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UNIVERSITÄT BERN

CDE
CENTRE FOR DEVELOPMENT AND ENVIRONMENT

CDE POLICY BRIEF

International participants of summer school in Nanyuki, Kenya, take a break. Photo: Lilian J. Trechsel

Unlocking knowledge for sustainability: Partnership-based research and education

The pandemic has made it abundantly clear: the gravest threats we face today transcend national boundaries, are inextricably linked, and demand joint, *knowledge*-based actions in response. Partnership-oriented university-level research and teaching have a crucial role to play here. CDE and its longstanding partners at home and abroad have refined effective, transformative approaches to help solve current sustainability crises and train the next generation of change agents. This policy brief outlines lessons from CDE's long-term experience in tackling shared challenges and addressing inequalities through inclusive, globe-spanning research and education.

KEY MESSAGES

- Overcoming 21st-century threats like climate change, species extinction, infectious disease outbreaks, and inequality will demand unprecedented levels of cooperation and sharing of knowledge.
- Higher education and research for sustainable development is an ideal vehicle to bring people together towards a common purpose. It can foster urgently needed collaboration between different scientific and professional disciplines, public and private sectors, social strata, countries, and regions.
- CDE has pioneered a transformative approach to tackling shared global challenges. It emphasizes North–South partnership, transdisciplinarity, knowledge co-production, and training of *change agents* – i.e. the next generation of leaders, experts, bridge builders, and engaged members of civil society.
- High-income countries and donors should invest more in long-term partnership-based sustainability research and education, make published knowledge accessible to all, and help establish centres of advanced study and teaching in low-income countries.

Borderless crises

The new decade wasted no time in reminding us of the borderless challenges we face. Indeed, fires ignited the decade before continued to rage worldwide. In January 2020, smoke from blazing landscapes in drought-afflicted Australia travelled over 4,000 km, darkening the skies above New Zealand and endangering the health of distant neighbours.[1] Travelling air pollution like this has threatened far-flung communities for years in countries like India and China – much of it owing not to fires but to dirty, climate-warming industrial production of goods for global consumers. Meanwhile, in Brazil, tropical forests that should clean and replenish the world's air continue to be wiped out at alarming rates, driven especially by global demand for meat, soybeans, and other "commodities".

And alongside these ecological crises, a social epidemic of inequality plagues countries everywhere. It, too, is *globally entwined* in both its causes, like

The research featured here is focused globally.

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Group fieldwork session near Pokhara, Nepal. Photo: Bishal Bhandari

"land grabs" and exploitation of workers, and its consequences, like economic refugees and reactionary politics.

These are just a few examples of our interwoven 21st-century sustainability challenges, none of which can be solved by individual countries in isolation.[2] And today, of course, we find ourselves struggling to contain a frightening pandemic – one that arguably resulted, like other major zoonotic disease outbreaks, from human mishandling of nature in our era of hyperglobalization.[3] In the big picture, COVID-19 might be seen as merely the latest globe-spanning sustainability crisis that demands international cooperation and scientific innovation if we hope to solve it. The question arises: How and where will such problem-solving collaboration take place – especially in our era of rising nationalisms, ideological divisions, and misguided zero-sum thinking? And how will new generations learn to tackle such challenges more *pre-emptively*, rather than simply being forced to react when the worst-possible scenarios come to pass?

Universities as networked laboratories for solutions and change agents

If history is a guide, university-level research and education will be decisive in overcoming present and future disease outbreaks and dealing with other worldwide sustainability challenges.[4] Indeed, universities have played a major role in past breakthroughs, ranging from the polio vaccine to renewable energy technology. They have also been instrumental in enhancing, systematizing, and sharing vitally important (but often less celebrated) practical and social innovations, such as techniques of sustainable land management and guidelines for governance of common-pool resources like rivers, forests, soils, and even clean air.[5] And crucially, universities are key sites where the next generation of experts, decision-makers, and engaged citizens forms or reshapes its worldview, learns to grasp the crises we face, and strives to design appropriate responses – whether targeted interventions or holistic transformations in the way we lead our lives.

