

# Monitoring and early warnings in mountain social-ecological systems

*The Summer School is organised under the Erasmus+ projects «Systems for Monitoring and Responses to Early Warnings – EU Experience for Russia» (Jean Monnet modules) and «Sustainable Natural Resource Use in Arctic and High Mountainous Areas» (Capacity Building in the field of Higher Education)*

The Summer School is organised by **Gorno-Altai State University** (Russia) and **Siberian Federal University** (Krasnoyarsk, Russia) in cooperation with Russian and international partners. It is designed as an “action school” set to explore and find solutions to real life problems, with **Altai Mountains**, one of the Russia’s-highest mountain system, set as the case study area. The School will include research methodology training and group work on multidisciplinary research projects. Transfer between Krasnoyarsk and Gorno-Altai will involve an overnight train trip on the **Trans-Siberian Railway**.



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*Governance of mountain social-ecological systems involves significant analytical and normative uncertainty not at least due to complex biophysical set-ups, such as interdependencies between diverse and contrast land-use & cover situations, dynamic geophysical processes, and high vulnerability of ecosystems to global and regional environmental change. In order to steer progress towards sustainable development goals (SDGs), of which many relate to mountain systems, governance actors require effective science-policy interfaces capable of timely recognition and communication of early warnings, backed by effective monitoring networks, including citizen science arrangements.*

*This summer school will build research capacity and strengthen science-policy interactions for addressing these issues in Altai Mountains and beyond. The **target audience** are early-stage researchers, civil servants and NGO activists involved in the management and governance of mountain systems. The **focus** will be on monitoring, reporting and verification systems for governance of mountain social-ecological systems, recognition of early warnings and development of science-policy interfaces. This discussion will be primarily based on the EU experience. It will be analysed for its applicability in Russian (in particular Siberian) socio-economic, political and biophysical context.*

*The school will be held in Siberian Federal University in Krasnoyarsk, Gorno-Altai State University and at two case study locations in Altai Mountains. The participants will be engaged in group projects on a specific issue in relation to the SDG agenda for mountain systems; the locations provide reach opportunities for setting-up case studies encompassing a broad range of topics.*



## Introduction

The **goal of the Summer School** is to support sustainable governance of mountainous socio-ecological systems in Southern Siberia and beyond through the promotion of European expertise in problem framing and development of sustainable solutions for high mountains under the ever increasing pressure from tourism, recreation, urbanisation as well as global environmental change, such as climate change and large-scale environmental pollution. We put emphasis on knowledge co-production exercises involving researchers and representatives of relevant stakeholders. More specifically, **the School aims to:**

- build knowledge on the principles of the development of ecological and institutional monitoring (including citizen science) through the analysis of the EU experience and its relevance in Russian context, and apply technological and policy innovations in Siberia;
- build understanding on how are science-policy interfaces in governance of mountain ecosystems designed and how they work; build awareness of EU institutions regulating mountain social-ecological systems and their relevance in other national contexts based on comparisons of EU and Siberian experiences;
- develop understanding of sustainable development goals (SDGs) and sustainability indicators for mountain social-ecological ecosystems, including vulnerability indicators, and their social aspects;
- create the awareness of the concept of early warnings as applied to mountain ecosystems, and of the concept of the precautionary principle and its applications in the EU and elsewhere;
- develop innovative solutions and implementation plan to tackle specific, real-life local challenges (Cases) in co-production process with relevant stakeholders; and, ultimately
- create a cross-border praxis-academia community involved to the governance mountainous socio-ecological systems across Eurasia.

## Program overview

The school consists of the following **periods**:

**Pre-School period** (May 15-July 15, 2018): pre-course reading and case study materials (made available through a dedicated e-learning site from June 30, 2018), development and collection of course participants profiles with short visions for the course (to be compiled to the course participant directory) and an introductory pre-course preparatory assignment, including the choice of the destination and a preliminary topic for group research in Altai Mountains.

