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UNESCO's Education for Sustainable Development Framework and the Reality of University–Community Cooperation in the Caucasus Mountain Region

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The project
Transdisciplinarity for
Sustainable Tourism
Development in the
Caucasus Region
(CaucaSusT) initiated the
integration of
transdisciplinary

approaches into partner universities in Armenia and Georgia. The aim was to develop cooperation between academics and nonacademic stakeholders from rural communities in the Caucasus mountain region. This paper uses the United Nations Educational, Scientific and Cultural Organization (UNESCO) framework for Education for Sustainable Development (ESD) beyond 2019 to reflect on the CaucaSusT project process and outcomes. We carried out qualitative research based on document analysis, individual interviews, and focus group discussions with

participating students, teachers, and local stakeholders. The results are presented and discussed according to their relevance to the ESD framework's 5 priority areas. We conclude that the CaucaSusT project was successful in contributing to the priority areas of education and training, educators, and youth, but it contributed less to the priority areas of policy and communities within the short project lifetime. We found the UNESCO ESD framework was a useful tool for evaluating the project. Based on our analysis, we provide recommendations for successful ESD project design and implementation in the Caucasus mountain region.

Keywords: transdisciplinarity; case study teaching; sustainability transformation; post-Soviet academic systems; university–community partnership.

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Introduction

Integration of the sustainable development paradigm into teaching and learning to empower current and future generations to meet their needs is a key objective of Education for Sustainable Development (ESD; see Balsiger et al 2017; Barth et al 2019). The recently proposed United Nations Educational, Scientific and Cultural Organization (UNESCO) framework for implementing ESD beyond 2019 focuses on strengthening ESD's contribution to achieving the United Nations Sustainable Development Goals (SDGs). The framework highlights 5 priority areas of action: policy, education and training, educators, youth, and communities (UNESCO 2019).

Although sustainable development is an essential goal for countries in the South Caucasus region, marginalized mountain communities often have limited economic opportunities and hence lack prospects for the future. In Armenia and Georgia, sustainability has become an integral part of development strategies for rural and mountainous regions (VNR 2017, 2018). Successful implementation of these strategies requires participatory decision-making, social learning, and coproduction of knowledge and

development solutions with the local population (Gleeson et al 2016; Balsiger et al 2019).

Local stakeholders' ownership and motivation are key factors in enabling innovation in mountain regions, yet external expert knowledge and facilitation skills are often needed. As a result, the outcomes of short-term interventions are often short lived. One way to address this gap is by establishing long-term collaboration between universities and local communities to tackle communities' sustainability challenges. This involves integrating local and case-specific knowledge to coproduce development solutions, as well as bringing research and teaching closer to addressing real-life challenges at local, national, and regional levels (Balsiger et al 2017; Barth et al 2019).

Transdisciplinary teaching and research approaches in line with ESD (Steiner and Posch 2006; Barth et al 2019; Gratzer et al 2019) could provide a way for such community–university collaboration. However, universities in the Caucasus have limited experience of transdisciplinarity. The extent to which higher-education structures are implementing ESD-related measures in general, and transdisciplinary approaches specifically, is unclear. Although the literature covers a range of ESD programs in

different regions of the world, mostly in the west (Steinfeld and Mino 2009; Segalàs Coral and Tejedor Papell 2016), the Caucasus region has received less focus (Karatzoglou 2013).

The project Transdisciplinarity for Sustainable Tourism Development in the Caucasus Region (CaucaSusT) was initiated in 2016 by partners in Armenia (Armenian State Pedagogical University [ASPU]), Georgia (Tbilisi State University [TSU]), and Austria (University of Natural Resources and Life Sciences Vienna [BOKU] and IMC University of Applied Sciences Krems), within the framework of the Austrian Partnership Programme in Higher Education and Research for Development (APPEAR). Its objectives are to integrate transdisciplinary approaches into university practices in Armenia and Georgia and to contribute to the cocreation of knowledge and long-term sustainable development of the Caucasus mountain region. The core of the project is a transdisciplinary case study course, which has been codeveloped by the partners, integrated into the curricula of ASPU and TSU, and held in 4 mountain communities in Armenia and Georgia.

The project was developed before the recent ESD framework elaboration; however, its main goals and activities are well aligned to the framework priority areas. This paper examines the extent to which the project supports integration of the framework into university practices in Armenia and Georgia. Furthermore, it evaluates the project results with respect to the framework's priority areas. We address this via the following research questions: (1) What are the challenges and successes of implementing transdisciplinary case study courses in Armenia and Georgia? (2) Can this course format contribute to the implementation of the ESD framework for 2030? (3) Is the ESD framework for 2030 a useful tool in evaluating case-study courses?

