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Teaching applied landscape ecology in interdisciplinary and intercultural student groups. Experiences from a 10-years study abroad program

Abstract

Against the background of the global environmental crises, landscape ecology and related disciplines become increasingly important. Higher education should therefore contribute to the development of experts and potential stakeholders who have not only scientific skills but also interdisciplinary, intercultural, and communication skills to be applied in diverse contexts throughout the world. A 10-years program, funded by the Stemmler Foundation within the German Stifterverband supported studies abroad with excursions, summer schools, and workshops with students from the Bachelor, Master and doctoral level of various study programs. Students from 39 countries from all over the world benefitted from this program. In summer schools, particularly ecosystem restoration and nature conservation were addressed in lectures and during field trips as well as with students' input of case studies from their country of origin. During international excursions to various countries, land use and culture, land-use history, and sustainable development were topics, with close interaction with local land users and stakeholders. Bridging the natural with the social sciences was achieved by involving respective experts as well as stimulate students to cross-disciplinary thinking and judgements. Master students were offered exploratory learning environments abroad within ongoing landscape ecological research projects for their thesis. Students' feedback reflect an overall successful approach, which prepared students for the global environmental challenges with hard and soft skills.

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Dublin Descriptors, exploratory learning, land use, restoration ecology, social sciences

1 Introduction

Against the background of the global environmental problems, applied landscape ecology is increasingly gaining importance for the provision of environmental scientific facts, practical guidelines, and solution scenarios for sustainable land use (Potschin and Haines-Young 2006, Mayer et al. 2016). In particular, ecosystem restoration has been put on the global agenda, as large parts of the earth's surface are degraded or even not suitable for land use anymore (Daily 1995, Gibbs and Salmon 2015, Olsson et al. 2019). Consequently, in 2019, the United Nations General Assembly declared 2021-2030 the UN Decade on Ecosystem Restoration. Additionally, the 17 Sustainable Development Goals (SDGs) introduced by the UN in 2015 explicitly point on ecosystem restoration for the achievement of several of the 169 specific targets (UN 2020).

The global dimension of environmental problems such as, e.g. climate change, loss of biodiversity, deforestation, soil erosion, desertification, eutrophication, and water pollution calls for international action in science, land-use practice, environmental policy as well as higher education. Particularly, the SDG 4 (Quality Education) with its target "acquisition of knowledge and skills needed to promote sustainable development through, e.g. education for sustainable development and sustainable lifestyles" as well as SDG 12 (Responsible Consumption and Production) with its target to "ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature" (UN 2020) refer to environmental education and education for sustainability, respectively.

Higher education is considered as one of the primary policy responsibilities within the European Union (Keeling 2006). Starting in 1999, 29 European governments agreed on reforming higher education in order to establish a "European Higher Education Area" of compatible national systems, known as the Bologna Process (Bologna Declaration 1999). One of the main aims of this European initiative was the introduction of the three-cycle degree structure to European higher education systems with the progression from the Bachelor to the Master and doctoral degree. By the use of study credits (ECTS), which can be accumulated during studies at different institutions and transferred, mobility should be enhanced between higher education institutions and countries and across different forms of studies (Cardoso et al. 2007, Klemenčič 2019). Since 2003, common standards have been developed for quality assurance in higher education (ENQA 2009). The so-called Dublin Descriptors serve as a qualifications framework of the European Higher Education Area and "offer generic statements of typical expectations of achievements and abilities associated with awards that represent the end of each of a (Bologna) cycle or level" (ECA 2014). These descriptors include the five components (1) knowledge and understanding, (2) applying knowledge and understanding, (3) making judgements, (4) communication, and (5) learning skills.

Students studying landscape ecology, environmental sciences, and related study programs have to be prepared to "think globally and act locally" in their particular socio-economic and cultural environment. In order to promote internationalization, interdisciplinarity, and intercultural skills in environmental higher education, a study-abroad program was established at the Free University of Bozen-Bolzano. Between 2009 and 2019, university courses of different teaching formats (e.g. excursions, summer schools) were organized which brought students to various locations in the world and discuss topics of basic and applied landscape ecology. A particular focus was laid on ecosystem restoration and nature conservation. This program particularly focused on extra-curricular activities, which were not part of the normal study program. It was financially supported by the Stemmler Foundation within the German Stifterverband. The program followed four main goals:

1. Promotion of mobility within the European Bologna Process and, in particular, the student exchange between Germany and Italy,
2. teaching applied landscape ecology with formats which strongly involve students with interactive learning and discussion,
3. enhancement of intercultural skills within international student groups, and the

4. promotion of mobility and the creation of an exploratory learning environment for master students within ongoing landscape ecological research projects.

