How to Promote Geography for Sustainability

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1. Global challenge for sustainability
2. Geography and sustainability
3. How to promoting geography for sustainability
1. Global challenge for sustainability
The world is transforming at an accelerating pace

No doubt human population growth is a major contributor to global climate change. Global climate change affect absolutely everyone and everything on this planet.
Human influence on the natural environment has intensified, and the earth has entered the stage of Anthropocene; Earth surface processes are gradually dominated by human behavior, resulting in numerous resources, disasters and ecological problems.
The decline in biodiversity caused by human activities is very serious and has already posed harm to the economy, livelihoods, food security, clean water and people’s quality of life around the world.
Climate change, biodiversity loss and nitrogen cycle in 9 key earth system processes have exceeded planetary boundaries (assessment in 2009); the 2015 assessment concluded that there is also a high risk of phosphorus cycle and land-system change.
There are always so many needs for the world.

**Resource Needs**
- Energy
- Environment
- Food
- Shelter
- Space
- Water

**Societal Needs**
- Disaster Resilience
- Governance
- Health
- Learning
- Prosperity
- Security
Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their needs.


The concept of sustainable development was introduced officially in United Nations "Conference on Agenda 21" for the first time.
Global programs were launched in the last several decades:

- **1992**, Agenda 21
- **2001**, Sustainability science
- **2013**, Future Earth
UN launched New global Sustainable Development Goals for the world

Transforming our world: the 2030 Agenda for Sustainable Development (United Nations, 2015)
The Sustainable Development Goals (SDGs)

a) The blueprint to achieve a better and more sustainable future for all

b) In order to leave no one behind

c) Achieve each Goal and target by 2030
Problems about implementing the SDGs

➢ Compared with the Millennium Development Goals (MDGs), the United Nations Sustainable Development Goals (SDGs) highlight their needs for the scientific community.

➢ The 2018 SDG Report states that it is not enough to achieve the initial targets by 2030 according to current rhythm.
Challenges for sustainability

- Regional economic restructuring under globalization
- Development inequalities
- Production capacity surplus
- Waste of resources
- Conflicts in municipal finance
- Social responsibility of enterprise

- Resources scarcity (Water, soil, energy)
- Climate change and its negative impacts
- Loss of agricultural land

- Environmental pollution
- Habitat and species loss
- Ecosystem service and function degradation
- Landscape homogenization

- Social inequalities
- Population growth
- Exclusion
- Violence and Crime
- Lack of coordination between different sectors
- Food security
- Epidemic diseases
- Opaque of environmental information

Ramin Keivani, 2010
Sustainability need to balance economic, environmental and social factors in equal harmony.
Half of the Sustainable Development Goals are related to environment and natural resources.
Geography is one of the most important KEY for sustainable development

**Geography** is an all-encompassing discipline that seeks an understanding of the Earth and its human and natural complexities—not merely where objects are, but how they have changed and come to be (Wikipedia).

Geography focus on the mechanism of interaction between human and environment. The research process requires the coupling of natural elements and human elements (Fu, 2015)

Geography is very important for unifying social and natural sciences and can provide a holistic way in understanding the world (Smith, 2016)
Geography was born for earth’s future and sustainability
2. Geography and Sustainability

Editorial

Promoting Geography for Sustainability

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What’s the research progress on Geography and Sustainability

Topic=(geography AND sustainability) or
Topic=(geography AND sustainable development)
What’s the research progress on Geography and Sustainability

- Number: 1868 publications.
- The first article was published in 1990.
- Rapid increase since 2010, occupied 97.4% (2010-2019)
Words in titles and abstracts

1990-1999

2000-2009

2010-2019

- Social
- Economic
- Environmental
- Ecology
- System
- Land/Resource use
- Policy
- Region/landscape

https://wordart.com/signup
The study areas in the last ten years (2010-2019)

- **Geography**: 672, 36.94%
- **Environmental Sciences Ecology**: 547, 30.07%
- **Science Technology Other Topics**: 205, 11.27%
- **Business Economics**: 185, 10.17%
- **Public Administration**: 161, 8.85%
- **Engineering**: 116, 6.34%
- **Social Sciences Other Topics**: 92, 5.058%
- **Education Educational Research**: 122, 6.71%
- **Urban Studies**: 122, 6.71%

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[Logo: Faculty of Geographical Science, BNU]
Hot words in the last ten years (2010-2019)

Top 50 words in the publications
The subjects involved

- Sustainable/sustainability: 2871
- Develop/development: 2587
- Geography/geographical: 2518
- Landscape: 389
- Science: 497

Geography, Sustainability, and Landscape Ecology
Coupled Human and Natural Systems; Human-Environmental Systems
Social-Ecological Systems; Social–environmental systems
Research framework

Coupled Human and Natural Systems

Social–environmental systems
Research objects

- Climate and land use change
- Food-Energy-Water nexus
- Tourism and culture
- Industry and health
Research objects

Driving Factor 1: Land use change
- Protection
- Salinization
- Protection

Legend:
- Increase
- Decrease

Agricultural development
Desertification

Driving Factor 2: Climate change

Climate and land use change

Food-Energy-Water nexus
More attention are being paid on Urban/city...
The driving mechanism of sustainable development
The solution for sustainable development
Research scales

Regional and global scales are the hot issues
Geo-data and modelling

Model: 517
Data: 457
Technology: 441
Inform: 409
Future: 396

Data and Integrated model for sustainable development
Education in Geography and Sustainability

