Moldova State University as an Actor of Climate Transition: Education, Innovation and Sustainable Entrepreneurship

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04.06.26

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1. Literature review findings

2. MSU Impact Pathway

3. Results and conclusions

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PRISMA Selection Process

PRISMA Stage	Action	Number of papers
Identification	Search in Web of Science Core Collection by Topic ("climate change" OR "climatic change") AND ("higher education institution*" OR "higher education" OR universit* OR HEI*)	24,331
Refinement	Search using the same keywords only in Title ("climate change" OR "climatic change") AND ("higher education institution*" OR "higher education" OR universit* OR HEI*)	406
Screening	Document type filter: Article and Review Article	329
Screening	Language filter: English	301
Eligibility	Analysis of titles and abstracts	85

Note: The table presents the step-by-step selection process used to identify the final set of publications included in the analysis.

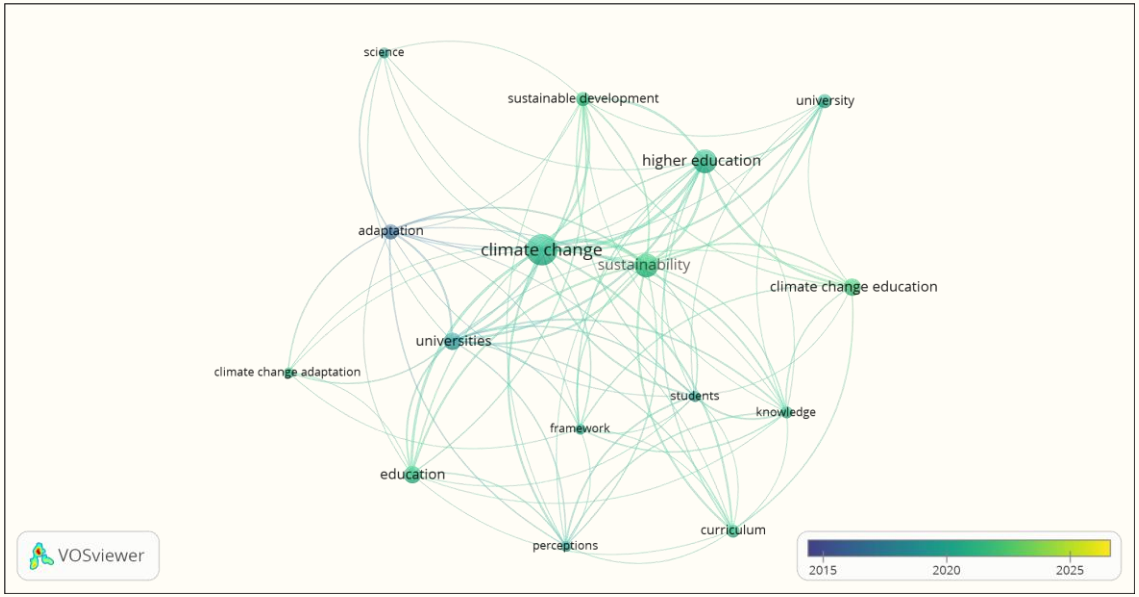

Figure 1. Temporal evolution of keywords related to climate change and higher education
Source: Authors' elaboration in VOSviewer based on Web of Science Core Collection data selected according to the PRISMA protocol

Figure 1 highlights the temporal evolution of the main keywords identified in the scientific literature on climate change and higher education. The central position of terms such as **climate change**, **sustainability**, **education**, and **higher education** shows that these concepts form the core of the analyzed research field.

The color gradient indicates that 2020 is the average publication year associated with most of the keyword. Terms displayed in more recent colors suggest a growing academic interest in sustainability, climate transition, and the role of education in addressing climate-related challenges. This confirms that universities are increasingly studied not only as educational institutions, but also as active actors in promoting climate awareness, responsible behavior, innovation, and sustainable development.