Instruments and teaching formats of this international cooperation between Germany and Italy were international excursions, summer schools, and workshops as well as the involvement of master students into ongoing research projects within their master thesis. Thus, a supplement to the normal study program with its traditional formats could be established. Particularly for the higher education in landscape ecology, geography, environmental sciences, agriculture, forestry and related disciplines with a strong link of basic science and practice, excursions are recommended as an important teaching format (Michiko Hama et al. 2005, Chiodo 2013). Excursions do not only enhance practical knowledge but also offer direct contacts to various stakeholders and land users. Summer schools were chosen as an "intensive teaching format" (Davies 2006). The summer schools promote particularly active learning and practices of shared expertise and can offer innovative pedagogy in international courses, including multicultural assembly of participants and supporting multifaceted knowledge sharing and the development of cultural expertise (Lakkala et al. 2017).

This paper gives an overview on the various activities and experiences of the study-abroad program. Teaching content, addressees, applicant selection, internationalization, and interdisciplinary approaches are described. Thus, the experiences from the past 10 years are reflected. The discussion will relate to the particular goals stated above, i.e. mobility between countries, internationalization, interdisciplinarity, and intercultural exchange. It will be concluded with students' feedback during this 10-years program and a general reflection of experiences, which can be transferred into other contexts of higher education in landscape ecology.

2 The study-abroad program: Background and course formats

In 2008, the Free University of Bozen-Bolzano applied for funding from the Stemmler Foundation (German Stifterverband) for a program, which followed the above-mentioned goals, particularly enhancing international mobility. The course formats within this study-abroad program comprised summer schools, excursions, and workshops. Additionally, master students were supported to spend a period abroad for their research on their thesis in ongoing projects. The funding enabled students particularly from the partner universities Bozen, Greifswald, and Hildesheim to participate in these activities abroad. The international excursions had a duration of up to 10 days, including a 1-day preparatory seminar with an introduction to the country and the excursion topics. The summer schools lasted around 9 days and comprised lectures, student presentations, and short field trips. Additionally, students had to work on short-term projects in small groups, e.g. on the restoration of a specific habitat near the summer school location. The workshops had a duration of 3

Table 1: Components of the study-abroad program with duration, teaching formats and specific activities, and eventual credits achieved.

Program component	**Duration [days]**	**Teaching formats and specific activities**	**ECTS**
Summer school	8-10	Lectures, field trips, student presentations, student projects	Yes, depending on the study program as optional course with a final written exam
International excursions	5-10	Preparatory seminar with introductory lectures, full-day trips, stakeholder meetings, student presentations in the field	No
Workshops	3-5	Lectures, discussion panels, practical exercises	No
Master students' research period abroad	10-40	Lab or field work for their master thesis within ongoing research projects, data analysis, preparation of a manuscript for publication	Yes (master thesis)

Table 2: Activities carried out within the study-abroad program hosted by the Free University of Bozen-Bolzano between 2009 and 2019, with location, duration of the activity, participating study programs, total number N of students participating (m = male, f = female students), and countries of origin of the student participants.