**Preparatory School** is open from July 15 to 18, 2018 in Krasnoyarsk at Siberian Federal University for Russian-speaking participants only, who need to adjust to the intensive pace of an international activity training, and to familiarise themselves with the terminology used in the international literature. The program will include introductory sessions by resident and guest faculty of Siberian Federal University and a short field research training in **“Stolby” Nature Reserve**, a large nature protected area featuring unique biodiversity and geological formations, just on the outskirts of the city. The focus of the field training will be on biodiversity management and governance of a mountainous area under the high recreational and urbanisation pressure.



**In-School period** (or the School proper) is open from July 18 to 29, 2018 in Gorno-Altai State University and at the premises of its partners in **Altai Mountains**, when the main program of the School takes place (see more in the detailed School agenda). During the in-school period we will offer a number of highly interactive sessions designed to familiarise the audience with the state of art in the field and analytical tools; this will be followed by supervised group research, and then by presentations of research findings to the school faculty and stakeholders (see the detailed Agenda). The topics for group research will be identified by students with a help of the School faculty and stakeholder representatives. To facilitate the process, we will prepare comprehensive descriptions of the case studies (see the preliminary Summer School program for short versions), each characterised by several interrelated environmental or socio-economic conflicts. The task of student groups would be to identify the particular problem they want or are capable to analyse and address given time and resource constraints, to develop research proposals containing the research question, its justification and research methodology, and to perform the research.

**After-School**, that is the time for finishing the in-School commitments and following-up. We will collect research reports and make them available to all the participants, stakeholders and partner universities for curriculum development and learning purposes. We will encourage the students and supervising faculty to re-develop their research reports to academic papers; subject to the quality and number of quality papers, we will consider a special issue of an international peer-reviewed journal.

## Eligibility, conditions, logistics

We will also do our best to create intellectually stimulating, creative and stress-free working and living environments. It is of utmost importance to us that the School participants not only receive useful knowledge and add new contacts to their networks, but also enjoy Siberia and have your rest. Altai is known as one the Russia's most beautiful areas, and this is for reason. We will work on achieving good work-life balance to ensure that you will have positive and lasting memory of the Summer School and Siberia.

**Travel and accommodation** will be centrally arranged by organisers, however they need to be covered by participants. We are striving to find the most cost efficient however decent options for accommodation and catering, while local transportation will be partly subsidised by Gorno-Altai State University (except the transfer between Krasnoyarsk and Gorno-Altai for for the participants of the Preparatory School). The character and cost of accommodation and catering will be varying, subject to the selected research track; some case study options imply living in tents and cooking outdoors. Full information will be provided in due course.

**The School target audience** are senior master's and PhD students, junior researchers and faculty, as well as civil servants, environmental activists and anyone interested in the management and governance of mountain systems, EU studies, and governance of natural resources in general.

**The School working language** is English. We are expecting, however, that most of our participants will come from Russia, and we will be working on eliminating the language barrier; on the measures we are taking towards this is our preparatory School in Krasnoyarsk.



**What happens next?** All the presentations will be followed up by structured feedback and recommendations for further work on research findings to bring them into a publishable form. Subject to the quality of findings, the School faculty will discuss options for joint publications in Russian and international peer-reviewed journals and/or for inviting contributions to a textbook on systems for monitoring, reporting and verification.

Please be aware that in the field research area there is a risk of exposure to ticks-borne encephalitis (TBE). The participants will be therefore required either to be TBE-vaccinated or to arrange a TBE insurance (it is arrangeable through the university or private insurance providers; the approximate cost is RUB 300).