Knowledge obstacles

For university-level research and education to realize its full sustainability potential, however, universities must simultaneously critically reflect on and address some homegrown problems.[6] First, scientists and teachers should more explicitly consider the ethical dimensions of their work, abandoning illusions of a neat split between human values and scientific facts.[7] Indeed, values are part and parcel of sustainable development and any science conducted in its service. Second, it is necessary to consciously work against trends of knowledge privatization, as evidenced by increasingly profit-oriented higher education systems, overly restrictive "intellectual property" regimes, and paywalled scientific journals run by multinational publishing companies.[8] Third, universities and science at large – especially in the global North – must critically examine their role in global power structures of the past (e.g. colonialism) and present (e.g. centre–periphery divides).[9] Fourth, they must actively strive to redress the knowledge impacts of these asymmetric power relations, above all the *highly unequal global distribution of scientific resources and capacities*.[10] Indeed, top-ranked, high-resource universities and peer-reviewed journals remain overwhelmingly concentrated in wealthy countries of the global North[11] – many of them former colonial powers or beneficiaries. Finally, a better balance must be struck between research and teaching – the latter has been increasingly sacrificed to the pressures of "publish or perish", much to the detriment of students, our future problem-solvers.

A transformative approach

There is no one right way for universities to effectively and reflectively tackle our shared sustainability crises. But important groundwork has been laid and lessons learned by pioneering institutions. Over the course of three decades, CDE and its collaborators have refined a productive, transformative research and education approach. It rests on several key pillars:

Partnership. If our problems are inextricably linked across borders, then we must address them together – as partners. Research projects and study programmes are an ideal means to bring actors from diverse (even conflicting) national settings together on a joint mission. CDE's longstanding strategy has been to build teams that comprise researchers and students from the global South and North – and to strive to put them on an equal footing.[12] This and other forms of "science diplomacy" can enable urgently needed constructive alliances in even the most turbulent of times; ideally, it will be complemented by capacity building and productive exchange about scientific norms.[13]

Transdisciplinarity. The shared challenges we face are also intrinsically multidimensional – ecological, social, and economic – and require many forms of expertise to solve them. CDE studies connect people from diverse disciplinary and vocational backgrounds. Land use or mining-sector specialists in a country (e.g. Peru) where goods are extracted might work together with tax and trade experts in a country (e.g. Switzerland) where the goods are imported, refined, and resold. Soil scientists and extension workers might be brought together with farmers in various different mountain regions worldwide to exchange insights about common challenges.[14]

Knowledge co-production. Importantly, these researchers and non-academic experts also engage directly with affected communities (e.g. water users), local policymakers (e.g. water authorities), and other stakeholders to co-produce knowledge.[15] Collaborative activities like group workshops typically emphasize production of three core forms of knowledge[16]: *systems knowledge*, for example mapping competing land uses in a given region (and identifying global drivers); *target knowledge*, such as articulating a consensus vision for the region that balances land uses like crop growing and nature conservation; and *transformation knowledge*, namely

identifying ways to make that vision a reality, often with reference to practical theories of change.[17] Every effort is made to ensure that resulting products – e.g. publications, websites, or raw data – are accessible to anyone who might benefit.

Training of change agents. At the heart of the approach are students and junior researchers, who are seen as the bridge builders to desirable, liveable futures. In the growing tradition of *education for sustainable development*, CDE's curricula emphasize acquisition of dynamic knowledge and various other key *competencies*[18] – like systems thinking, anticipation of possible scenarios, working collaboratively across disciplines and cultures, and grappling with human values – as opposed to rote learning of facts and isolated methodologies. Further, CDE is engaged in integrating sustainable development – both topically and in day-to-day practice – into all other faculties as part of a whole university approach (see Box 1).[19]

Reversing 'brain drain' and forging global ties

Virtually all of these elements come together in the International Graduate School (IGS) North-South, a cooperative PhD-level sustainability programme coordinated by CDE, which unites the universities of Bern, Basel, Lausanne, and Zurich and around 130 students from the global North and South. It brings together students from Switzerland/Europe, Africa, Asia, and Latin America.[20] In 2012 and 2017, CDE researchers surveyed and interviewed around 150 graduates of the programme,[21] producing several valuable insights:

Boosting students from the global South. Crucially, the IGS North-South appeared to reduce education inequality in its network. Instead of "brain drain", it arguably contributed to "brain gain" or "circulation" in the global South: About 90% of students from lower-income countries returned to live and work there after graduation. Many also experienced an immediate career boost: Those with a leading position in their field increased from 11% before the PhD to 49% after. Further, most alumni found jobs in academia, going on to train a new generation of Southern experts. Importantly, these programme participants were not simply the children of elites: two-thirds assessed themselves as *lower- or lower-middle-class*, and roughly half had parents with no formal education or only primary/secondary school.