Year	Program activity	Location	Duration [days]	Study programs[1]	N (m/f)	Countries of origin
2009	Summer school	Bozen (N Italy)	8	AGR, LENC	22 (7/15)	Belarus, China, Germany, Italy, Nepal, Pakistan, Turkmenistan
2009	Excursion	NW China	9	ENV, LAND, LENC	17 (5/12)	China, Germany, Italy
2010	Summer school	Bozen (N Italy)	9	AGR, LENC	27 (12/15)	Brazil, China, Croatia, Germany, India, Italy, Kazakhstan, Poland
2010	Workshop "Sustainable Land Use in NW China"	Bozen (N Italy)	3	AGR, LENC, PhD students	18 (10/8)	China, Germany, Italy
2011	Summer school	Malkocin (Poland)	10	AGR, FS, LENC	16 (10/6)	Chile, China, Finland, Germany, India, Indonesia, Italy, Poland, Turkmenistan, Uzbekistan, Vietnam
2011	Excursion	Sicily (Italy)	5	AGR, FS, LENC	12 (4/8)	Brazil, China, Croatia, Czech Republic, Germany, India, Italy, Slovenia, Uzbekistan
2011	Workshop "Multivariate Methods in Landscape Ecology"	Bozen (N Italy)	5	LENC, PhD students	15 (7/8)	Austria, China, Germany, Ghana, Italy, Turkmenistan, Uzbekistan, Vietnam
2012	Excursion	Guatemala	10	AGR, FS, LENC, PhD students	10 (5/5)	Croatia, Guatemala, Italy, Uzbekistan
2012	Summer school	Bozen (N Italy)	9	AGR, ENCS, LENC	17 (10/7)	Germany, Ghana, Italy, Peru, Romania
2012	Workshop "Research Cooperation China-Europe	Bozen (N Italy)	4	PhD students, Postdocs	15 (10/5)	China, Germany, Italy
2013	Excursion	Sicily (Italy)	5	AGR, FS, LENC	18 (10/8)	Austria, Belgium, Czech Republic, Germany, Italy, Slovakia
2013	Summer school	Bozen (N Italy)	8	AGR, ENCS, LENC	19 (7/12)	Argentina, Germany, Ghana, Italy, Madagascar, Romania, Thailand
2014	Summer school	Malkocin (Poland)	9	AGR, LENC, PhD students	21 (12/9)	Bangladesh, Canada, Germany, India, Iran, Italy, Poland, Sierra Leone, Thailand, USA, Vietnam
2015	Summer school	Matera (Italy)	8	AGR, COMM, FES, FS, LENC, PhD students	21 (9/12)	Bangladesh, China, Colombia, Czech Republic, Germany, Indonesia, Italy, Kenya, Mexico, Spain, Taiwan
2016	Excursion	Thailand	8	AGR, ES, LENC	15 (5/10)	Columbia, Germany, Ghana, Italy, Romania, Thailand
2019	Excursion	Peru	10	COMM, EMMA, ENCS, END, GEO, LENC	19 (6/13)	Germany, Italy, Peru, USA

[1] Study programs AGR = B.Sc. Agricultural Science (Free University of Bozen-Bolzano, Italy), COMM = Communication Sciences and Culture (Free University of Bozen-Bolzano), EMMA = M.Sc. Environmental Management of Mountain Areas (Free University of Bozen-Bolzano), ENCS = M.Sc. Environment, Nature Conservation, and Sustainability (University of Hildesheim, Germany), END = M.Sc. Environmental Development (PUCP, Lima, Peru), ENV = M.Sc. Environmental Management (Xinjiang University, China), ES = M.Sc. Environmental Science (University of Chiang Mai, Thailand), FES = Forest and Environmental Sciences (University of Basilicata, Italy), FS = International M.Sc. Fruit Science (Universities of Bozen-Bolzano/Italy, Ljubljana/Slovenia, and Brno/Czech Republic), GEO = B.Sc. Geography (PUCP), LAND = M.Sc. Landscape and Remote Sensing Ecology (Xinjiang University, China), LENC = M.Sc. Landscape Ecology and Nature Conservation (University of Greifswald, Germany)

to 5 days, with lectures, discussion panels, and - in the case of the workshop on "Multivariate Methods in Landscape Ecology" – also practical exercises. An overview of these various formats is given in Table 1. On principle, the course formats were open to the bachelor, master, and doctoral level.

All international excursions and the workshops were extra-curricular which means that the students did not receive credits according to the European Credit Transfer and Accumulation System (ECTS; EC 2015). Depending on the respective study programs (cp. Table 2), some students could receive credits for the participation in the summer schools and thus an optional course within their programs after a written course exam. In all cases, students received a confirmation for their participation with data on course content, duration, and their specific contribution (e.g. course presentation).