## The School faculty and tutors

**Sybille van den Hove**, Bridging for Sustainability (Brussels, Belgium) (via teleconferencing)

**Tatiana Iashina**, Altai-Sayan Mountain Partnership (Gorno-Altai, Russia)

**Natalia Iurkova**, Gorno-Altai State University (Gorno-Altai, Russia)

**Kadri Kask**, Estonian University of Life Sciences (Tartu, Estonia)

**Viktar Kireyev**, Siberian Federal University (Krasnoyarsk, Russia)

**Valdo Kuusemets**, Estonian University of Life Sciences (Tartu, Estonia)

**Olga Likhacheva**, Pskov State University (Pskov, Russia)

**Nina Pakharkova**, Siberian Federal University (Krasnoyarsk, Russia)

**Petra Pröll**, University of Salzburg (Salzburg, Austria)

**Tatiana Shashkova**, Siberian Federal University (Krasnoyarsk, Russia)

**Anton Shkaruba**, Erda RTE (The Hague, The Netherlands)

**Galina Sorokina**, Siberian Federal University (Krasnoyarsk, Russia)

**Olga Zhuravleva**, Gorno-Altai State University (Gorno-Altai, Russia)

## Coordinating team

**Tatiana Iashina**, focal point for Altai-Sayan Mountain Partnership and Katunski Reserve

**Natalia Iurkova**, focal point for Gorno-Altai State University & School co-director

**Nina Pakharkova**, focal point for Siberian Federal University & School co-director

**Eduard Podgaiski**, focal point for Russian State Hydrometeorological University

**Anton Shkaruba**, School academic director

**Galina Sorokina**, organisational support from the Jean Monnet project SMART at Siberian Federal University

## Contacts, information and updates

- logistics, accommodation, applications, enrolment and School charges: **Nina Pakharkova**, [nina.pakharkova@yandex.ru](mailto:nina.pakharkova@yandex.ru), and **Natalia Iurkova**, [dipgasu@mail.ru](mailto:dipgasu@mail.ru)
- academic planning and research: **Anton Shkaruba**, [shkarubaa@ce.u.edu](mailto:shkarubaa@ce.u.edu)

<http://www.sfu-kras.ru/en/education/courses/ecological-school>



## Detailed schedule of the summer School “Monitoring and early warnings in mountain social-ecological systems”

### July 15, Sunday

- arrivals of the participants in Krasnoyarsk

### July 16, Monday

9.00 – 10.00 course registration (Entrance Hall, SibFU Library, 79/10 Svobodny prospect)

10.00 – 10.20 opening ceremony; welcome from Director of the SibFU School of Ecology and Geography, presentation of the Summer school, including the academic component (Anton Shkaruba), house rules (Nina Pakharkova) and logistics (Galina Sorokina) – Room 44-12 (SibFU, 79 Svobodny prospect)

10.20 – 11.00 Introduction of the participants - Room 44-12 (SibFU, 79 Svobodny prospect)

11.00 – 12.00 Sustainable development and introduction to environmental governance (Anton Shkaruba, Viktor Kireyeu) - Room 44-12 (SibFU, 79 Svobodny prospect)

12.00 – 13.00 lunch (SibFU canteen)

13.00 – 14.00 Campus excursion (Start from Entrance Hall, SibFU Library, 79/10 Svobodny prospect)

14.00 – 16.00 Urbanization in the alps - forms and impacts on the environment (Petra Pröll) - Room 44-12 (SibFU, 79 Svobodny prospect)

16.00 – 19.00 – city tour

### July 17, Tuesday

9.00 – 19.00 – Field program at Stolby Nature Reserve – an introductory session, a research excursion and a wrap-up seminar (Start from SibFU Library parking lot)

### July 18, Wednesday

Departure from Krasnoyarsk Main Railway Station for Biisk (time and train are TBD later)

### July 19, Thursday

Arrival to Biisk and bus transfer to Gorno-Altai

Arrival to the tourist camp “Manzherok”

13.00-14.00 – Lunch

18.30-19.30 – Dinner

From 20.00 – an ice-breaker and introduction of faculty and participants

### July 20, Friday

9.00 – 10.00 – breakfast

10.00 – 11.30 – Early warnings and sustainability transition: European and Siberian contexts (Anton Shkaruba)

11.30 – 13.00 – Knowledge management, communication strategies and citizen science applications (Viktor Kireyeu, Eduard Podgaiskii)

13.00-14.00 – Lunch

14.00 – 15.30 – Structuring and analysis of policy problems (Anton Shkaruba, Olga Likhacheva, Sybille van den Hove – by Skype)