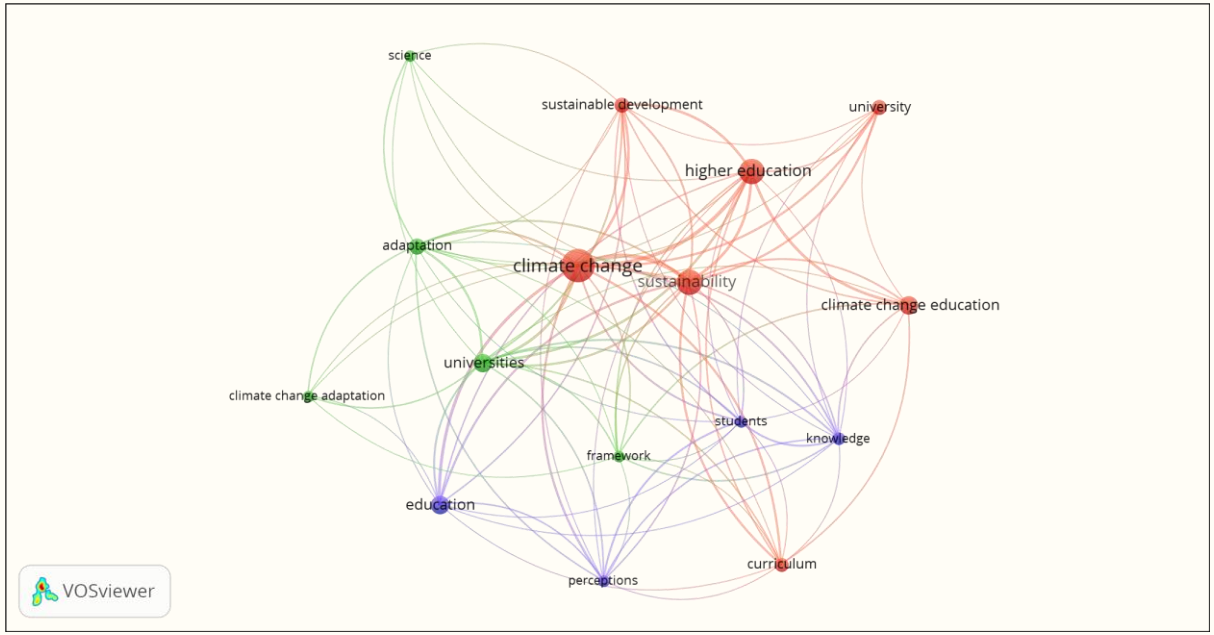

Figure 2. Keyword co-occurrence network on climate change, sustainability and higher education
Source: Authors' elaboration in VOSviewer based on Web of Science Core Collection data selected according to the PRISMA protocol

The central position of **climate change** confirms that this concept represents the main research focus around which the other topics are structured. The strong links between the keywords indicate a high level of interconnection between climate change, sustainability, education, and development.

The cluster related to education emphasizes the important role of higher education institutions in developing competencies, increasing climate awareness, and promoting responsible behavior among students and society. At the same time, the association between sustainability-related and development-related terms suggests that universities are increasingly analyzed as active contributors to climate transition through education, research, innovation, institutional practices, and partnerships with public and private stakeholders.

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General conclusions from the literature:

- Universities are strategic actors in climate transition, linking education, research, innovation, engagement, and campus operations;
- Climate change education should be interdisciplinary, practical, and focused on real climate solutions;
- Universities can accelerate green innovation and sustainable entrepreneurship through support systems, industry collaboration, and applied research;
- As regional innovation actors, universities connect businesses, public institutions, NGOs, and communities;
- Campuses can serve as “living laboratories” for climate action in energy, mobility, waste, buildings, procurement, and biodiversity;
- Effective climate transition requires institutional change: governance, funding, leadership, participation, and long-term strategy.

Application of the Impact Pathway methodology

1. Identification of climate change actions carried out within MSU;
2. Development of the evaluation form;
3. Determination of the evaluators;
4. Collection of evaluations;
5. Interpretation of results.

Code	Possible MSU Action	Immediate Output	Expected Outcome	Climate/Sustainability Impact
A1	Integrating mandatory sustainability and green entrepreneurship modules into study programs	Updated curriculum; approved modules; trained teaching staff	Students with green skills and the ability to identify climate solutions	Increase in human capital for the green transition
A2	Operation of the EcoVision/Climate Innovation Lab	Space, methodologies, workshops, interdisciplinary teams	Ideas and prototypes for climate solutions generated by students and researchers	The university becomes a climate innovation hub
A3	Partnerships with the private sector for real sustainability challenges	Company briefs; student projects; mentoring	Academic solutions tested in the business environment	Knowledge transfer and innovation to the economy
A4	Partnerships with public authorities for climate policies and plans	Consultations, local data, applied projects	University research enters public decision-making	Institutional capacity for adaptation/mitigation
A5	Hackathons and idea competitions for climate solutions	Events, teams, pitches, prizes	Entrepreneurial motivation and green start-up ideas	Development of the sustainable entrepreneurship ecosystem
A6	Incubation/mentoring for sustainable start-ups	Mentoring sessions, business plans, contacts with investors	Ideas transformed into entrepreneurial initiatives	Climate solutions with market potential
A7	Changing the university's institutional practices	Energy-efficiency measures, waste management, green procurement	The university teaches by example and reduces its own footprint	Credibility and operational impact in the climate transition

Evaluator Category	Why It Is Useful	Suitable Questions
Teaching staff	They know the curriculum, competences, and academic feasibility.	Which modules can be integrated? Which learning outcomes are realistic?
Students	They are the main beneficiaries and can assess motivation/attractiveness.	What activities motivate them? Which competences do they feel they lack?
MSU administration	It knows the resources, internal policies, and institutional priorities.	Which actions are institutionally feasible? What resources are available?
Companies	They can validate relevance for the market and innovation.	What climate solutions is the market looking for? What partnerships are useful?
Public authorities/NGOs	They can validate relevance for policy and community.	Which local/national climate needs should be addressed?

Question in the Form	Recommended Scale	What You Obtain
How much does the action contribute to climate education?	1 = very little, 5 = very much	Contribution score for the education criterion
How much does the action contribute to innovation?	1-5	Innovation score
How much does the action contribute to sustainable entrepreneurship?	1-5	Entrepreneurship score
How feasible is the action in the next 1-3 years?	1-5	Feasibility score
Does Action A influence Action B?	-3...+3	Interdependence matrix

Results:

The Impact Pathway mapping shows that MSU's contribution to climate transition is not generated by isolated activities, but by a mutually reinforcing portfolio of actions. The strongest pathway links curriculum integration, climate innovation laboratory activities, private-sector and public-sector partnerships, and support for student-led green entrepreneurship. Curriculum integration builds sustainability competences; innovation lab activities transform competences into practical solutions; partnerships increase the relevance and implementation potential of these solutions; and entrepreneurship support enables climate-oriented ideas to move toward market and social application.

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Thank you!

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