Sensitizing students from the global North. The socio-economic story of alumni from the global North differed in revealing ways. Two-thirds assessed themselves as *upper-middle- or upper-class*, and nearly 90% had parents with advanced degrees. Yet they did not experience the same immediate career boost from obtaining their PhD. These results arguably highlight the existing concentration of wealth and expertise in Switzerland/Europe – and, among other things, the intense local (academic) job competition this produces. But Northern students ideally gain something much greater from studying tough issues of sustainable development in the field and shoulder-to-shoulder with Southern students: a shift in consciousness – and a calling for life.

Space for mutual risk-taking, growth, and networking. Finally, interviews with alumni also highlighted the unique *space for transformation* enabled by the programme, perhaps best embodied by its annual summer school. Held at a new global site each year (e.g. Côte d'Ivoire, Kenya, Bolivia, Nepal), the IGS summer school challenges its diverse participants to try out different roles – as students, field researchers, peer teachers, local informants, etc. – while they work on joint projects on the ground. The combination of exploring unfamiliar surroundings, exchanging perspectives with peers from different cultures and disciplines, and testing new methods provides many students with a growth-inspiring experience of liminality or "in-betweenness".[22] Students typically emerge from this and similar programme experiences with a greater understanding of the need for transdisciplinary cooperation, an increased sense of purpose, as well as strengthened competencies and new ways of learning. Finally, they acquire an expanded network of skilled colleagues and friends that enables more and better research and growth.

Going forward, CDE is working to share its offerings with greater numbers of up-and-coming researchers and students – particularly at the bachelor's and master's level (https://bit.ly/36IuQHw) – and with higher education institutions in the global South that wish to integrate sustainability in their curricula. We believe the more we extend the reach of our approach and collaborative networks, the more we can aid the fundamental changes needed to enable a better future.

Beyond zero-sum

In conclusion, as CDE and other mission-driven institutions continue to hunt for solutions to today's global sustainability crises, we would do well to remember one amazing feature of *knowledge*: it is essentially inexhaustible – the ideal common-pool resource.[23] In fact, the more we share our knowledge, the more it *grows* – exponentially and synergistically – as experts, teachers, students, and laypeople alike innovate, broaden, complement, and re-share each other's insights, techniques, and breakthroughs. The knowledge we collectively generate can be used to cure and prevent diseases, decarbonize energy, make our food systems safer, improve communication, expand creation and appreciation of the arts, and enhance access to all such public goods – if we enable it. Our universities (from *universitas* for "whole") and colleges (from *collegium* for "partnership") can and should be ideally positioned to realize the full potential of knowledge understood this way.

Box 1. Integrating sustainability in higher education

Universities can, should, and do contribute to happier, healthier, more just societies. But they can also be main contributors to problems of unsustainability. The long-running division of knowledge into siloed university disciplines is a prime example: students in economics or law, for instance, can rise to become top scholars in their field without ever seriously engaging with ecology or alternative (e.g. non-Western) value systems. Many eventually advise policymakers or even set policy themselves. This arguably makes us uniquely unprepared to tackle wicked problems like climate change and resource overexploitation in the comprehensive manner needed.

CDE is addressing this with strong backing from the University of Bern by helping to integrate urgent issues of sustainable development into the curricula of all university faculties – as well as in day-to-day operations (Trechsel et al. 2018).[24] In particular, lecturers are supported in finding links to sustainability issues in their subject areas, and incorporating them into their lesson plans. More broadly, they are encouraged to adopt a more competence-oriented and learner-centred teaching approach. So far, experience shows that a combined top-down (e.g. compulsory sustainability courses) and bottom-up (e.g. student-led initiatives; www.bene-unibe.ch)[25] strategy works best to motivate teachers and staff to integrate sustainability into their thinking and practice.