15.30 – 17.00 – Mountain ecosystems: policy and management contexts (tbd)

17.00 – 18.00 – Introduction to case studies (Natalia Iurkova, Olga Zhuravleva, Klimova Oxana)

18.00-19.00 – Dinner

### July 21, Saturday

9.00 – 10.00 – breakfast



- 10.00 – 11.00 – Selection of cases study groups – a mediation exercise (all the faculty)
- 11.00 – 12.00 – Policy frameworks for natural resource governance in Russia (Olga Likhacheva, Viktor Kireyeu)
- 12.00 – 13.00 – Development of research strategies and plans – mediated group work (supported by all the faculty)
- 13.00-14.00 – Lunch
- 14.00 – 18.00 – Presentations of case studies, brainstorming and development of research plans (supported by all the faculty)
- 18.00-19.00 – Dinner

### July 22, Sunday

- 7.30 – 8.30 – breakfast
- Early departure to case study research areas (the lake of Teleckoye and Katunski Nature Reserve) (8.00); start of field works near Manzherok
- Recognition excursions upon arrival

### July 23-26, Monday-Thursday

- Field work in case study locations

### July 27, Friday

- Early departure for the Manzherok tourist camp
- Work on project presentations
- 18.00-19.00 – Dinner

### July 28, Saturday

- 9.00 – 10.00 – breakfast
- 10.00 - 13.00 – work on group projects
- 13.00-14.00 – Lunch
- 14.00 - 17.00 – presentation of project findings
- 18.00 – Farewell dinner

