

As model regions for balancing ecological with economic and social needs, biosphere reserves, by involving local stakeholders, are intended to test and develop future-oriented solutions for today's challenges in mountain regions, such as food security, poverty reduction, erosion, global warming and the conservation of biodiversity. However, the challenging task of implementing UNESCO's Man and the Biosphere Reserve concept in an ideal manner may be a little over-ambitious. The reality sometimes shows a different picture.

In this publication you will find various examples – good and critical ones – of mountain biosphere reserves from all over the world and read about the important roles they play as sites for conserving biodiversity, for international science collaboration, and for enhancing the sustainable use of natural resources.



ISBN: 978-3-7001-6968-0



Celebrating 40 years of UNESCO's MAB Programme: an Austrian contribution

Biosphere Reserves in the Mountains of the World

Excellence in the Clouds?



Austrian Academy of Sciences Press, Vienna 2011

Abbreviations	4
Preface by Thomas Schaaf	5
Mountain Regions of the World – Threats and Potentials for Conservation and Sustainable Use	7
An Overview of the World's Mountain Environments by Georg Grabherr & Bruno Messerli	8
Europe's Mountain Biodiversity: Status and Threats by Marcus Zisenis & Martin F. Price	15
Sustainability and the Biosphere Reserve: A Compromise between Biodiversity, Conservation and Farmscape Transformation by Fausto O. Sarmiento	19
Towards Effective Conservation in Mountains: Protected Areas and Biosphere Reserves by David Rodríguez-Rodríguez & Bastian Bomhard	24
UNESCO's MAB Programme – The Role of Biosphere Reserves in the Mountain Regions of the World	29
The Development of UNESCO's MAB Programme, with a Special Focus on Mountain Aspects by Sigrun Lange	30
Biosphere Reserves in European Mountains: an Exploratory Survey by Diana Borowski & Catalina Munteanu	35
The MAB Programme – Vision and Reality: Case Study of the Transboundary Tatry Biosphere Reserve by Ivan Vološčuk	41
Worldwide Case Studies – The Role of Biosphere Reserves in Research and Monitoring	45
Monitoring Global Change in Mountain Biosphere Reserves: GLOCHAMORE, GLOCHAMOST and GLORIA by Sigrun Lange	46
Sierra Nevada Observatory for Monitoring Global Change: Towards the Adaptive Management of Natural Resources by F.J. Bonet, R. Aspizua, R. Zamora, F. Javier Sánchez, F. Javier Cano-Manuel & I. Henares	48
Monitoring Climate Change Effects in the Katunskiy Biosphere Reserve (Russian Federation) by Tatjana Yashina & Igor Artemov	53
First Steps towards Social Monitoring in Biosphere Reserves by Sigrun Lange	57
A New Label for Biosphere Reserves with a Long Research Tradition? The Case of the Gossenköllesee BR, Austria by Günter Köck	60
A Piece of Wilderness: The Conservation of the Primeval Beech Forests in the Carpathian Biosphere Reserve, Ukraine by Fedir Hamor, Vasyl Pokynchereda, Victoria Gubko & Yaroslav Dovhanych	64
Worldwide Case Studies – The Challenge of Reconciling Conservation and Sustainable Development	69
Altayskiy Biosphere Reserve: Indigenous and Local People's Contribution to Conservation and Sustainable Development by Yuri Badenkov, Svetlana Shigreva & Igor Kalmikov	70