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Policy implications

Invest in boundary-spanning sustainability research and education
To enable a future in which we all can thrive, governments and donors should further increase investment in advanced studies and teaching on and for sustainable development. Besides delivering targeted solutions, such science can foster the *systemic* perspective we urgently need to tackle today's interlinked wicked problems – including climate change, species extinction, epidemics, pollution, overconsumption, armed conflict, and inequality. Crucially, it can prompt a much-needed shift towards mainstreaming hands-on cooperation and knowledge-sharing across boundaries: between academic disciplines, public and private sectors, social strata, nations, regions, and more.

Tackle science inequality by committing to equal partnerships with global South
Worldwide crises like COVID-19 and climate-warming emissions will not be overcome unless societies everywhere are equipped with the knowledge and resources needed to combat them locally. Wealthy countries, many of which have arguably hoarded talent and prestige, can do much more. First, they should fund and institutionalize long-term research and education partnerships with countries in the global South. New digital formats (e.g. virtual classrooms and conferences) can enable even greater collaboration,[26] complementing in-person elements (e.g. joint fieldwork, summer schools) pioneered by programmes like the IGS North-South (www.igs-north-south.ch). Second, every effort should be made to fully unlock existing and future data, transforming scientific publishing models to enable open access to everyone as fast as possible (e.g. www.coalition-s.org). As the pandemic has shown, sharing data can save lives if done quickly and widely. Third, more generous support should be given to establish and improve centres of advanced research and education in the global South. Students and experts who conduct transdisciplinary research and/or study and teach in low-income countries should be incentivized and rewarded, in line with improved academic metrics that emphasize experience, research quality, and societal contributions over journal impact factors (e.g. www.sfdora.org).

Promote lifelong learning and holistic integration of sustainability in higher education
Finally, higher education policymakers should encourage integration of sustainability in the curricula and operations of all disciplines. This means providing space and time for transformative, lifelong learning – not only for students, but also for teachers (www.betterscience.ch/en/). Teachers should be given targeted support to incorporate sustainability issues in their courses (www.esd.unibe.ch), as well as more room for collaboration, knowledge sharing, experimentation, reflection, and a better work–life balance. Indeed, to overcome current crises, sustainability must become something that is *lived* (e.g. sufficient lifestyles), not just theorized and debated – especially in the global North.

Suggested further reading

OECD [Organization for Economic Cooperation and Development]. 2020. *Addressing Societal Challenges Using Transdisciplinary Research*. OECD Science, Technology and Industry Policy Papers, No. 88. Paris, France: OECD. https://doi.org/10.1787/0ca0ca45-en

Stöckli B, Wiesmann UM, Lys JA. 2018. *A Guide for Transboundary Research Partnerships: 11 Principles: 7 Questions.* 3rd edition. Bern, Switzerland: Swiss Commission for Research Partnerships with Developing Countries (KFPE). https://bit.ly/35eie8A

Trechsel LJ, Zimmermann AB, Graf D, Herweg K, Lundsgaard-Hansen L, Rufer L, Tribelhorn T, Wastl-Walter D. 2018. Mainstreaming education for sustainable development at a Swiss university: Navigating the traps of institutionalization. *Higher Education Policy* 31(4):471–490. https://link.springer.com/article/10.1057/s41307-018-0102-z

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References and notes

[1] Salinger J. 2020. Australia's bushfires mean New Zealand has become the land of the long pink cloud. *The Guardian*. 7 January 2020. https://www.theguardian.com/world/2020/jan/08/australia-bushfires-aotearoa-new-zealand-has-become-kikorangi-mawhero-land-of-the-long-pink-cloud

[2] Messerli P, Kim EM, Lutz W, Moatti JP, Richardson K, Saidam M, Smith D, Eloundou-Enyegue P, Foli E, Glassman A, Licona GH. 2019. Expansion of sustainability science needed for the SDGs. *Nature Sustainability* 2(10):892–894. https://www.nature.com/articles/s41893-019-0394-z