Education for Sustainable Development (ESD)

Integration ESD at local level in learning cities

Education for sustainable development
3. How to promote Geography for Sustainability
(1) Deep the research on Geography and Sustainability for earth future
General research framework

Resource Ecology
- Resource utilization
- Ecosystem services
- Pattern
- Process
- Scale

Earth Surface Processes

Earth Surface System Modeling and Simulation
- Model development
- Dynamic predication
- Human systems
- Natural systems

Regional and Global Sustainable Development
Direction 1: Integrating research on multiple processes of water, soil, air and ecosystem

(Fu, 2020)

◆ Soil-water-air interactions and their ecological effects
◆ The mechanisms of biogeochemical process on earth surface
◆ Earth spheres interactions and responses to global change
Direction 2: Cascades of ecosystem structure, functions and services

(Fu, 2020)

- Regime shifts of ecosystem structure and function as well as environmental effects
- Maintenance mechanism of ecosystem service formation and human well-being
- Land use trade-off and regional ecological security
Direction 3: Feedback mechanisms of natural and social systems

(Fu, 2020)

- Resilience and capacity boundaries of social-ecological systems
- Quantification of human activities and their environmental impacts
- Coupling effects of natural and human factors and feedback mechanism
- Structure matching and tele-coupling of natural and social system at multi-scales


Liu et al., *Ecology and Society*, 2013
Direction 4: Mechanism, approach and policy of sustainable development

- Water, energy and food nexus and collaborative management
- Complexity and inter-linkages among SDGs
- Implement approach and policy achievement of SDGs

Fu et al., *National Science Review*, 2019
Direction 5: Data, models and simulation of sustainable development (Fu, 2020)

- Data assimilation of sustainable development
- Correlation rules, machine learning and analysis of big data
- Integrated model and decision support systems for sustainable development
(2) Launch global research program on Geography and Sustainability
What's the next global programs?

Global Environmental Change Programmes
Global Dryland Ecosystem Programme (Global-DEP)

A Platform for Global Research Collaboration on Dryland Ecosystem
Framework of Global-DEP

- Ground survey
- Case study
- Thematic scoping & regional consultation workshops

Monitoring
- Global dryland ecosystems change and their driving forces

Analysis
- Changes in the structure and functions of dryland ecosystems
  - Soil & water retention
  - Sandstorm prevention
  - Biodiversity
  - Food production
  - Carbon sequestration

Assessment
- Ecosystem Services of dryland and their linkages with human well-being
- Dryland ecosystem management and sustainable livelihoods

(Fu, 2018)

Science Plan of Global-DEP
Database of Global-DEP
(3) Establish some international organizations on Geography and Sustainability
IGU Commission: Geography for Future Earth
Coupled Human-Earth Systems for Sustainability

This letter certifies that a new International Geographical Union (IGU) Commission (C17.02) on Geography for Future Earth: Coupled Human-Earth Systems for Sustainability has been formally established under the direction, as chair, of Academician Fu Bojie of Beijing Normal University, China.

The IGU Commission: Geography for Future Earth: Coupled Human-Earth Systems for Sustainability provides a platform for communication among geographers globally with the aim of promoting research and innovation in relation to sustainability.

http://igu-gfe.org/

The International Geographical Union (IGU) commission established in October 2017
(4) Provide education on Geography and Sustainability for the world

(Endorsed by UNESCO Member States through the adoption of 37 C/Resolution 12)
The First Faculty of Geographical Science was founded in Beijing Normal University.
Structure of Faculty of Geographical Science, BNU

School of Geography

School of Natural Resources

Institute of Disaster Reduction and Emergency Management

Center for Geo-Data and Analysis

Institute of Remote Sensing Science and Engineering

State Key Laboratory of Earth Surface Processes and Resource Ecology (ESPRE)

Institute of Land Surface System and Sustainable Development

7 divisions
(5) Establish journal on Geography and Sustainability
The sources titles of the publications on Geography and Sustainability during 2010-2019

No flagship journal on Geography and Sustainability
The only dedicated journal to focus on promoting geography for sustainability.

The future flagship journal on Geography and Sustainability

*Geography and Sustainability* aims to serve as the focal point for developing, coordinating and implementing interdisciplinary research and education to promote sustainable development through an integrated geographic perspective. The journal encourages wider analysis and innovative thinking about global and regional sustainability by bridging and synthesizing natural and human sciences.

Now, *Geography and Sustainability* is welcoming original, high-quality research articles, review articles, short communications, technical comments, perspective articles, and editorials on the following themes:

**Editor-in-Chief:**

**Bojie Fu**  
Faculty of Geographical Science, Beijing Normal University, China

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Please visit official website: http://www.journals.elsevier.com/geography-and-sustainability
Thematic areas

➢ **Geographical Processes**: Interactions with and between water, soil, atmosphere, ecosystem, human and their spatio-temporal variations;

➢ **Ecosystem Services and Human Wellbeing**: Ecosystem structure, processes, services and their linkages with human wellbeing;

➢ **Human-Environmental Systems**: Interactions between humans and the environment, resilience of socioecological systems and vulnerability;

➢ **Sustainable Development**: Theory, practice, and critical challenges in sustainable development;

➢ **Geo-data and Model for Sustainability**: Geo-data and models to support sustainable development and decision makings.

Please submit your manuscript and make your active contributing for global sustainable development through an integrated geographic perspective!

http://www.journals.elsevier.com/geography-and-sustainability
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Thank you so much for your attention!