Content

Central Asia's Blue Pearl: The Issyk Kul BR in Kyrgyzstan by Matthias Schmidt	73
Ecotourism in Nanda Devi Biosphere Reserve: A Win-Win Option for Environmental Conservation and Sustainable Livelihoods By K.G. Saxena, R.K. Maikhuri & K.S. Rao	77
Arganeraie Biosphere Reserve, Morocco, and the Role of Women's Cooperatives by Mohamed Boussaid	81
Conserving Biodiversity for the Sake of Local People: Why Biosphere Reserves are Ideal Development Instruments for Ethiopia by Sisay Nune	84
Saving the Wild Coffee Forests – Joint Forces for Kafa BR by Svane Bender-Kaphengst	89
The Sierra Nevada de Santa Marta Biosphere Reserve, Colombia – The Origin of 'Coffee K.U.L.T.' ® by Lydia Thiel & Dirk Effler	93
Increasing Energy Efficiency – the Case Study of Großes Walsertal Biosphere Reserve by Sigrun Lange	96
Worldwide Case Studies – Model Regions for Participatory Approaches, Global Networking and Effective Evaluation	99
Education and Training for Conservation: the Case of the Sierra Gorda Biosphere Reserve, Mexico by Roberto Pedraza	100
Key Factors for a Successful Implementation of the Biosphere Reserve Concept – the Example of the Mexican Sierra Gorda by Monika Bertzky	102
Biodiversity Conservation in the Transboundary Biosphere Reserve of Krkonose/Karkonosze by Jiri Flousek & Jakub Kaspar	104
International Partnerships and Learning Platforms: The Cooperation between a German and Several Canadian BRs by Rebecca Pollock, Karl-Friedrich Abe, Reinhard Braun, Andrew Hawrysh & Claude LeTarte	108
Tracking Management Effectiveness: Experiences from two Carpathian Biosphere Reserves by Cristian-Remus Papp	112
Imprint	116
Authors	117



Lake Issyk Kul is said to be the second largest high-mountain lake in the world (© Matthias Schmidt).

Central Asia's Blue Pearl: The Issyk Kul Biosphere Reserve in Kyrgyzstan

by Matthias Schmidt

The post-Soviet states of Central Asia have faced significant changes over the past two decades: The dissolution of the Soviet Union was followed not only by political change but also by the efforts of nation building, economic decline and increasing individual insecurity. To put a region of 43,116 square kilometres inhabited by more than 400,000 people under protection was a courageous idea indeed, considering that the area accounts for more than a fifth of the territory and population of the Kyrgyz Republic which was founded in 1991. The realisation of such a project, however, was probably only possible in view of the fluid times of political and economic transformation, administrative reorganisation and the confrontation with new ideas of nature conservation and strong influences from the West. In 1995 scientists and environmentalists from Germany, supported by the Naturschutzbund Deutschland (NABU) and the Gesellschaft für Technische Zusammenarbeit (GTZ), took the initiative and consulted the Kyrgyz Government to establish a nature reserve zone around Lake Issyk Kul including parts of the Central Tian Shan. In 2001, this region became one of the largest biosphere reserves in the world.

Unique landscape around Issyk Kul

Lake Issyk Kul covers an area of 6,236 square kilometres and is located in the middle of the Asian landmass, in a region dominated by steppes, deserts and mountain ranges. Issyk Kul is said to be the second largest high-mountain lake in the world. Despite its high continental location at an altitude of 1,608 metres above sea level (m.a.s.l.), the (668 metres) deep lake does not freeze up during winter owing to its brackish quality and some hot springs feeding into the lake. One interpretation of the lake's name as 'Hot Lake' relates to this fact. According to another translation, Issyk Kul means 'Holy Lake' which highlights the spiritual and cultural importance of the large lake to the Kyrgyz people. The lake and its surrounding high mountains of the Central Tian Shan, rising up to Pik Pobeda – at 7,439 metres the highest peak of Kyrgyzstan and the second highest of the former Soviet Union – host a unique fauna and flora as well as numerous cultural historical sites (Uhlemann et al. 2003).

