutual benefits of exchange between European and non-European societies. It is also not surprising that climate change receives less consideration in programs supporting mobility from non-European countries, the focus on asserting European ascendancy in higher education seems to crowd out consideration of broader issues of environmental and social justice.

These two perspectives illustrate the need for greater consideration of the climate impacts of international student mobility and some of the unique challenges, opportunities, and entanglements of the European higher education arena. While they are helpful in approaching the issue from two competing perspectives, they are not the only ways in which one might conceptualise this issue. For example, perspectives such as mobility justice (Sheller, 2018) or ecofeminism (Gaard, 2015) might yield additional insights to those presented here. It is also important to keep in mind that in terms of their absolute effect on global climate change, carbon emissions related to international student mobility are still limited compared to other forms of human activity: the 3.9 to 4.5 gigatons of carbon attributable to tourism (Lenzen et al, 2018) far outweigh the 0.014 to 0.035 gigatons (14 to

35 megatons) attributable to international student mobility globally (Shields, 2019), arguably without the same educational benefits and development of intercultural communication and tolerance. Furthermore, the climate impacts of international mobility are only one aspect of the unsustainable practices of neoliberal higher education, which also include academic conference travel (Bjørkdahl & Duharte, 2022) and endowment investments.

The term “sustainability” is often imbued with a normative connotation, implying “immorality” rather than a more literal meaning of “finiteness” or “of a limited duration.” This emphasis holds even in expanded conceptualizations of sustainability that take a broader view of social justice and human wellbeing (e.g., Raworth, 2017). Thus, discussions about sustainable behaviours and actions often focus on the morality of individual decisions and actions. However, when considering prospective futures for education, it is helpful to concentrate on this more literal definition of sustainability and therefore to ask given the inevitability of change. Current models of international student mobility are not sustainable and must therefore change. The main questions are therefore what this change looks like and how it is brought about. The conceptual approaches discussed in this paper—focusing on the public goods arising from mobility and critiquing and dismantling colonial practices and assumptions—can be useful in informing changes in policy and practice that may manage this process of change in ways that maximise benefits to students and societies.

## Declarations

**Conflict of interest** The authors declare that they have no conflict of interest

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