3 Results

The main study programs addressed within this international program were the B.Sc. Agricultural Science (AGR) and M.Sc. Environmental Management of Mountain Areas (EMMA) at the Free University of Bozen-Bolzano in Northern Italy, the M.Sc. Landscape Ecology and Nature Conservation (LENC) at the University of Greifswald in NE Germany, and the M.Sc. Environment, Nature Conservation, and Sustainability (ENCS) at the University of Hildesheim in NW Germany. Particularly the EMMA and LENC program are highly international with students from many countries from all over the world because the whole program is taught in English. Additionally, students from the host country of the courses contributed to the internationality of the student group such as, e.g. students from the University of Szczecin within the summer schools in Malkocin (NW Poland) in 2011 and 2014 and from the Pontifical Catholic University of Peru (PUCP) in Lima in the excursion to Peru in 2019.

Since 2009, 6 international excursions to China, Guatemala, Italy, Peru, and Thailand, 7 summer schools in Italy and Poland, and three workshops on multivariate methods in landscape ecology, sustainable land use in NW China, and European-Chinese research cooperation, respectively, have been carried out within the study abroad program (Table 2). Additionally, master students were financially supported to go abroad for their master thesis within ongoing landscape ecological research projects. The funding of the students comprised travel costs, accommodation, and fees during the excursions (e.g. entrance fees for national parks). Accordingly, the financial situation of the student applicants could be avoided as a filter for participation. In all cases, the host of the summer school or excursion contributed with co-funding to the activity, which comprised direct payment of expenses or the use of local facilities needed for the performance. This win-win situation could be achieved because students from the host could participate in the program.

For their application to a particular program activity (e.g. excursion), the students had to submit their curriculum vitae and a motivation letter which stated their particular interest in the offered activity. The content and quality of the motivation letter was crucial for the selection. Criteria of assessment were environmental knowledge in theory and practice gained so far, internships, interdisciplinary skills, working experiences, and the particular motivation for the target country and thematic topics of the teaching activity. In the case of the excursions, individual interviews with the applicants were performed.

In addition to the excursions, summer schools, and workshops, 9 master students were integrated in ongoing research projects with their master theses. The topics comprised various fields of vegetation, landscape, and restoration ecology and had implications for land-use practice. Most of these master theses were published by the respective research team (Table 3). As an active learning approach, it thus supported students' self-learning skills and facilitated learning outside the classrooms as exploratory and experimental learning (Gogus and Arikan 2008, Fry et al. 2009).

Interdisciplinary education within the excursions and summer schools was promoted by three approaches:

Table 3: Master theses integrated into the study-abroad program, which were published by the research team; order according to publication year.

Authors	**Year**	**University of the master student**	**Master thesis' topic**
Mirschel et al.	2011	University of Greifswald	Natural tree rejuvenation in anthropogenic pine (*Pinus sylvestris* L.) forests of NE Germany
Radtke et al.	2013	University of Göttingen	Influence of forest management on the invasion of Tree of Heaven (*Ailanthus altissima* (Mill.) Swingle) and Black locust (*Robinia pseudoacacia* L.) in deciduous forests of the Southern Alps
Skowronek et al.	2013	TU Freiberg	Regeneration potential of floodplain forests in N Italy under the influence of non-native tree species
Ambraß et al.	2014	University of Göttingen	Invasion and management of Tree of Heaven (*Ailanthus altissima* (Mill.) Swingle) and Black locust (*Robinia pseudoacacia* L.) in coppice forests of the Southern Alps
Nagler et al.	2015	University of Innsbruck	Impact of management of larch grasslands on carbon stocks in the European Alps
Osei et al.	2018a	University of Greifswald	Tree species' performance for reforestation in Ghana's High Forest Zone
Osei et al.	2018b	University of Greifswald	Socio-economic determinants for reforestation of smallholder plantations in Ghana
Osei et al.	2019	University of Greifswald	Socio-economic and ecological benefits of bamboo and trees in Ghana

1. Integration of experts from various disciplines of the natural (e.g. landscape ecology, agricultural sciences) as well as the social sciences (e.g. anthropology, tourism studies),
2. participation of students from study programs in the natural science (e.g. landscape ecology, agricultural science) as well as the social sciences (e.g. communication science, landscape architecture), and
3. providing students with topics for their contribution to the teaching activities from the natural as well as the social sciences.