Transdisciplinary case studies and ESD

Transforming an educational system to integrate sustainable development requires finding new pathways of teaching and learning within and outside of the classroom (Tilbury 2011). It involves equipping the younger generation not only with scientific knowledge but also with soft skills, such as communication and conflict resolution (Steiner and Posch 2006; Segalàs Coral and Tejedor Papell 2016; Rieckmann et al 2017; UNESCO 2019). ESD can be challenging in traditional disciplinary school settings (Balsiger 2015; Rieckmann et al 2017), and success depends on the educator's role as a facilitator ensuring learning among students and between students and teachers (Tilbury 2011; Balsiger et al 2017).

ESD in mountain regions must consider these regions' unique social, cultural, and environmental conditions. Integration of scientific knowledge and the experiential knowledge of local stakeholders is therefore a key factor for successful ESD implementation (McKeown et al 2002; Tilbury 2011; Rieckmann et al 2017).

Transdisciplinarity provides a framework for such discourse by focusing academic inquiry on real-world problems, cocreating societally relevant knowledge, and transcending academic and disciplinary boundaries (Klein et al 2001; Pohl et al 2017; Nicolescu 2018; Pearce et al 2018). It was designed to approach complex societal problems

collaboratively by bringing together academic and nonacademic stakeholders to coproduce knowledge and jointly elaborate on actions to address the respective challenges (Enengel et al 2012), thus fostering sustainable development processes (Lang et al 2012; Barth et al 2019). Transdisciplinarity is a mutual learning process that takes into account real-life problems, integrating abstract and case-specific knowledge, to provide solutions for complex sustainability issues through systematic analysis (Fam et al 2018). Mochizuki and Yarime (2016: 19) see transdisciplinarity as a method or approach in ESD for promoting "active collaboration with various stakeholders throughout society, organizing processes of mutual learning among science and society."

Case-based work is a practical way of organizing transdisciplinary research and teaching (Muhar et al 2006; Scholz et al 2006; Steiner and Posch 2006; Hansmann et al 2009). Transdisciplinary case studies can contribute to understanding of real-world problems and initiate collaboration between experts and community members, and students as young researchers can play a key role (Scholz and Tietje 2002). By integrating research and learning, issues of sustainable development are addressed in a concrete, real-life setting and therefore provide a potential instrument for SDG implementation at a local level (Gratzer et al 2019). We consider transdisciplinarity in general and transdisciplinary case study approaches specifically in line with, and as part of, ESD.

The CaucaSusT case study format

The overall objective of the CaucaSusT case study course was to bring together students and teachers from different disciplines and local stakeholders to develop ideas and implement projects in the wider field of sustainable tourism in the mountains. The main long-term goal was for academic and nonacademic stakeholders to cooperate in addressing challenges related to sustainable development. The academics brought expertise in geography, planning, economics, and sociology, among others. Learning objectives were initially guided by the key competencies of sustainability proposed by Wiek et al (2011): systems thinking (ie systems and network analysis), anticipatory competence (ie scenario development), normative competence (ie critically assessing sustainable and unsustainable development aspects), strategic thinking (ie planning and management of the course and proposed interventions), and interpersonal competence (ie working in interdisciplinary groups of students, teachers, and local stakeholders to realize the value of local knowledge).

The Armenian and Georgian partners integrated these competencies into the specific learning objectives for each university (eg ASPU courses included teaching-related learning objectives) and adapted them each year according to the types of students. During the second year, adaptation of the ASPU case study course additionally considered the ESD competencies and learning outcomes proposed by Vare (2018).

It has been planned to conduct 2 case study courses in each country within the CaucaSusT project (4 courses in total). However, the format had to be arranged to enable this activity to continue beyond the project period as part of the

FIGURE 1 Case study areas of the CaucaSusT project.



regular study program curriculum. Students were involved for the equivalent of about a semester. This included preparatory courses at their home universities (principles of sustainable development, tourism, transdisciplinarity, soft skills, etc) and onsite stays in the mountain areas for 10–14 days. Case study sites were located in the Lesser Caucasus (Tsaghveri, Georgia, and Meghradzor and Dilijan, Armenia) and the Greater Caucasus (Stepantsminda, Georgia), as shown in Figure 1.

Preparation for the course included area selection, initiation of cooperation with key stakeholders, needs analysis, compilation of information on the public, and organization of working space and accommodation in the case study areas. At the same time, the participating universities made curriculum adjustments, trained teachers, recruited students, and timetabled activities.

The course format was based on that proposed by Scholz and Tietje (2002) for cohorts of about 25 students. These students were assigned to working groups of 4–5, facilitated by 1–2 teachers. Students were grouped according to their interests and their disciplinary backgrounds to provide an appropriate mix of disciplines. After the preparatory phase on campus, these groups conducted interviews and group discussions onsite with local residents to define local sustainability issues and codesign scenarios for sustainable development (Klein et al 2001; Muhar et al 2006; Scholz et al 2006; Lang et al 2012; Pohl et al 2017). After the field phase, the results were compiled into a joint project report. Table 1 presents the critical topics raised by local stakeholders that formed the main research topics in the case study regions.