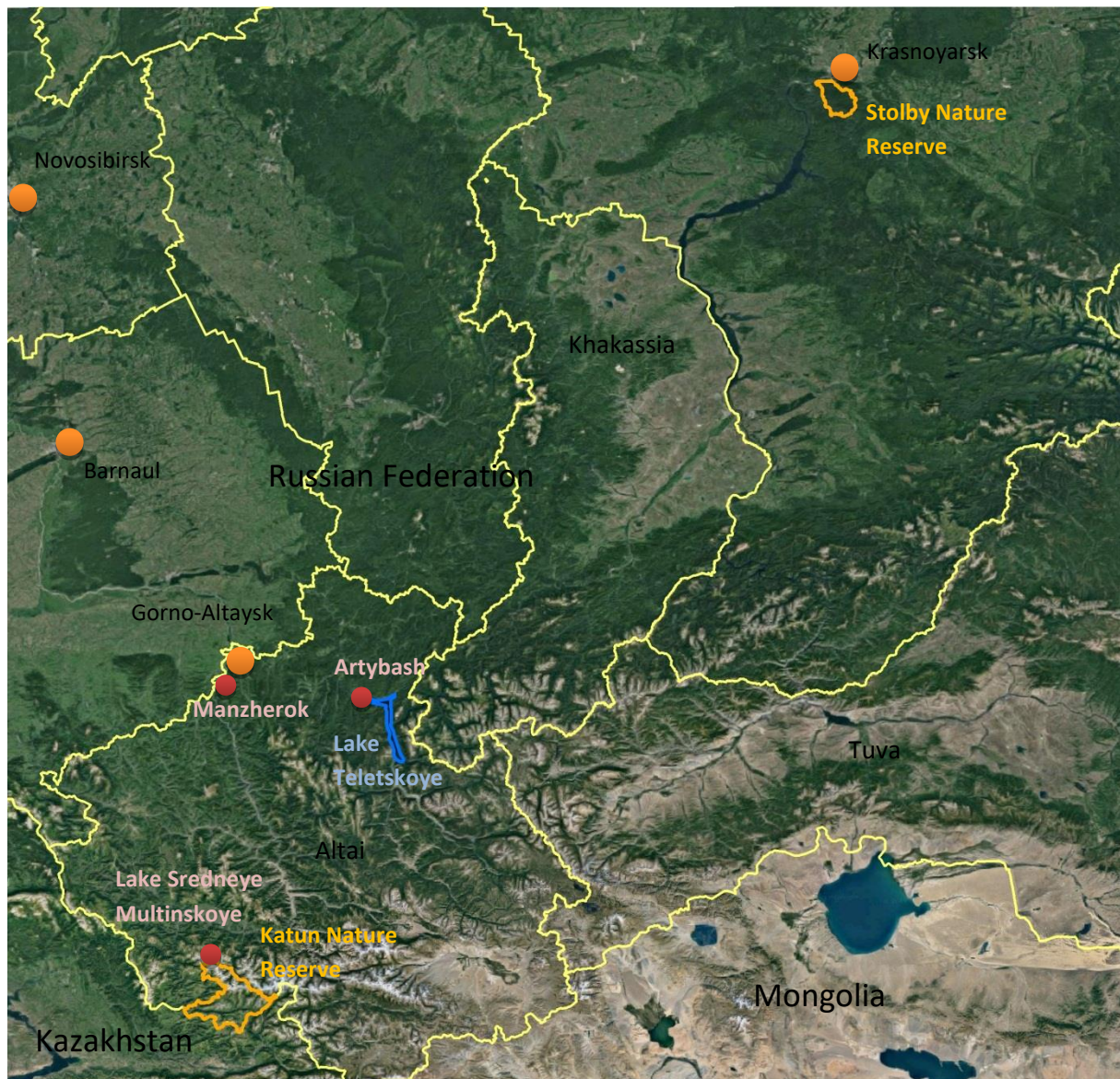
### July 29, Sunday

- 9.00 – 10.00 – breakfast
- 13.00-14.00 – Lunch
- from 14.00 – departures

## Group research – the concept, ideas for the research framework and sectors

### The research framework

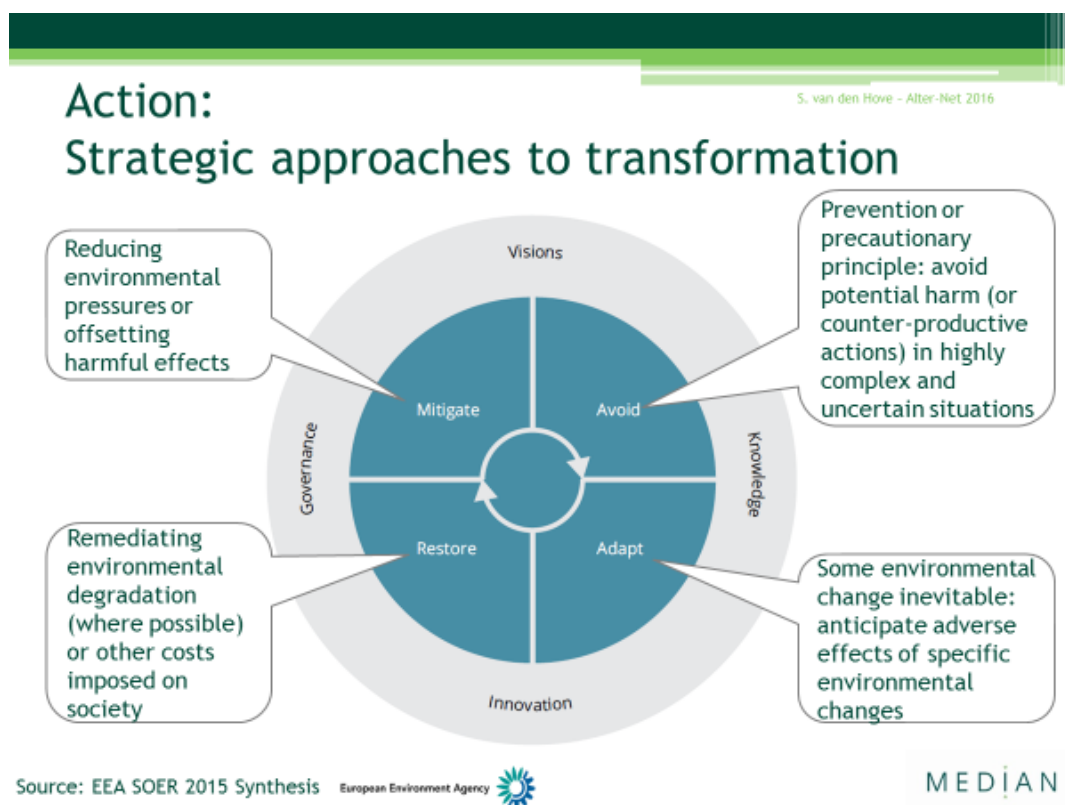
The central component of the School is supervised group research. The research groups (3-5 participants) will be expected to address the issues of socio-ecological monitoring, recognition and communication of early warnings in the context of socio-economic transition to free market and/or transboundary governance of mountain socio-ecological systems. The case studies will be set at three locations in Altai Mountains characterised by a broad range of sustainability issues and disturbing trends. The first one is the Lake of Teletskoye, the second is Katunski Nature Reserve, and the third one is by the Lake of Manzherok (see the map).