Within the summer schools and additionally to vegetation and landscape ecology, environmental ethics was involved. Ethical considerations of practical landscape ecology, nature conservation, and ecosystem restoration were presented by K. Ott (until 2012, University of Greifswald, afterwards University of Kiel) and discussed with the students (e.g. Ott 2010, Ott et al. 2017). This was based on the so-called "Greifswald Approach" of interdisciplinary and integrative landscape ecology with the core disciplines landscape ecology, landscape economics, environmental ethics, and international nature conservation, which was introduced by M. Succow at the University of Greifswald in 1996. This approach became the leading idea of the international M.Sc. Landscape Ecology and Nature Conservation (LENC) and is reflected, particularly by the interdisciplinary approach to restoration ecology (Zerbe and Wiegleb 2009, Zerbe 2019) and the integrative research on the ecology, function, restoration and wise use of peatland ecosystems (Succow and Joosten 2001, Wichtmann et al. 2016, Jurasinski et al. 2020).

On the excursion to Peru in 2019 (Table 2), for example, social scientists (e.g. anthropology, tourism studies) were involved as teachers and the students had to prepare topics with regard to the social as well as natural sciences in their presentations (Table 4). These presentations were partly held in an introductory seminar at the PUCP in Lima and partly on-site, e.g. in the former Inca centre Cusco in the High Andes, within an afforestation of *Eucalyptus* trees, at a mining site in the mountains or at the coast addressing fishery. In this way, students became experts for their specific topic during the excursion. With this approach, it was aimed at a perception of landscape, which takes the physical nature as well as culture and human impact into account. Thus, it is also in accordance with the definition of landscape by the European Landscape Convention (Council of Europe 2000: chapter 1, art. 1) which "means an

Table 4: Topics which were presented by the students during the interdisciplinary excursion to Peru in 2019, addressing the social as well as the natural sciences, partly held during an introductory seminar at the PUCP in Lima and partly on-site on the excursion route.

No.	Presentation topic	Location
1.	History of Lima	PUCP
2.	Political corruption and its effect on land use and ecosystems	PUCP
3.	Migration (domestic, international) in Peru	PUCP
4.	Environmental migration and (re)configuration of human settlements: Implications for territorial planning	PUCP
5.	Minorities in Peru	PUCP
6.	*Sendero Luminoso* and the destruction of Ayacucho	PUCP
7.	Peru in the global system and neo-colonialism	PUCP
8.	Animal husbandry and grazing effects in the Amazonian basin	PUCP
9.	Natural hazards in Peru and its effects on land-use development	on-site
10.	Fair trade and eco-tourism	on-site
11.	Cultural history of Cusco with regard to the Inca empire and Spanish colonialism	on-site
12.	Agriculture and deforestation in the Andean region	on-site
13.	*Eucalyptus* und *Pinus* afforestations in Peru	on-site
14.	Nazca lines and culture	on-site
15.	Mining in the Peruvian Andes with particular emphasis on Las Bambas in Abancay	on-site
16.	Cash crops and subsistence farming	on-site
17.	Quechua culture	on-site
18.	Fishery in Peru with particular emphasis on Pucusana	on-site
19.	Agroforestry in Peru and its potential for ecosystem restoration	on-site

area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors". In particular on the excursion to Peru in 2019, the spirit of Alexander von Humboldt (1769-1859) guided our way at his 250th birthday, as he introduced a holistic view on landscapes, integrating the natural environment and human impact (see the Kosmos lectures from A. v. Humboldt); he defined landscape as the "total character of a region of the Earth" ("Totalcharakter einer Erdgegend"; Fränzle 2001).

During the excursions, the students had to write a protocol on the single day trips. They were asked to not only provide information on the facts learnt during the day but also give statements on their personal and individual perceptions. These records were compiled into a comprehensive report, which was handed out to all participants after the excursion.

In the summer schools, a particular focus was laid on case studies presented by the students referring to their country of origin. Thus, different cultural backgrounds, motivations, and references for nature conservation and ecosystem restoration could be identified and discussed. An example of topics is given in Table 5, referring to the summer school in Matera in 2015.

4 Discussion

Within the activities of the study-abroad program from 2009 to 2019, a total of 282 students from 39 countries and the continents Europe (13 countries), North America (2), Central America (2), South America (5), Asia (13), and Africa (4) participated, thus reflecting the high degree of internationality of the program. During the summer schools, the students had to present a project on ecosystem restoration or nature conservation from their own country which provided the student group not only an insight into the physical and cultural features of the respective country but also into different aspects and cultures of nature perception, natural resource protection,

Table 5: Topics of students' presentations on the summer school in Matera in 2015 with case studies from their country of origin.