As an international cooperation project, there was a lot of exchange among the 4 partner universities via joint seminars and teacher training and mutual field visits, among

TABLE 1 Critical topics raised by local stakeholders.

Region (year)	General topics	Specific topics
Meghradzor, Armenia (2018)	Tourism development challenges and opportunities	Sustainable land use Recreational potential assessment Tourism festival organization ESD in local public schools
Tsaghveri, Georgia (2018)	Tourism management and challenges for sustainable development	Environmental issues Social, cultural, and economic conditions Touristic infrastructure Gaps between tourism and other sectors
Dilijan, Armenia (2019)	Sustainable tourism development challenges and opportunities of Dilijan National Park	Ecotrail design and development Nature protection issues Touristic infrastructure ESD in local public schools
Stepantsminda, Georgia (2019)	Tourism infrastructure and services for sustainable development	Sustainable development of Kazbegi National Park Issues of nature protection and land use Issues of participatory planning and management

others. Regular reflective steps allowed adjustments to be made during the project period. Table 2 summarizes the project timeline and activities and explains the connection to the priority areas of the UNESCO ESD framework. The data collection methods and the resulting outputs and documents are given in Appendix S1 (*Supplemental material*, <https://doi.org/10.1659/MRD-JOURNAL-D-20-00023.1.S1>).

Methods of analysis

All activities listed in Table 2 were observed and documented by the team members, who participated either actively as trainers and organizers or passively as observers. To gain an in-depth understanding, we conducted qualitative content analysis, which is considered a useful method for evaluating transdisciplinary research (Vienni Baptista and Rojas-Castro 2020).

Apart from document analysis, we conducted individual interviews and focus group discussions with participating students ($n=81$), teachers ($n=22$), and local stakeholders ($n=40$), with questions focusing on the evaluation of the transdisciplinary case study course in individual, institutional, and community contexts. The duration of the interviews averaged approximately 40 minutes for local stakeholders and 1 hour for teachers and students. All interviews were recorded and transcribed with the permission of the interview partners. Understanding the local languages in both countries was helpful in interpreting implicit expressions by teachers, students, and local stakeholders.

We conducted thematic data analysis by using an inductive approach through open coding of the data (Maxwell and Chmiel 2014). Significant keywords of the transcribed data were collected and considered with respect to results from other studies (Klein et al 2001; Fam et al 2018). Codes were grouped in different themes with reference to the 5 ESD priority areas as described by UNESCO (2019). Relevant successes and challenges were then identified as presented in Table 3. The detailed results are given in Appendix S2 (*Supplemental material*, <https://doi.org/10.1659/MRD-JOURNAL-D-20-00023.1.S1>).

Outcomes and discussion

The UNESCO ESD framework with its reference to 5 priority areas proved to be a useful tool to evaluate and reflect on the project results. Our analysis showed that the 2 investigated countries from the Caucasus region, Armenia and Georgia, face similar challenges regarding ESD, resulting from the transition processes after the disintegration of the Soviet Union. The project was successful in achieving its short-term goals—specifically, in establishing interdisciplinary cooperation in both partner universities (at the levels of departments, teachers, and students) and in initiating contact and collaboration among the universities, local community members, and other nonacademic stakeholders. This was productive and appreciated by both local and academic stakeholders. Nevertheless, the different existing mentalities and cultures of cooperation within and outside of academia make this process challenging. As such, the long-term goal to integrate sustainability issues into academic work and establish strong collaboration with local

communities requires continuous work, enthusiasm, and resources.

The outcomes of the CaucaSusT project relate to all priority areas of the UNESCO framework. However, they have differing degrees of impact: the project provided valuable contributions to the priority areas of education and training, educators, and youth, but it was less impactful with respect to the priority areas of policy and communities.

Policy

To achieve synergies between education and sustainable development agendas, long-term collaboration between academia and policymakers is essential (UNESCO 2019). The project succeeded in raising awareness about transdisciplinarity and, in the case of Armenia, initiated a promising dialogue with policymakers at the national level. Nevertheless, political instability, the lack of consistent educational strategies, and a fairly high turnover of decision-makers renders long-term cooperation and integration of innovations into policy difficult. Furthermore, the higher-education systems in both countries still suffer from the separation of teaching and research under the former Soviet regime, when the primary task of universities was to produce graduates for the labor market and research was assigned to the Academies of Science. Thus, universities are often disregarded as driving forces for societal innovation (Huisman et al 2018).