[3] IPBES [Intergovernmental Platform on Biodiversity and Ecosystem Services]. 2020. *IPBES Workshop on Biodiversity and Pandemics. Workshop Report*. Bonn, Germany: IPBES. https://bit.ly/2TBRDNn

[4] Trechsel LJ, Zimmermann AB, Graf D, Herweg K, Lundsgaard-Hansen L, Rufer L, Tribelhorn T, Wastl-Walter D. 2018. Mainstreaming education for sustainable development at a Swiss university: Navigating the traps of institutionalization. *Higher education policy* 31(4):471-490. https://link.springer.com/article/10.1057/s41307-018-0102-z

[5] WOCAT [World Overview of Conservation Approaches and Technologies]. 2020. *WOCAT SLM Database*. Bern, Switzerland: WOCAT. https://qcat.wocat.net/en/wocat/list/

[6] Trechsel LJ, Zimmermann AB, Graf D, Herweg K, Lundsgaard-Hansen L, Rufer L, Tribelhorn T, Wastl-Walter D. 2018. *Op. cit.*

[7] Kläy A, Zimmermann AB, and Schneider F. 2015. Rethinking science for sustainable development: Reflexive interaction for a paradigm transformation. *Futures* 65:72–85. https://doi.org/10.1016/j.futures.2014.10.012

[8] Hil R, Lyons K. 2017. A post-neoliberal academy? *Arena Magazine* 147:44–77. https://www.academia.edu/download/53767389/postneoliberalacademic.pdf

[9] Mburu S, Huxley N, Miles R, Scott L, Cross A, Tufet M. 2020. *Race and Inequality in International Development Research: A UKCDR perspective*. UK Collaborative on Development Research blog post. https://www.ukcdr.org.uk/race-and-inequality-in-international-development-research-a-ukcdr-perspective/; Trechsel LJ, Zimmermann AB, Steinböck C, Breu T, Herweg K, Thieme S. 2020. *Safe Spaces for Disruptive Learning and Transformation: International Mobility of Doctoral Students*. Manuscript submitted for publication.

[10] UNESCO [United Nations Educational, Scientific and Cultural Organization]. 2015. *UNESCO Science Report: Towards 2030*. Paris, France: UNESCO. https://en.unesco.org/unescosciencereport; Barth M, Michelsen G, Rieckmann M, Thomas I, editors. 2015. *Routledge Handbook of Higher Education for Sustainable Development.* Routledge International Handbooks. London, New York: Routledge. https://bit.ly/3m3QF8F

[11] UNESCO [United Nations Educational, Scientific and Cultural Organization]. 2016. *World Social Science Report 2016: Challenging Inequalities – Pathways to a Just World*. Paris, France; Brighton, UK: UNESCO/International Social Science Council (ISSC); Institute of Development Studies (IDS). https://en.unesco.org/wssr2016

[12] Stöckli B, Wiesmann UM, Lys JA. 2018. *A Guide for Transboundary Research Partnerships: 11 Principles: 7 Questions*. 3rd edition. Bern, Switzerland: Swiss Commission for Research Partnerships with Developing Countries (KFPE). https://bit.ly/35eie8A; Trechsel LJ. In press. Experiences of PhD graduates researching and learning for sustainable development in an inter- and transdisciplinary setting. *ETH Learning and Teaching Journal*. https://learningteaching.ethz.ch/index.php/lt-eth

[13] Upreti BR, Zimmermann AB, Debele B, Cissé G. 2012. *Partnerships in Development-oriented Research. Lessons Learnt and Challenges Ahead*. Kathmandu, Nepal: NCCR North-South, South Asia Coordination Office. https://www.nccr-north-south.unibe.ch/Upload/Upreti-et-al-Partnerships-in-Development-oriented-Research-2012-lo.pdf

[14] OECD [Organization for Economic Cooperation and Development]. 2020. *Addressing Societal Challenges Using Transdisciplinary Research.* OECD Science, Technology and Industry Policy Papers, No. 88. Paris, France: OECD. https://doi.org/10.1787/0ca0ca45-en