Country of student's origin	**Topic**
Austria	Communication of ecological projects: how to raise awareness among people
Bangladesh	Environmental management and biodiversity conservation plan for Sundarbans mangroves
China	Rehabilitating China's largest inland river
Colombia	General outline for the restoration of the tropical dry forest in Colombia
Czech Republic	Comparison of environmental characteristics and ecological value between technical reclamation and spontaneous succession on post-mining areas
Germany	Peatland restoration in Lower Saxony, Germany
	Restoration of mountain landscape and sub-alpine ecosystems through the recovery of traditional land-use techniques
Indonesia	The Central Kalimantan Peatland Project as a case study for peatland restoration
Italy	The case of Patto Città Campagna as a planning approach to protect the landscape of Apulia – an architectural view
	Nature-based engineering interventions for the mitigation of hydrogeological instability
	Restoration of soil carbon content in perennial fruit crops in Apulia and Basilicata through sustainable management practices
	River and floodplain restoration in South Tyrol
	Energy production through geothermic plants in traditional settlements - the case of the Sassi in Matera
	Natura 2000 network for biodiversity conservation in Basilicata
	Costa Concordia after the salvage - the restoration of the seabed in Tuscany
	The "Prader Sand": Revitalisation of the Solda River through widening of the river channel
Kenya	Enhanced community ownership: monitoring and incentives to reduce natural resource destruction
Mexico	Contribution of tropical forest certification to nature conservation
Spain	Holistic management as a restoration tool in rangeland grasslands
Taiwan	Restoration of paddy terrace wetlands in Ba-Yien Village

and ecosystem restoration. During the excursions, students became intimately acquainted with a very different culture from their own, e.g. European students in China or Guatemala (Table 2). Thus, the sole number of students from different countries turns to a real internationalization of higher education which enhances the quality of interpersonal relationships in cross-cultural encounters (Young et al. 2016) and supports the development of "participating and emancipated citizens" (Santos and Guimarães-Iosif 2013) in an international environment. In particular, with the summer schools and excursions extending over a time span of up to 10 days, the intense studies led to an inclusive and collaborative learning community among participants (Wihlborg and Friberg 2016).

An interdisciplinary learning environment was established by 1) involving experts from various disciplines (e.g. landscape ecology, agricultural sciences, geography, landscape architecture, environmental ethics, anthropology, communication science, tourism studies); 2) offering courses to students from both natural as well as social science programs (cp. Table 2); and 3) facilitating contributions of the students to the summer schools, excursions, and workshops with presentation topics and case studies, respectively, with a natural science or a social science focus (Table 4). Thus, a comprehensive insight into environmental problems and sustainable land use could be achieved which has taken natural, cultural as well as socio-economic factors into account. On the excursion to Peru, even an astronomist contributed during a field trip at night with explanations on star constellations related to the Inca culture and their ritual calendar (e.g. Dearborn and Bauer 2015) which is still present today as indigenous knowledge (Willis and Curry 2020). This didactical approach is

in line with the highly interdisciplinary character of landscape ecology (Tress et al. 2005, Naveh 2007).

The long-term success of the program with regard to the integration of the natural and the social sciences into the students' further professional development cannot be assessed as the need for monitoring was not foreseen at the time of the program. However, there were indications throughout the program, which reflect an acquired capacity to perform this integration in practice. As preparation for the international excursions, students had to introduce particular topics on land use, nature conservation, and ecosystem restoration. Many students tried to give comprehensive insight by addressing concepts and methodologies from both natural and social sciences. For example, on a visit to a teak (*Tectona grandis* L.) plantation during the excursion to Northern Thailand (Table 2: excursion in 2016) a student introduced not only the biological and ecological characteristics of this economically important tree species, but also the socio-economic constraints of sustainable forestry in Thailand such as, e.g. illegal logging, expansion of agricultural land and subsequent forest destruction, poverty of rural communities, and national programs to combat these environmental and socio-economic problems. During the summer schools, students learnt how to implement ecological restoration projects accompanied by approaches, which involve local communities in order to achieve acceptance of the projects (e.g. Porter-Bolland 2013, Baldauf 2020).