The overall approach to problem solving will be taken from EU policies concerned with land-use, water and biodiversity governance, risk management and precaution, and mediation of transboundary conflicts. Possible areas of research inquiry may include identification of tipping points and development of sustainability indicators, valorisation of ecosystem services, appropriate governance arrangement for public involvement in environmental decision-making and citizen science (including technological developments, such as internet of things), development of science-policy interfaces and communication of scientific uncertainty, risk management approaches and the applications of the precautionary principle, all in the context of creation of sustainable livelihoods and/or ecological sustainability of Altai Mountains and/or the surrounding regions. The examples of the sectors addressed by group research include game management, forestry, agriculture, energy, tourism (in particular, green and scientific tourism emerging in Russia), local communities (including economics and infrastructure).

The research reflection can be structured according to the following strategic approaches to transformation: Mitigate, Adapt, Avoid, restore (SOER 2015 synthesis).



The research will be implemented according to research plans prepared during case study introduction and brainstorming sessions at the beginning of the School. If necessary, the participants might have an opportunity to arrange interviews with the representatives of stakeholder groups in

Gorno-Altaysk and elsewhere in the region, while most of the research will be done by the Lakes of Teletskoye and Manzherok, Katunski Nature Reserve and their neighbourhood.

## Overview of case areas and topic suggestions

All the topics proposed by case study groups need to deal with the identification and analysis of negative trends threatening the sustainability of socio-ecological systems of Altai Mountains, to suggest the directions for addressing the emerging problems and / or (more realistic) for its better understanding and future research inquiry, including (where relevant) the indicators describing the state of the system and its dynamics. We encourage analytical comparisons with the EU context and/or references to EU policies or practices succeeding or failing to address similar issues.

The topics we suggest here are indicative, and we consider them as starting points for discussions within interest groups rather than options to choose from. All of them offer good opportunities to explore such issues as promotion of ecosystem services and nature-based solutions, development and promotion of local and indigenous knowledge and management practices, development and effectiveness of science-policy interfaces, communication tools and strategies in general (e.g. general issues of environmental awareness as well as more specific tools), adequacy of monitoring systems in place (in a broad sense) and their role in decision- and policy-making, governance fits/misfits and interplays, options for green economy, adaptive (co-)management and applications for preventive approaches, the precautionary principle etc.

### The Lake of Teletskoye

The lake of Teletskoye is the largest water body of Altai stretching over 77 km and containing c.a. 40 km<sup>3</sup> of fresh water. Due to high water quality, stunning scenery and relative proximity to and easy access to Gorno-Altaysk, the area by the lake is experiencing a lot of pressure from ever increasing number of visitors and rapidly developing HORECA sector. For case study research we suggest to consider the following topics:

- **Vulnerability to climate change** and climate change threats in the context of other environmental impacts on the lake and its watershed; plausible scenarios; institutions, their interplays and fit with the biophysical system; science-policy interfaces, boundary organisations and objects (e.g. indicators).
- **Eutrophication**: worrying trends of nutrient fluxes and comforting discourses; indications of early warning, their recognition by stakeholders and in higher policy floors, communication



and perception; management and technological solutions, including ecolabelling, campaigning and promotion for phosphorus-neutral detergents etc.