Great climatic variations within the region due to its mountainous relief and its immense size are reflected in a variety of ecological zones: deserts, semi-deserts, arid and humid steppes, floodplain areas, coniferous and juniper forests, subalpine and alpine grasslands (Gottschling 2002). Marco Polo sheep (*Ovis ammon polii*), Siberian ibex (*Capra sibirica*) and the endangered snow leopard (*Uncia uncia*) are native. Twelve plant species, eight mammals and fifteen bird species are on the Red List of Kyrgyzstan (Skvortsov 1985). The oligotrophic lake itself hosts only small numbers of fish, a result of fatal experiments in the 1970s when non-native species were introduced that led to the near extinction of local fish species. Apart from its ecological uniqueness and its high number of endemic species, the area around Issyk Kul provides the basis for the livelihood of around 425,000 people (2009). Agriculture in the form of arable farming and animal husbandry has long formed the main economic pillar. Its relevance even increased since the dissolution of the USSR, because many people lost their jobs in the context of economic privatisation processes and now depend more than before on local land and natural resources.

Agrarian utilisation is closely connected to altitude. Settlements, gardens, arable fields and grasslands are located in the vicinity of the lake between 1,600 and 2,200 metres, whereas forests, spring and autumn pastures are found at altitudes between 2,200 and 3,000 metres above sea level. The alpine zone ranging from 3,000 to 4,000 metres serves as summer pasture (*jailoo*) for sheep, cattle, horses and yaks (Asykulov & Schmidt 2005). Apart from agriculture, the area around Issyk Kul has valuable mineral resources and is a popular tourist destination. Each summer, up to one million tourists, mainly from Kyrgyzstan itself and from neighbouring Kazakhstan, spend their holidays in one of the resorts on the lake shores.

History of protection

Although most of Kyrgyzstan's population are Muslims, animistic and nature-religious ideas are widespread. Several holy sites (*mazar*) such as springs, hills, mountains, caves or trees can



Fig. 1: Animal husbandry plays a major role in most households in Issyk Kul BR (© Matthias Schmidt).

be found in the area (Dömpke & Musina 2004). They are the destination of many pilgrims who pray at these sites for the realisation of their wishes, such as fertility, rain or healing. As already mentioned Issyk Kul itself is also seen as a holy lake and plays an important role within Kyrgyz tradition and literature, such as in the novels of the world-famous novelist Chinghiz Aitmatov.

Already during the Soviet era, nature conservation zones (*zapovedniki*) were established along the shore line in the western part of the lake and in high mountain areas. These *zapovedniki* followed a strict protection concept according to which people are seen as nature-disturbing factors and should be excluded from the area. Consequently, the *zapovedniki* of the Issyk Kul area covered relatively small, unpopulated and economically unutilised territories. Following the goal of large-scale preservation of the natural and cultural environment around Issyk Kul, new concepts became necessary and were realised in the form of a biosphere reserve (BR). The Issyk Kul BR thus enlarges not only the spatial extent but also the scope of Soviet protection concepts: Humans are explicitly seen as part of the natural and cultural landscape, and its main goals cover not only the conservation of landscapes and cultural sites but also the sustainable economic development of the area. Elements of the development plan comprise the extension of biodiversity, the support of environment-friendly land utilisation practices, including efficient crop rotation, improved irrigation methods and effective usage of fertilisers, as well as ecological education and awareness-raising of the population. Besides, different projects of sustainable agriculture, fruit and wool processing as well as ecotourism were and are carried out (Toktosunov 1998; Hünninghaus 2001).

In line with historically evolved utilisation patterns, the area was divided into four zones: Strict nature conservation obtains in the core zones which are congruent with the already mentioned *zapovedniki* and comprise 3.4 per cent of the territory of the Issyk Kul BR. High mountain steppes and pastures as well as nival regions form the buffer zone that accounts for 81.2 per cent of the whole territory. Arable-field and pasture areas near settlements dominate the transition zones (15.4%), while the reconstruction zones include the main settlements of Karakol, Balykshy and Cholpon Ata as well as the mining areas in which environmental and sustainable reconstruction of old industries and settlements is to be carried out.