The study-abroad program considerably enhanced diversity among students. The concept of diversity in Higher Education has various dimensions, for example, gender, age, nationality, ethnical groups, disabilities as well as cultural, socio-economic, and educational backgrounds (Claeys-Kulik et al. 2019). It increasingly gains importance for the development of universities (Bergan and Harkavy 2018, Brooks 2020). The high degree of international participants in the program was already mentioned above. With an average of 8 male students (total 129) per course and 9.6 female (total 153) across the whole program activities, the gender ratio was quite balanced. This was also reflected by their participation during the activities where no inequalities among genders could be observed. On the contrary, in groups with a participation of various higher education levels, bachelor students tended to be more reserved compared to master and PhD students. Accordingly, they have to be actively stimulated to ask questions and to participate in discussions. With regard to gender, cultural, religious, and/or ethnical background, practical problems might arise, e.g. when groups are accommodated in multi-bedrooms during excursions. This has to be communicated in advance and solutions have to be found if someone feels uncomfortable with this.

The UN has setup 17 ambitious Sustainable Development Goals for our planet. Given that Higher Education in various study programs prepares students for their later role as scientists, experts, stakeholders, teachers, and decision-makers who might be involved in the solution of environmental problems and challenges or knowledge transfer, interdisciplinary perspectives and insights into theory and practice of landscape ecology are indispensable. Particularly during excursions and field trips on the summer schools students expanded their knowledge on land-use systems, met stakeholders and actors, and reflected their class-room knowledge against real-world problems. In Guatemala, for example, they met a farmer who was, on principle, willing to adopt a certification for sustainable cocoa production, but could not afford the costs for it. Although, certification is considered as an adequate tool to promote sustainability in the cocoa value chain and to improve the livelihoods of cocoa farmers a particular farmer might be less optimistic on the net benefits that certification offers at the farm level (KPMG 2012).

As the summer school in Bozen in 2013 was recognized as an official optional course in the study program of the B.Sc. Agricultural Sciences (AGR), it was subject to the university internal evaluation, which follows a standard procedure for all study programs at the Free University of Bozen-Bolzano and thus is not particularly focused on the specific goals of the study-abroad program. As these students' evaluations of the course and the teacher might have severe shortcomings (Ewing 2012, Braga et al. 2014, Hornstein 2017) they have to be interpreted carefully with regard to the didactic quality of a university course. With regard to the questions asked within

this evaluation, the course quality and the teachers' performance have been assessed very positively by the students (up to 100 %). The slightly negative assessment for the course organization (17 % negative responds out of n = 19 students) is related to the fact that the teachers reacted flexibly on the students' knowledge base and on topics emerging during the teaching activity and thus spontaneously, deepened within the lectures and discussions.

More detailed information is provided by the written assessments of the students. A particular outcome of the whole program was that feedback from the students, either given orally or written after the excursions and the summer schools was generally positive. A selection of individual student's feedback is stated below:

"…the excursion to China was primarily an enrichment and an expansion of my horizons. Even though the journey through the many bus rides was physically exhausting for me, the positive experiences that have been gained outweigh today…" (participant of the international excursion to China in 2009).

"…it was very interesting for me to see how big the differences between here [S.Z.: N Italy] and the rural, less developed areas in north-west China are, where the people get along in very simple conditions, sometimes it was like just being set back in history…" (participant of the international excursion to China in 2009).

"…I am really enthusiastic about this intercultural summer school! It has been a really great opportunity to meet and exchange ideas/experiences with other people coming from different countries…" (participant of the summer school in Bozen in 2012)

"…The learning atmosphere you created and the tactical way you handled our questions was exceptional. We hope this partnership in learning will continue always ..." (participant of the summer school in Malkocin, Poland in 2014);

"…during an interview with a local farmer with his field in the distance, students learned more about the realities of agriculture in the Western Andes…" (participant of the excursion to Peru in 2019).

These few comments reflect that all the courses carried out in the past 10 years were always highly appreciated by the students, not only because of the teaching contents and practical experiences during the excursions, but particularly by the intercultural exchange. These activities organized and coordinated by the Free University of Bozen-Bolzano were also positively perceived by the regional press. Several articles have been published in the Autonomous Province of South Tyrol during the program 2009-2019.