Education and training

The UNESCO framework highlights the importance of cooperation between educational institutions and local communities through formal and nonformal educational approaches (UNESCO 2019). The CaucaSusT project developed the capacities of partner universities to implement interdepartmental cooperation, integrate academic and practical knowledge, and embed transdisciplinarity in the sense of working closely with the local stakeholders on several master's degree curricula. Our results indicate that successful integration of ESD approaches is possible, but there are certain challenges: The previously mentioned separation between teaching and research during Soviet times is still reflected today in the limited research capacities of universities; thus, their capacities for developing innovative modes of knowledge coproduction need to be improved (Huisman et al 2018). Because this requires the provision of resources, the university leadership's awareness of the problem and their motivation for institutional change becomes crucial. The project was welcomed by the leadership of all partner universities; however, the prospect of continuing beyond the funding period will require a strong commitment by all decision-makers in the academic institutions.

Educators

Our study showed that most participating teachers were quite flexible and adopted transdisciplinary approaches quickly. Others remained within their traditional disciplinary comfort zones and were less open to innovations and to engaging with real-life challenges. These teachers also indicated that their individual knowledge and understanding

TABLE 2 Project timeline, activities, and their relevance to ESD priority areas.

Year	Project steps/activities	Purpose and relevance for ESD priority areas
2015	Preparatory project phase	Integration of TD approaches into the Caucasus region to support sustainable development (1) Addressing cocreation of knowledge with communities, curricula, teacher training, and youth involvement (2–5)
2016	Kickoff partner meeting	Inventory of options for implementing TD approaches at the partner universities in AM and GE (2)
	Summer School SNC-mt	Integration of TD approaches into SNC-mt activities (1) Discussion of participatory methods among all partners (2, 3) Exposing youth to TD and participatory methods (4)
	Workshop at Caucasus Mountain Forum 2016	Integration of TD approaches into SNC-mt activities (1) Cocreation of knowledge about project development (2) Exposing youth and teachers to TD and participatory methods (3, 4)
	First visits to rural case study regions	Establishing cooperation with local communities (5) Investigating the local perspective on needs (5) Familiarizing academic partners with TD methods (2, 3)
	Selection of participating teachers at ASPU and TSU and PhD scholars	Formation of interdisciplinary teaching teams (2, 3) In-depth involvement of AM and GE PhD colleagues in project-related research (2, 4)
	Teachers' workshop 1 Teachers' workshop 2	Training and exchange on TD approaches among teachers of different disciplines from AM and GE, identifying existing knowledge and needs and discussing a course format (2, 3) Involving university administration and students (2) Evaluation and feedback from workshop 1 integrated into workshop 2 (3)
2017	Visit to the case study regions as part of the teachers' workshops	Discussion with the local community about their needs, and collaboration on the course (5) Familiarizing teachers with TD methods (2, 3)
	TD case study course design, implementing changes in curricula	Integration of TD approaches into the curriculum (2) Team building and exchange within interdisciplinary teaching teams (3) Continuous communication with communities (2, 5) Informing and involving students (4)
2018	Case study course 1	Implementation of the TD case study course
	Evaluating course 1 with feedback from all participants, adjusting course 2	Reflection on the integration of the course into ASPU and TSU and its application in the context of Armenian and Georgian communities (2, 3, 4, 5)
2019	Case study course 2	
	TD summer school	Integrating TD approaches into the Caucasus region by involving young scholars from all Caucasus countries (1, 2) Involving ASPU and TSU teachers as organizers, trainers, and trainees (2, 3)
	Meetings with policymakers, scientific papers, and presentations at conferences	Linking ASPU and TSU with policymakers on national and local levels (1) Raising awareness of the international TD community about TD approaches in the Caucasus region, and enhancing networks of the Caucasus partners (2, 3)
	Workshop at Caucasus Mountain Forum 2019	Integration of TD approaches into SNC-mt (1) Raising awareness of other Caucasus universities about TD methods (1, 2)
2020	Developing project follow-up and strengthening integration of results at the institutional level	Ensuring continuation of the TD approaches at ASPU and TSU (2, 3) Enhancing national and international networks of the Caucasus partners (2)

Note: 1, policy; 2, education and training; 3, educators; 4, youth; 5, communities; TD, transdisciplinary; AM, Armenia; GE, Georgia; ESD, Education for Sustainable Development; SNC-mt, Scientific Network for the Caucasus Mountain Region; ASPU, Armenian State Pedagogical University; TSU, Tbilisi State University.

of scientific quality was not valued enough within the project.

Participation in the case study courses helped some teachers to critically reflect on their curricula and teaching methods. For others, it was challenging to change from the

role of an instructor to that of a facilitator who guides students during the course. These findings are in line with results from similar studies in other parts of the world (Steiner and Posch 2006; Hansmann et al 2009; Balsiger 2015; Pearce et al 2018).

TABLE 3 Contribution of the project outcomes to the priority areas of the UNESCO ESC framework. (Table continued on next page.)

