

Geography

GEOGRAPHY AT THE UNIVERSITY OF BERN

Geography is the science of physical and social processes in specific spatial contexts. From this perspective, it analyses different areas of our society and environment at different scales and can thus actively contribute to solving the challenges facing society as a whole. Geography at the University of Bern offers a broad spectrum of subdisciplines. These follow what we call the “Bern Model” of geography, which gives the classic topics of Physical Geography (Soil Science, Geomorphology, Hydrology, Palaeolimnology, Climatology, Climate Impact Research, Remote Sensing, and Geocomputation and Earth Observation) and Human Geography (Economic Geography, Social and Cultural Geography, Political Urbanism and Sustainable Spatial Development) [1] a joint perspective through Geographies of Sustainability (Critical Sustainability Studies, and Land Systems and Sustainable Land Management) [2]. These thematic focuses are supported by methodological focuses in the field of data science, as well as by quantitative and qualitative methods, geographic information systems (GIS), remote sensing, and laboratory methods.

How is geography linked to sustainable development, and how has this influenced practice?

Sustainability and sustainable development are core topics in geography. At the University of Bern, geographical research has been based on current social problems and linked to questions of sustainable development for over 50 years. In the early days, the focus was on spatial planning and the need for information, maps, and concepts that would provide a basis for managing landscapes sustainably. Issues at stake included settlement development and transport planning, and – increasingly – environmental issues such as natural hazards, climate, or air pollution. In the 1970s and 1980s, as part of UNESCO’s Man and the Biosphere programme, the [University of Bern’s Institute of Geography](#) brought together all sub-branches of geography to examine specific regions and landscapes from a sustainability perspective [3].

Today, all dimensions of sustainability are related to geography in a wide variety of contexts. The discipline has

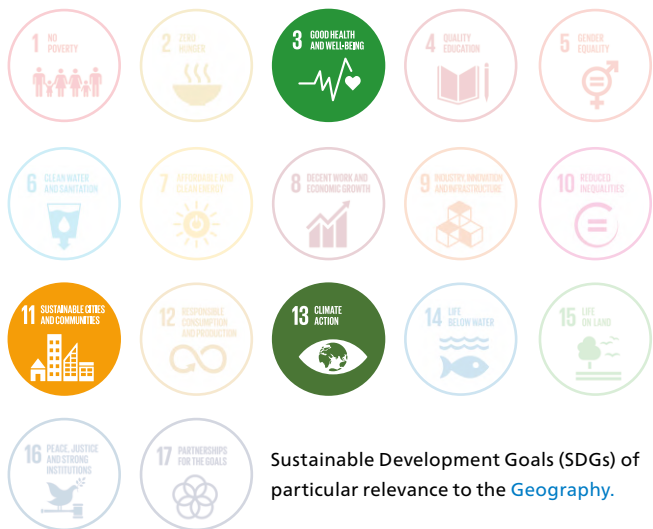
incorporated sustainability topics into basic research and is also expanding its methodological focus on sustainability, for example in terms of transdisciplinarity. By adopting transdisciplinary methods, it integrates knowledge and needs from practice into research and, conversely, makes research results accessible to society and promotes their uptake in practice. The research–application dichotomy has been increasingly fading since the 1990s. Participatory and transdisciplinary processes of knowledge production have gained in importance and are being developed, for example, in the context of the [mLAB](#), which attempts to bring together research, media, and art in order to experiment with new forms of knowledge production and communication [4]. Transformational knowledge is generated not only at the university, but also through the network of geography graduates, who carry core concerns of sustainability into their professions, be it in business, policy, administration, or education, and who keep in touch with the Institute of Geography.

Example: Urban climate

Bern’s urban climate was a topic of climate research at the institute already in the early 1970s, particularly with regard to questions of ventilation and winter smog in the context of large-scale urban development projects. Measurements and their analyses provided the basis for reports and a set of maps that were subsequently used in urban planning for decades (**SDG 11**) [5]. Air pollution control measures led to a significant improvement in winter. In summer, however, photochemical smog continued to increase. Thanks to growing expertise in measuring and analysing pollutant data and in boundary layer meteorology, it was possible to compile practical information in this field, as well, for example on the effectiveness of traffic restrictions. At the same time, the institute’s methodological repertoire was expanded to include numerical modelling, a skill that later became important for other fields of research, such as climatology. In this way, basic research not only had an impact on practice, but practical application also fertilized basic research.