Development constraints: ecology versus economy and administrative weaknesses

Owing to its large size, high number of inhabitants, political instability and economic poverty, the Issyk Kul BR is confronted with tremendous problems. Ecological goals compete with the economic interests of international companies and socio-economic concerns of the local population, while public promotion is weak and the administration is characterised by high fluctuation rates and corruption.

Agriculture and animal husbandry as a livelihood strategy

Kyrgyzstan was one of the least industrialised republics of the former Soviet Union. The agrarian sector always played an important role within the economy of Kyrgyzstan. Almost all households in the rural areas of the country are in some ways involved in agricultural activities. The same holds true for the Issyk Kul region where, according to official statistics, more than 70 per cent of the population sustain their livelihood mainly from agriculture (Statistical Committee of the Kyrgyz Republic 2004). In particular, animal husbandry plays a major role in most households within their livelihood strategies (cf. Fig. 1). Apart from income generation by selling meat, milk products and wool, animals represent an important capital that can be converted to cash when required. After the dissolution of the Soviet Union, the number of livestock and sheep decreased dramatically: In Issyk Kul province, sheep flocks diminished from 1.8 million (1991) to 580,000 (1997), with a slight increase to around 690,000 head in 2009. Additionally, around 175,000 cattle, 75,000 horses and 4,000 yaks are kept nowadays (Statistical Committee of the Kyrgyz Republic 2010). Although the number of animals is much lower than at the end of the 1980s, the productivity of the pastures has declined significantly during the past two decades (Aidarbekova 2007). In particular, easily accessible pastures are overstocked nowadays, because remote pastures are often no longer used. In contrast with the large collective farms (*kolkhozes*) of the Soviet system, today the small agricultural units – mainly households – do not have the personnel and organisational means to send their herds to remote pastures. Generally, using the mountain steppes for pasturing as part of the cultural landscape of the Central Tian Shan, does not conflict with the goals of the BR. However, there might be a problem when the number of grazing animals increases further making their density too high in specific areas, resulting in forest and soil degradation processes. Since other income opportunities are scarce, many people either want to enlarge their private herds (Asykulov 2002) or work as labour migrants in Russia or Kazakhstan (Schmidt & Sagynbekova 2008), while the money they send home is also often invested in livestock (Schoch et al. 2010). Remarkably, the majority of the inhabitants of the Issyk Kul BR do not see any relationship between big herds and negative impacts on nature (Asykulov 2002). However, more than half of the pastures in the Issyk Kul area show clear signs of degradation (Aidarbekova 2007).

Arable farming in the form of rain-fed and irrigated agriculture is practised on seven per cent of the territory of the Issyk Kul BR. Its importance has increased in recent years. Less use of fertilisers and the lack of crop rotation have caused yields to decrease significantly. Furthermore, there is a shortage of agricultural machines and a lack of effective organisation and marketing of agricultural products.

Mineral resources – inheritance burdens and income source

A conflicting discrepancy between economic utilisation and ecological goals is obvious with regard to mining activities in the area. The Kumtor gold mine, run by a Kyrgyz-Canadian syndicate, plays a particularly important role in the national economy of Kyrgyzstan, because it generates more than ten per cent of the national income. The gold mine is located at approx. 4,200 metres above sea level in a zone which is extremely fragile in ecological terms (Fig. 2). For the extraction of gold, large amounts of toxic chemicals are necessary, leading to the contamination of glaciers and high mountain steppes in the vicinity of the mine. Tonnes of highly toxic waste are produced day by day and deposited on site. But the mine is located within the catchment area of the Naryn River, the major tributary of the Syr Darya, which is the lifeline for millions of people in Uzbekistan and Kazakhstan. An accident would have dramatic consequences for all Central Asia. Furthermore, the transport of tonnes of fuel and toxic chemicals across the BR represents a constant danger to the environment and a serious threat to the whole ecosystem. Already in 1998, a truck accident led to the spillage of approx. 1.7 tonnes of cyanide into Lake Issyk Kul, resulting in an ecological disaster (Moldogasieva 1998).