Priority areas	Approaches	Successes	Challenges
Policy	Presenting project outcomes to the Ministries of Education and Science (AM, GE)	The TD concept was integrated into the discourse and dialogues were initiated with representatives of the Ministries of Education and Science (AM, GE).	Initiated projects are often discontinued after changes in leadership. Political instability leads to uncertainty with respect to uptake of recommendations. Universities had little involvement of in national policy.
	Sharing the project experience on national, regional, and international levels	Project results and experience were reflected in the documents of the Scientific Network for the Caucasus Mountain Region. Interest in TD approaches was expressed by Azerbaijan universities.	Integration of TD approaches lacked funds and administrative support in other universities in the region.
Education and training	Involving university leadership and teachers in the process of integration of TD approaches into the university curricula	TD methods were integrated into the curricula of several faculties of ASPU and TSU. Support came from university leadership (AM). Successful implementation of TD case-study courses, continuous cooperation among different faculties, improved teaching capacities, and integration TD methods in their scientific work occurred.	Some university leaders find TD approaches “nonscientific.” Low salaries and the lack of relevant funds decrease the motivation of many teachers to engage in TD research and teaching. Continuous facilitation is needed by the Austrian partners to ensure project follow-up.
	Creating opportunities for international and intercultural exchange in the TD field	The case study course in Georgia was integrated with a BOKU course. TD summer school brought together teachers from BOKU and the Caucasus region. Erasmus+ funds supported student exchange.	More time is required for linking additional complementary activities.
	Communicating with case-study communities	Cooperation established between university teachers and community members continues.	The fieldwork lacked time and funds.
	Raising awareness on the national level about TD approaches and community issues	The raised profile of ASPU as an innovative university increased the number of applicants. Current societal problems in mountainous regions are integrated into study materials, theses (AM, GE).	Individual motivation and mobility of key people were lacking.
Educators	Facilitating the formation of interdisciplinary teachers' teams	Established interdisciplinary and TD cooperation as a new practice in AM and GE universities led teachers to mutual learning and team teaching, joint research, and study material development.	Uneven power relationships occurred between the teachers and project coordinators. Disciplinary inputs were prioritized subjectively. Teachers lacked previous interdisciplinary and TD cooperation experience.
	Supporting teachers in adapting to TD case study course implementation	Practical implementation of TD case-study courses led teachers to critically reflect on their teaching practices and curricula, making them more community oriented.	The hierarchical relationship with students challenges teachers' role as facilitators. Difficulties occurred in adapting TD approaches to the community context.
	Facilitating access to publications on TD approaches and sustainability, and initiating exchange	Teachers' acquaintance improved with literature on TD approaches and sustainability. Selected materials were adapted and translated to Armenian and Georgian languages.	Teachers lacked experience with different styles and structures of scientific publications and had challenges in understanding the content of peer-reviewed publications.

TABLE 3 Continued. (First part of Table 3 on previous page.)

Priority areas	Approaches	Successes	Challenges
Youth	Implementing students working in interdisciplinary groups, facilitated by teachers	Students' motivation increased to engage in TD approaches due to flattened hierarchy with the teachers and interdisciplinary collaboration.	Teachers' traditional hierarchical attitudes prevented students from expressing their opinions.
	Integrating students into practical research with local community members, and allowing students freedom to make decisions	Students developed new competences: Complex understanding of sustainable development challenges Communication with peers from other disciplines and outside of academia Interactive presentations and group works (soft skills).	Locals perceived students as not competent because of their lack of relevant knowledge. Students lacked familiarity with sustainability competences and related methods. Students faced uncertain situations and unclear tasks during fieldwork (students are used to receiving predefined tasks).
	Increasing students' research, publications, and conference presentation capacities	Students' participated in national and international conferences (eg ISCONTOUR, Caucasus Mountain Forum) and published in scientific journals.	Funds for supporting student research activities are often limited to the project funds. Lack of research experience among some teachers limits their ability to support students.
	Increasing potential for a multiplier effect through the students	15 ASPU student participants currently work as teachers and share their knowledge in rural schools.	Working as teachers and in rural communities is not attractive to young people.
Communities	Initiating university–community collaboration, and focusing teaching and research on community needs	Knowledge coproduction enhanced trust of locals toward academics. Teachers and students recognized the case-specific knowledge of community members. Communication was facilitated between the community and the administration (GE). Small enterprises received financial support from ASPU following the TD case study course (AM). Topics of master's theses became societally oriented.	Locals often expect financial support. Poor living conditions make it difficult to prioritize sustainability. Locals lacked the time to participate. Some community members considered case studies more beneficial for the students than as making a contribution to communities.
	Considering mountain regions' specialty and the complexity of community sustainability	Future scenarios recommended by the students fit well into the context of the communities. Practical recommendations appropriately addressed community problems and needs.	The local situation needs to be examined more carefully. Reluctance exists among community members to accept innovative ideas.