Today, summer heat stress in cities is a core focus of applied research [6], especially in view of the expected increase in heat stress under future climate conditions (**SDG 13**). Swiss cities urgently need knowledge to plan

adaptation measures. The Climatology Group at the Institute of Geography operates a dense climate monitoring network on behalf of the City of Bern and the local energy and water provider, *Energie Wasser Bern (ewb)*. Using geostatistical methods, they process the resulting data into daily high-resolution heat maps, which in turn provide the basis for heat risk maps. Of particular interest in this regard are the effects of heat on health, which are being analysed in collaboration with the Institute of Social and Preventive Medicine (**SDG 3**). The climatology group works closely with the city authorities, scientifically monitors implemented measures, and analyses their impact or provides information for the planning of measures (SDG 11). Numerical modelling and drone thermal imaging are also used. And this is not the only example of strong practical relevance – similar examples could be given from all of the institute’s research groups.



How does the University of Bern’s Institute of Geography incorporate the topic of sustainable development into research and teaching?

Teaching in geography contains many links to sustainability, not only in terms of the topics addressed by the various subdisciplines, but also in terms of the inter- and transdisciplinary methodologies used. Master’s students can choose sustainability as a specialization. Questions of sustainable development are at the core of each research group’s research and teaching: The *Soil Science* Group, for example, investigates the sustainable use of soils and examines their composition, in particular heavy metals, microplastics, and organic micropollutants. The *Paleolimnology* Group focuses not only on climate reconstructions but also on cycles of matter, such as of phosphorus. The

Geocomputation and Earth Observation Group deals with the effects of climate change on terrestrial ecosystems as well as interactions between global environmental changes and terrestrial ecology and biogeochemistry. The *Hydrology* and *Geomorphology* groups research processes and develop models to support sustainable use of ecosystems, their protection against anthropogenic influences, and the protection of society against natural hazards. The *Climatology* and *Climate Impact* Research groups deal with climate variability and its effects, climate risks, and climate change adaptation. Interactions between the management and use of land resources, the promotion of ecosystem processes and biodiversity, and the associated decision-making processes are topics addressed by the *Land Systems and Sustainable Land Management* Group. The *Critical Sustainability Studies* Group examines perspectives on intersectional power relations and justice at the interfaces of im/mobility, education, and labour, as well as in the context of raw material use. The *Political Urbanism and Sustainable Spatial Development* Group investigates the sociopolitical dimension of spatial development and examines how spatial planning can promote sustainable development. The *Economic Geography* Group analyses economic developments that enable places to maintain or achieve overall sustainability. The *Social and Cultural Geography* Group researches how issues of reproductive justice are linked to environmental justice and thus offers a critical examination of future sustainable societies. (For more details on the focus of Human Geography, see [1].)

The strong focus on sustainability research at the Institute of Geography is also reflected in many Bachelor’s and Master’s theses. Supervision of such theses is a collaborative endeavour between the Institute of Geography and the university’s centres of competence and other units, such as the Oeschger Centre for Climate Research (OCCR), the Centre for Development and Environment (CDE), the Wyss Academy for Nature, the Center for Regional Economic Development (CRED), and the Interdisciplinary Centre for Gender Studies (ICFG).

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University of Bern

Centre for Development and Environment (CDE)
Mittelstrasse 43
3012 Bern
Switzerland
www.cde.unibe.ch

Contact: sustainability.cde@unibe.ch

Author: Prof. Dr. Stefan Brönnimann (Institute of Geography)

Review: Staff members Institute of Geography

Series editors: Jonas Frédéric Chastonay, Camilla Steinböck, Dr. Lilian Julia Trechsel (CDE)

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