[15] Schneider F, Giger M, Harari N, Moser S, Oberlack C, Providoli I, Schmid L, Tribaldos T, Zimmermann AB. 2019. Transdisciplinary co-production of knowledge and sustainability transformations: Three generic mechanisms of impact generation. *Environmental Science and Policy* 102:26–35. https://doi.org/10.1016/j.envsci.2019.08.017

[16] Pohl C, Hirsch Hadorn G. 2007. *Principles for Designing Transdisciplinary Research*. Munich, Germany: oekom. https://www.oekom.de/buch/principles-for-designing-transdisciplinary-research-9783865810465

References and notes

[17] Oberlack C, Breu T, Giger M, Harari N, Herweg K, Mathez-Stiefel SL, Messerli P, Moser S, Ott C, Providoli I, Tribaldos T. 2019. Theories of change in sustainability science: understanding how change happens. *GAIA – Ecological Perspectives for Science and Society* 28(2):106–111. https://doi.org/10.14512/gaia.28.2.8

[18] Wiek A, Withycombe L, Redman CL. 2011. Key competencies in sustainability: A reference framework for academic program development. *Sustainability Science* 6(2):203–218. https://link.springer.com/article/10.1007/s11625-011-0132-6

[19] Herweg K, Zimmermann AB, Lundsgaard Hansen L, Tribelhorn T, Hammer T, Tanner RP, Trechsel L, Bieri S, Kläy A. 2017. *Integrating Sustainable Development into Higher Education: Guidelines with In-depth Modules for the University of Bern. Foundations.* Bern, Switzerland: University of Bern, Vice-Rectorate Quality, Vice-Rectorate Teaching, Centre for Development and Environ-ment (CDE), Educational Development Unit (ZUW), and Bern Open Publishing (BOP). https://boris.unibe.ch/105009/1/online_2017_Guidelines_University%20of%20Bern.pdf

[20] Trechsel LJ. In press. Experiences of PhD graduates researching and learning for sustainable development in an inter- and transdisciplinary setting. *ETH Learning and Teaching Journal*. https://learningteaching.ethz.ch/index.php/lt-eth

[21] Heim EM, Engelage S, Zimmermann AB, Herweg K, Michel C, Breu T. 2012. *Tracking Alumni Career Paths: Third NCCR North-South Report on Effectiveness*. NCCR North-South Dialogue 42. Bern, Switzerland: NCCR North-South. https://boris.unibe.ch/17598/1/Heim_et-al_NCCR_Dialogue_42.pdf; Trechsel LJ, Zimmermann AB, Steinböck C, Breu T, Herweg K, Thieme S. 2020. *Safe Spaces for Disruptive Learning and Transformation: International Mobility of Doctoral Students*. Manuscript submitted for publication.

[22] Förster R, Zimmermann AB, Mader C. 2019. Transformative teaching in Higher Education for Sustainable Development: Facing the challenges. *GAIA – Ecological Perspectives for Science and Society* 28(3):324–326. https://doi.org/10.14512/gaia.28.3.18

[23] Hess C, Ostrom E. 2007. *Understanding Knowledge as a Commons: From Theory to Practice*. 2007. Cambridge, MA and London, UK: MIT Press. 381 pp. http://www.wtf.tw/ref/hess_ostrom_2007.pdf; Graeber D. 2011. *Debt: The First 5,000 Years*. Brooklyn, NY, USA: Melville House Publishing. https://libcom.org/files/__Debt__The_First_5_000_Years.pdf

[24] Trechsel LJ, Zimmermann AB, Graf D, Herweg K, Lundsgaard-Hansen L, Rufer L, Tribelhorn T, Wastl-Walter D. 2018. *Op. cit.*

[25] Trechsel LJ, Häderli S, Zimmermann AB. 2020. *What Do students of the University of Bern Consider Important for Their Future? Results and Discussion of a National Union of Students Survey*. Bern, Switzerland: Centre for Development and Environment (CDE), University of Bern, with Bern Open Publishing (BOP). https://boris.unibe.ch/146168/

[26] Mader C, Zimmermann AB, Diethart M, Mulà I. 2020. Virtual conferences in higher education: Teasing out their transformative potential for sustainable development. *GAIA – Ecological Perspectives for Science and Society* 29(1):57–59. https://doi.org/10.14512/gaia.29.1.12