Source: UNESCO 2019: Annex II, pp 8–9.

Note: TD, transdisciplinary; AM, Armenia; GE, Georgia; ESD, Education for Sustainable Development; ASPU, Armenian State Pedagogical University; TSU, Tbilisi State University; BOKU, University of Natural Resources and Life Sciences Vienna; ISCONTOUR, International Student Conference in Tourism Research.

Youth

The action area on youth in the UNESCO framework aims to transform young people into future decision-makers (UNESCO 2019). Many graduates from the partner universities (in particular from ASPU) work as schoolteachers and can therefore be agents of change, promoting sustainability in the national education sector.

Inter- and transdisciplinary approaches can contribute to youth engagement in sustainability processes (Balsiger et al 2017; Barth et al 2019; UNESCO 2019). Our analysis showed that the case study course provided a great opportunity for the students to enhance their sustainability-related competences, as highlighted by Wiek et al (2011). In particular, interviewed students referred to the need for collaboration with stakeholders and integration of different

types of knowledge (interpersonal competency), and many demonstrated normative competency when discussing sustainable and unsustainable development. Many students displayed systems thinking competency when working on systems and network analyses, as well as anticipatory competence when envisioning potential scenarios and discussing them with local stakeholders. Strategic thinking was used to some degree when planning for specific interventions to address sustainable tourism challenges. We perceived more advanced systems and strategic thinking among TSU students, probably because of differences in the respective education curricula and because they were further ahead in their degree programs than those from ASPU.

For some students, this was also the first opportunity to work with peers from other departments. Initially, some students found the unusual freedom to develop their ideas and the absence of predefined tasks from teachers challenging. Overcoming such uncertainties raised their decision-making capacities. In addition, cooperation and knowledge coproduction with the local population equipped the students with soft skills that are an important part of ESD (Wiek et al 2011; Bürgener and Barth 2018). Although students appreciated working in a team with teachers, they were also challenged to overcome traditional hierarchical relationships, which are still typical of many universities in the Caucasus region.

Communities

The project was a pioneering initiative in the Caucasus region to integrate rural mountain communities in transdisciplinary knowledge coproduction as part of academic teaching. The 4 case study courses conducted in different locations proved to be a useful approach to understanding the local communities' sustainability issues. Implementing the courses in regions with different development statuses was helpful to evaluate the universities' research capacities and potential to contribute to the communities. Authorities and local residents, particularly in rural regions where tourism is a new development, were open to involving universities as partners to gain new ideas. However, in all 4 cases, the preparation phase was not long enough to engage a larger number of local stakeholders and to prepare students more thoroughly for the specific development challenges of the individual communities. As a consequence, the results of a 2-week field visit could not contribute substantially to transformation toward sustainability. Rather, they only touched on certain aspects and engaged a limited number of stakeholders (although, during all 4 courses, the intentions and importance of ensuring benefits to the local communities were explicitly discussed). In line with experiences from other studies (Tilbury 2011; Mochizuki and Yarime 2016; Rieckmann et al 2017), we found that working toward implementation of ideas generated during the courses would need longer-term cooperation than can be achieved within the context of a teaching project. In both countries, there were attempts to link the case study courses to existing regional development stakeholders and processes, such as the European Neighbourhood Programme for Agriculture and Rural Development. However, practical issues, such as conflicting time frames and changes in program management, impeded success (although universities in both countries continue to develop networking and plan collaborations for long-term partnership with communities).

Conclusions and recommendations

The CaucaSusT project opened a pathway to university–community collaboration in the Caucasus mountain region and initiated stronger integration of ESD into activities of partner universities. The UNESCO ESD framework for 2030, along with its priority areas, was a useful tool to reflect on the implementation and results of the transdisciplinary teaching and research project.

Based on the lessons learned, and considering the importance of achieving better outcomes for university–community collaboration in the Caucasus region, we have developed several recommendations. We identified features, differentiated for the range of stakeholder groups, that are critical to implementing the ESD framework within the higher-education sector in Armenia and Georgia. To enhance the likelihood of adoption and hence success of ESD through integration of transdisciplinary case study teaching and learning approaches, interventions should do the following:

- Increase the prominence of the Scientific Network for the Caucasus Mountain Region. This would enhance its role in encouraging the integration of ESD into the Caucasus universities by raising awareness about the importance of ESD on the policy level and supporting exchange of experience among its members. It would also contribute to the other ESD framework features.
- Motivate university leadership to include references to SDGs in their strategic documents and to support interdisciplinary and transdisciplinary research. This could be increased by raising awareness (including with the help of SCN-mt) and cooperating with the ministries responsible for implementing the ESD framework.
- Encourage strategic planning to ensure continuous access to funds by departments to address societally relevant issues, field study research, and long-term collaboration with mountain communities, independent from project time frames.
- Support teachers in pursuing educational approaches that enhance sustainability competences among the students, including integration of practical knowledge of Caucasus rural residents. Teacher motivation can be increased by providing access to international training, acknowledging their professional growth, and possibly increasing salary benefits for projects.
- Provide supporting conditions that increase the enthusiasm of students, enable them to work with communities throughout their studies, and help them to choose bachelor's or master's thesis topics based on community issues.
- Consider carefully the needs of the potential case study communities in the Caucasus mountain region with respect to students' and teachers' research capacities. This can be facilitated by better preparation before the field studies, including desk research, preliminary field visits, and interaction with stakeholders, as well as clear guidance on time management.
- Integrate nonacademic experts from the Caucasus region and members of local nongovernmental organizations into teaching and knowledge coproduction processes, duly recognizing them as stakeholders experienced in working with local communities.
- Continue collaborative work with the same communities over a longer period to cocreate tangible outcomes. Trust building with local activist youth can be fundamental to enabling such long-term cooperation.

We believe that ESD is a way to contribute to sustainability in the Caucasus countries. It is crucial not only to adopt sustainable development approaches at the national and local levels but also to ensure their practical

implementation in real-life cases. Close collaboration between universities and communities will foster the transformation of attitudes of academic and nonacademic stakeholders toward a sustainable future in the Caucasus mountain region.