Fig. 2: Gold mine in Issyk Kul BR (© Matthias Schmidt).



Fig. 3: The lake Issyk Kul offers many opportunities for leisure activities (© Matthias Schmidt).

Tourism at Issyk Kul

Tourism is another major economic activity in the area. The Issyk Kul region is the setting for various forms of leisure activities, such as water and beach activities, horse riding, cycling and mountaineering, fishing, hunting and wildlife watching (Fig. 3). By far the most important form of tourism is a kind of mass tourism that populates the lake shores during the summer months. Already in the 1970s and 1980s, 27 leisure zones were allocated to the construction of holiday camps and other tourist infrastructure (Lunkin & Lunkina 1987). Thus, most of the tourists numbering almost one million are concentrated in specific local centres on the shores of Issyk Kul, for example in the city of Cholpon Ata. However, the environmental imprint in these locations is significant: The air is polluted by noise and emissions, refuse is produced, pastures and arable land are used for the construction of hotels, holiday houses and recreational camps. Recent developments and plans within the tourism sector do not take the goals of the BR into account. The planned construction of an international airport near the city of Balykshy would improve accessibility and probably increase the influx of tourists thus presumably exacerbating the impact of tourism on the fragile environment. Ecotourism might be an alternative form of ecologically friendly tourism, but so far it has not fulfilled its potential. The tourists' financial means are low, and they are not able or willing to spend extra money on costly environment-friendly services or products. However, it might be a feasible objective, as well as a step forward, to promote eco-friendlier forms of tourist activities, with a clear indication of hiking routes and camping sites combined with well-targeted marketing of local products.

Weak public relations and institutional framework

A major problem of the Issyk Kul BR is the lack of public awareness of its status. The natural beauty and the popularity of the area are obvious. However, the need to behave appropriately in order to preserve this unique environment is not realised by either the tourists, the miners or the local population. Most of the visitors were not aware of the Issyk Kul BR until they entered the territory and paid a small entrance fee. Unfortunately, there are almost no other signs of its unique status within the area. A notable exception is the Ecocentre in Cholpon Ata (Fig. 4). Promotion and marketing of the BR, as well as environment-friendly land utilisation are almost non-existent and there are very few local products available. It must count as a success that nowadays the people of the area are aware at least that they are living within a biosphere reserve (Asykulov 2002), but to most of them the utilisation and protective functions of the various zones are not at all clear. On the one hand, it might be seen as a positive sign that people do not have to change their behaviour much when becoming part of a conservation zone, but on the other hand, carrying on all their economic activities as usual often runs contrary to ecological goals.

The core problem faced by the administration of the Issyk Kul BR is to be found in its complicated political and administrative responsibilities. Land, forests and water are managed by various administrative units of diverse ministries or departments at

different regional levels (Aidarbekova 2007). Responsibilities and competencies are not always clear which impedes decision-making processes. In addition, political insecurity and frequent changes in the managerial staff prevent a sustainable policy and development. Nepotism and corruption prevail and lead to a situation in which high positions are held by non-experts.

Conclusion

The establishment of the Issyk Kul BR was a foundation stone and the right measure at the right time on the way to preserving the unique landscape of the Central Tian Shan. The idea of protecting the natural and cultural landscape as well as supporting the development of the local population remains persuasive, but unfortunately, this is far from the present reality in Kyrgyzstan. Political instability, administrative disorder, insufficient financial means, nepotism and corruption as well as severe economic problems stand in the way of compliance with conservation rules and a constructive economic development. The local population needs to use local land and natural resources but is not supported by strong institutions in managing these resources in a sustainable way. In the first instance, their basic needs must be covered and they must have hope for a stable and fair political rule – these aspects go beyond the scope of the Biosphere Reserve.