By applying the Dublin Descriptors (ECA 2014) to the 10-years program with its various teaching formats, the assessment results are stated in Table 6. Although, the learning outcome is assessed in a general way it has to be levelled according to the student's particular study state, i.e. bachelor, master, and doctoral degree.

The only constraint of the study-abroad program was the increasing bureaucracy in Italy, which was increasingly putting obstacles on the organization and financial accounting. It became increasingly difficult, for example, to reimburse students for travel expenses when not inscribed at our university, although this was explicitly foreseen by the funding agency. These administrative obstacles have even stopped the program after 10 years. In order to overcome these obstacles, an international network is necessary which clearly recognizes the benefits of intercultural, international, and interdisciplinary higher education and puts all efforts in its realization, from acquiring funding, planning and networking to the realization within different teaching formats with strong participation and interaction of the international students within interdisciplinary teams. Such a program has to be built on a strong commitment of the academic and administrative leaders of the higher education institution. In case of administrative problems and obstacles, respectively, a task force with representatives from the academic and administrative staff might find solutions. The quality of Higher Education should not decrease with an increase of bureaucracy.

Table 6: Application of the Dublin Descriptors (ECA 2014) to the 10-years study abroad program with its various teaching formats, particularly excursions and summer schools.

Dublin Descriptors	**Assessment of the 10-years program with particular regard to the teaching formats summer schools and excursions**
Knowledge and understanding	• Basic, applied, and methodological knowledge on landscape ecology, restoration ecology, and nature conservation particularly bridging the natural and social sciences • Knowledge on cultural landscapes, land use, and sustainable management options • Understanding interrelationships between landscape features and human impact
Applying knowledge and understanding	• Applying theoretical knowledge and understanding of landscape and restoration ecology to practical problems of land use, land-use development, and the use of natural resources • Applying knowledge, understanding, and problem-solving abilities in multi- and interdisciplinary environments • Applying knowledge within master thesis research
Making judgements	• Capability of critical analysis, evaluation, and synthesis of complex landscape ecological issues • Developing judgement skills during intense discussions of topics on applied landscape ecology, nature conservation, and ecosystem restoration • Capability of interdisciplinary judgements on environmental problems taking into account the human dimension and considering ethical, cultural, and social aspects
Communication	• Gaining skills in intercultural communication • Achieving communication skills by the interaction with stakeholders and land users • Gaining skills in communication with peers, experts as well as non-experts • Learning how to communicate in countries with foreign languages (e.g. China, Thailand) and to critically assess translations
Learning skills	• Taking initiative and responsibility to identify and address learning needs for further knowledge in landscape and restoration ecology • Capability to gain further knowledge and understanding autonomously • Ability to promote the further career in landscape ecology within an academic or professional context in a knowledge-based society

5 Conclusions

After this 10-years study abroad program the following conclusion can be drawn which can be transferred into other contexts of higher education in landscape ecology:

- The program promoted the internationalization and mobility of students in and outside Europe according to the goals of the Bologna Process;
- international student groups promote intercultural exchange and the diversity (e.g. gender, age, nationality, ethnic, study degree) in higher education;
- the interdisciplinary character of higher education in landscape ecology, environmental sciences and related disciplines deepens the skills of students to find solutions for environmental problems by a holistic view on the physical as well as the human environment;
- students of different levels of higher education, i.e. bachelor, master, and PhD students in the same course can facilitate each other;
- the contact with stakeholders and land users during the excursions, improve the soft skills of students with regard to the application of knowledge as well as communication and making judgements;
- extra-curricular activities such as, e.g. international excursions and workshops help to individualize the study program's profile and thus developing a unique feature differing from similar programs at other universities against the background of the high competition of universities for students;
- the integration of master students with their master thesis' projects into ongoing research projects and the publication of the results enabled the students - besides enhancing mobility between research institutions (see above) - to get acquainted with practical landscape ecological research from planning and designing a research project, collect-

ing data in the field or lab, analysing the data, and preparing a manuscript for publication;
- against the background of reduced public funding for higher education at European universities (Warden 2018, EUA 2020), either because of decreasing total funding or because of rising student numbers at constant public funding, external funding for additional teaching activities, e.g. from foundations are necessary (Pruvot et al. 2015).

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