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REFERENCES

- Balsiger J.** 2015. Transdisciplinarity in the class room? Simulating the co-production of sustainability knowledge. *Futures* 65:185–194.
- Balsiger J, Förster R, Mader C, Nagel U, Sironi H, Wilhelm S, Zimmermann AB.** 2017. Transformative learning and education for sustainable development. *GAIA—Ecological Perspectives for Science and Society* 26(4):357–359.
- Balsiger J, Shatberashvili N, Salukvadze J, Somuncu M, Tarkhnishvili D, Machavariani M, Dzeladze M, Gevorgyan A, Abbasov R, Shayesteh K, et al.** 2019. *Caucasus Regional Research Agenda 2020–2030: Key to Sustainable Regional Development*. Tbilisi, Georgia: Printarea.
- Barth M, Lang DJ, Michelsen G.** 2019. Transdisciplinary learning to foster sustainable development: Institutionalizing co-engaged south-north collaboration. *GAIA—Ecological Perspectives for Science and Society* 28(4):382–385.
- Bürgener L, Barth M.** 2018. Sustainability competencies in teacher education: Making teacher education count in everyday school practice. *Journal of Cleaner Production* 174:821–826.
- Enengel B, Muhar A, Penker M, Freyer B, Drlik S, Ritter F.** 2012. Co-production of knowledge in transdisciplinary doctoral theses on landscape development—An analysis of actor roles and knowledge types in different research phases. *Landscape and Urban Planning* 105(1–2):106–117.
- Fam D, Neuhauser L, Gibbs P, editors.** 2018. *Transdisciplinary Theory, Practice and Education*. Cham, Switzerland: Springer.
- Gleeson EH, von Dach SW, Flint CG, Greenwood GB, Price MF, Balsiger J, Nolln A, Vanacker V.** 2016. Mountains of our future earth: Defining priorities for mountain research—A synthesis from the 2015 Perth III conference. *Mountain Research and Development* 36(4):537–548.
- Gratzer G, Muhar A, Winiwarter V, Lindenthal T, Radinger-Peer V, Melcher A.** 2019. The 2030 agenda as a challenge to life sciences universities. *GAIA—Ecological Perspectives for Science and Society* 28(2):100–105.
- Hansmann R, Crott HW, Mieg HA, Scholz RW.** 2009. Improving group processes in transdisciplinary case studies for sustainability learning. *International Journal of Sustainability in Higher Education* 10(1):33–42.
- Huisman J, Smolentseva A, Froumin I, editors.** 2018. *25 Years of Transformations of Higher Education Systems in Post-Soviet Countries: Reform and Continuity*. Cham, Switzerland: Springer.
- Karatzoglou B.** 2013. An in-depth literature review of the evolving roles and contributions of universities to education for sustainable development. *Journal of Cleaner Production* 49:44–53.
- Klein JT, Grossenbacher-Mansuy W, Häberli R, Bill A, Scholz RW, Welti M, editors.** 2001. *Transdisciplinarity: Joint problem solving among science, technology, and society. An effective way for managing complexity*. Berlin, Germany: Springer.
- Lang DJ, Wiek A, Bergmann M, Stauffacher M, Martens P, Moll P, Swilling M, Thomas CJ.** 2012. Transdisciplinary research in sustainability science: Practice, principles, and challenges. *Sustainability Science* 7(1):25–43.
- Maxwell JA, Chmiel M.** 2014. Generalization in and from qualitative analysis. In: Flick U, editor. *The SAGE Handbook of Qualitative Data Analysis*. London, United Kingdom: SAGE, pp 540–553.
- McKeown R, Hopkins CA, Rizi R, Chrystalbridge M.** 2002. *Education for Sustainable Development Toolkit*. Knoxville, TN: Energy, Environment and Resources Center, University of Tennessee Knoxville.
- Mochizuki Y, Yarime M.** 2016. Education for sustainable development and sustainability science: Re-purposing higher education and research. In: Barth M, Michelsen G, Rieckmann M, Thomas I, editors. *Routledge Handbook of Higher Education for Sustainable Development*. London, United Kingdom, and New York, NY: Routledge, pp 11–24.
- Muhar A, Vilsmajer U, Glanzer M, Freyer B.** 2006. Initiating transdisciplinarity in academic case study teaching. *International Journal of Sustainability in Higher Education* 7(3):293–308.
- Nicolescu B.** 2018. The transdisciplinary evolution of the university condition for sustainable development. In: Fam D, Neuhauser L, Gibbs P, editors. *Transdisciplinary Theory, Practice and Education*. Cham, Switzerland: Springer, pp 73–81.
- Pearce B, Adler C, Senn L, Krüttli P, Stauffacher M, Pohl C.** 2018. Making the link between transdisciplinary learning and research. In: Fam D, Neuhauser L, Gibbs P, editors. *Transdisciplinary Theory, Practice and Education*. Cham, Switzerland: Springer, pp 167–183.
- Pohl C, Krüttli P, Stauffacher M.** 2017. Ten reflective steps for rendering research societally relevant. *GAIA—Ecological Perspectives for Science and Society* 26(1):43–51.
- Rieckmann M, Mindt L, Gardiner S.** 2017. *Education for Sustainable Development Goals. Learning Objectives*. Paris, France: UNESCO [United Nations Educational, Scientific and Cultural Organization].
- Scholz RW, Lang DJ, Wiek A, Walter AI, Stauffacher M.** 2006. Transdisciplinary case studies as a means of sustainability learning. *International Journal of Sustainability in Higher Education* 7(3):226–251.
- Scholz RW, Tietje O.** 2002. *Embedded Case Study Methods: Integrating Quantitative and Qualitative Knowledge*. Thousand Oaks, CA: SAGE.
- Segalás Coral J, Tejedor Papell G.** 2016. The role of transdisciplinarity in research and education for sustainable development. In: Lambrechts W and Hindson J, editors. *Research and Innovation in Education for Sustainable Development*. Vienna, Austria: ENSI [Environment and School Initiatives], pp 197–210.
- Steiner G, Posch A.** 2006. Higher education for sustainability by means of transdisciplinary case studies: An innovative approach for solving complex, real-world problems. *Journal of Cleaner Production* 14(9–11):877–890.
- Steinfeld JI, Mino T.** 2009. Education for sustainable development: The challenge of trans-disciplinarity. *Sustainability Science* 4:1.
- Tilbury D.** 2011. Are we learning to change? Mapping global progress in education for sustainable development in the lead up to “Rio plus 20.” *Global Environmental Research* 14(2):101–107.
- UNESCO [United Nations Educational, Scientific and Cultural Organization].** 2019. *Framework for the Implementation of Education for Sustainable Development (ESD) Beyond 2019*. Paris, France: UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000370215>; accessed on 9 April 2020.
- Vare P.** 2018. A rounder sense of purpose: Developing and assessing competences for educators of sustainable development. *Form@re—Open Journal Per La Formazione in Rete* 18(2):164–173.
- Vienni Baptista B, Rojas-Castro S.** 2020. Transdisciplinary institutionalization in higher education: A two-level analysis. *Studies in Higher Education* 45(6):1075–1092.
- VNR [Voluntary National Review].** 2017. *First Voluntary National Review on Implementation of the Sustainable Development Goals*. Tbilisi, Georgia: VNR. <https://sustainabledevelopment.un.org/content/documents/10680SDG%20Voluntary%20National%20Review%20Georgia-.pdf>; accessed on 9 April 2020.
- VNR [Voluntary National Review].** 2018. *SDG Implementation. Voluntary National Review (VNR) Armenia: Transformation Towards Sustainable and Resilient Societies. Report for the UN High-Level Political Forum on Sustainable Development*. Yerevan, Armenia: VNR. https://sustainabledevelopment.un.org/content/documents/19586Armenia_VNR_2018.pdf; accessed on 9 April 2020.
- Wiek A, Withycombe L, Redman CL.** 2011. Key competencies in sustainability: A reference framework for academic program development. *Sustainability Science* 6(2):203–218.

Supplemental material

APPENDIX S1 Project activities, methods, and outputs and their relevance to ESD priority areas.

APPENDIX S2 Contribution of the project outcomes to the priority areas of the UNESCO ESD framework.

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