- **Waste management**, including waste generation, disposal and recycling; policy framework, actors and their vested interest; solutions related to policy and technological innovation, including ICT tools.
- **Sanitation and water supply**, in particular sewage systems of the growing HORECA sector; policy framework, actors and their vested interest; solutions related to policy and technological innovation, including ICT tools.
- **Fleet of boats** is rapidly growing on the lake, and as long as its large portion are Soviet-produced vessels, and because the level of technical maintenance is not very advanced, this represents a significant and growing source of environmental pollution; policy and management tools (including monitoring, reporting, enforcement and communication) are to be explored to identify plausible solutions.
- **Teletskoye Partnership** is a broad and active partnership of stakeholders exploiting the resources of the lake; they are genuinely concerned about the state of the lake and its capacity to serve as a resource system; the question would be about the potential of the Partnership to promote sustainable development goals, as well as constraints and enabling conditions for such a role.

### Katunski Reserve

Katunski Biosphere Reserve with its unique biodiversity and breath-taking scenery is listed as a UNESCO World Heritage site. The proposed research topics are related to the vulnerability of the biophysical system, but also indigenous and traditional management practices, and Reserve's location by the border:

- **Forest fires and reforestation**: the problem of forest fires is growing, and in the Reserve it needs to be analysed from the perspectives of management options for the implementation of forestry measures in a protected areas with troubled access, as well as from the perspectives of enabling governance conditions. Conceptually it borders with the problem of **drying coniferous forests**, in particular Larch and Spruce stands.



- **Melting glaciers**, partly due to warming climate and partly to long-range environmental pollution, is a problem with a broad range of implications to ecosystems and human well-being in the Reserve and its neighbourhood. The implications have to do with environmental status of aquatic systems, geohazards (including land-slides and avalanches), water supply and sanitation etc.; the research can explore the biophysical system and develop boundary objects and communicating strategies to ensure that emerging issues are recognised and addressed, in particular where vulnerable ecosystems and social groups are concerned.
- The Reserve is a home to **indigenous communities**, and their traditional management practices often conflict with biodiversity conservation targets and activities; the research can address these issues, in particular by exploring perceptions and behavioural models of local people, as well as the flexibility of biodiversity conservation concepts and policy frameworks, so collaboration options could be identified.
- The Reserve is located by the borders with Kazakhstan, China and Mongolia, which are dividing basically the same **transboundary mountain area**; its governance is fragmented by national borders, however the plans to established a transboundary nature reserve are well underway, in particular in the Kazakhstan-Russia segment of the multilateral negotiation process; the research can address these issue through the analysis of constraints and enabling conditions for a successful cooperation and its potential threats and benefits, as long as Katunski Reserve is concerned.
- The number of **visitors to the Reserve** is growing that calls for rethinking the scheme of visitor management that is currently in place; a new governance and management shall account for biophysical and socio-economic status of the livelihood, and take into account the emerging trends, in particular global and regional environmental changes; the research group may offer conceptual guidelines, plausible scenarios or sustainability indicators that could support the development of a new management and governance model.

## Manzherok

Manzherok is a recreational area by the lake with the same name, just 30 km away from Gorno-Altaisk. It is also one of the oldest recreational areas in the neighbourhood, while the area is also relatively densely populated. The most important sustainability issues are therefore related to intensive recreational use and the rural/urban sprawl. We suggest the following topics characterising this location:

- **Renewable energy**, most of all solar generation in the area are supported by the dedicated program of the Republic of Altai that is rather a unique situation in Russia; the area, in particular the village of Maima, area locations of some ambitious solar generation projects; the group may explore the efficiency of the support, the barriers and enabling conditions, which are relevant for this specific location, as well as the multiplier effect of the program and the lessons it can offer to other (mountain) locations.
- **Urban and rural sprawl** is an important land-use driver in the area; the group may want to explore socio-economic drivers behind the process, institutional conditions, and what measure for the sprawl containment would be efficient and appropriate in this governance situation.