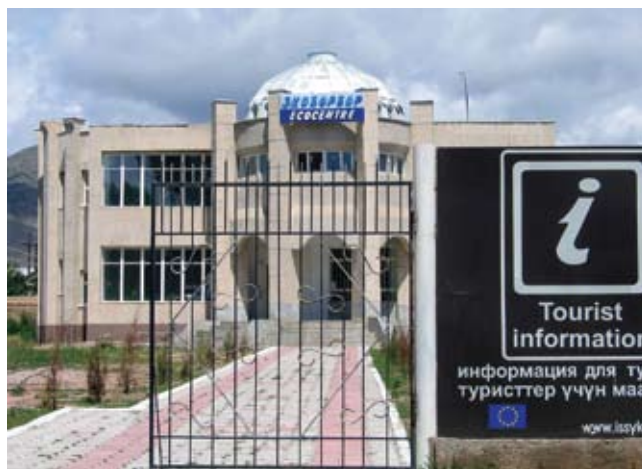


Fig. 4: Eco-centre in the city of Cholpon Ata (Matthias Schmidt).

References

- Aidarbekova, C. (2007). Sustainable management of natural resources in Issyk-Kul Biospheric Territory. Unpublished Report to the European Commission Project 'Development of National Environmental Strategies for Sustainable Development'. Bishkek.
- Asykulov, T. (2002). Sozioökonomische und naturräumliche Bedingungen in Ostkyrgyzstan und die Frage über die Entwicklung des Biosphärenreservats 'Ysyk-Köl'. Unpublished PhD thesis, Ernst-Moritz-Arndt-University Greifswald.
- Asykulov, T. & M. Schmidt (2005). Naturschutzkonzepte im Transformationsprozess: Das Biosphärenreservat Ysyk-Köl in Kirgistan. *Natur und Landschaft* 80, 8: 370–377.
- Dömpke, S. & D. S. Musina (2004). The call of our ancestors. Natural sacred sites in the Issyk-Köl Biosphere Territory. Bishkek.
- Gottschling, H. (2002). Umweltgerechte Landnutzung im Biosphärenreservat Issyk-Kul, Kirgistan. Beiträge aus landschaftökologischer und sozio-ökonomischer Sicht. Heidelberg.
- Hünninghaus, A. (2001). Management von Biosphärenreservaten in Transformationsländern. Dargestellt am Beispiel des Biosphärenreservats Issyk-Köl in Kyrgyzstan. Bochum.
- Lunkin J. M. & T. V. Lunkina (1987). Touristic zones of Kirgizia. Frunze (in Russian).
- Moldogasieva, K. (1998). Ecological catastrophe at Issyk Kul: unexpected scenario and potential consequences. Bishkek (in Russian)
- Schmidt, M. & L. Sagynbekova (2008). Past and present migration patterns in Kyrgyzstan. *Central Asian Survey* 27, 2: 111–127.
- Schoch, N., Steimann, B. & S. Thieme (2010). Migration and animal husbandry: competing or complementary livelihood strategies. Evidence from Kyrgyzstan. *Natural Resources Forum* 34: 211–221.
- Skvortsov, V. I. (Ed.) (1985). Red book of the Kyrgyz SSR. Rare and endangered animal and plant species. Frunze. (in Russian)
- Statistical Committee of the Kyrgyz Republic (2004). Kyrgyzstan in numbers. Bishkek (in Russian)
- Statistical Committee of the Kyrgyz Republic (2010). Census of livestock and poultry in the Kyrgyz Republic in 2009. Bishkek. (in Russian)
- Toktosunov, K. (1998). The Biosphere territory and regional development in the Issyk-Kul region of Kyrgyzstan. In: Dömpke, S. & M. Succow (Eds.). *Cultural landscapes and nature conservation in Northern Eurasia*. Bonn: 200–206.
- Uhlemann, K., Vinnik, D. F. & K. I. Ismanova (2003). Biosphärenreservat Issyk-Kul – Inventar der kulturhistorischen Stätten. Eschborn.