Biodiversity in Central Asia

A Visual Synthesis

Biodiversity in Central Asia:
A Visual Synthesis

based on official country information to the Convention on Biological Diversity, scientific papers and news

The publication has been supported by the Swiss Federal Office for the Environment (FOEN).

The publication aims to contribute to the Aichi Biodiversity Targets 1 and 19 by sharing information and improving public knowledge of biodiversity values, functions, status and trends, main threats and societal responses.

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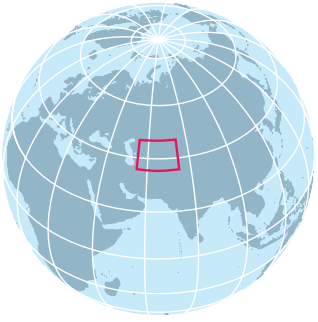

Foreword

A profusion of high mountain ranges rise from the vast flatlands of deserts and steppes in Central Asia and host a rich variety of indigenous and endemic flora and fauna in a range of vibrant ecosystems. Arctic, Mediterranean and Indo-Eurasian species meet and interact in the same East–West crossroads where culture and trade intersect. This hotbed of diversity is an important global treasure and one we must protect. Fortunately, Central Asian nations participate in the main international conventions related to the issue. All Central Asian countries are members of the Convention on Biological Diversity, the UNESCO World Heritage Convention and the Ramsar Convention on Wetlands, and most are members of the Convention on Migratory Species, the Convention on International Trade in Endangered Species and the Cartagena Protocol on Biosafety.

However, progress toward meeting the objectives of these conventions has been uneven, and the 2010 global biodiversity targets were not achieved. Meeting the 2020 Aichi Biodiversity Targets will require a coordinated effort to implement the 2011-2020 Strategic Plan for Biodiversity and the Nagoya Protocol on Access and Benefit Sharing. Close cooperation and coordination between relevant multilateral environment agreements and institutions will be crucial. In this way biodiversity management can benefit from increased synergies, as experience in other areas such as chemical and waste management has shown. With this in mind, this report provides a synthesis of biodiversity information in Central Asia prepared by experts to communicate the challenges of biodiversity protection to global and national audiences. Importantly, the information is presented primarily in a visual format intended to help educators and decision-makers in agriculture, forestry and fisheries understand the scale and complexities of the task ahead.

Regional biodiversity problems became apparent 50 years ago with the disappearance of tigers, and a number of alarming trends have followed. The Aral Sea ecosystem has essentially died, and Issyk-Kul Lake in Kyrgyzstan has experienced a collapse of its fisheries over the past 10 years, and is highly endangered. The teresken bush in the Tajik Pamirs, an important food source for both wild and domestic animals, faces eradication as a result of overgrazing and fuelwood harvesting. Overexploitation of this kind is one of five pressures on biodiversity highlighted in this report. The other four are climate change, pollution, habitat fragmentation and invasive species.

In spite of the missed targets and negative trends, there is much to celebrate – the twentieth anniversaries of national independence of the Central Asian countries, the Rio Conventions and the Global Environment Facility (GEF). This joint anniversary is more than symbolic. Cooperation between the GEF and Central Asian countries has included projects covering a range of ecosystems from deserts to seas to high mountains, and interventions from policy development to education to demonstration projects and many small improvements and innovations. These efforts have produced instances of transboundary cooperation and the joint planning of nature reserves, ecosystem corridors and the protection of natural areas.

Foreign support has also been important in Central Asia. For example, Switzerland has been active there for more than 15 years, providing support for water management, forestry and sustainable mountain development including pasture management, organic agriculture and biodiversity services. A recent example of Swiss assistance is the development of mechanisms for payments for ecosystem services. Switzerland and the Central Asian countries are members of the same GEF group, and with their history of bilateral support, the Swiss are well positioned to represent Central Asia in discussions with the GEF, the World Bank and other prospective donors.

Overall, there is much to look forward to when it comes to preserving biodiversity both globally and in Central Asia. As the 2011-2020 UN Decade on Biodiversity unfolds, this volume will undoubtedly make a key contribution to those efforts.

Bern - Montreal - Geneva 10 January 2012

Franz Perrez
Ambassador, Head of International Affairs Division,
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Executive Secretary
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Indicators	Kazakhstan	Kyrgyzstan	Tajikistan	Turkmenistan	Uzbekistan
Population growth and pressure on ecosystems	↔	↗	↗	↗	↗
Habitat fragmentation and pollution	↗	↔	↔	↗	↗
Climate change impacts	↗	↗	↗	↗	↗
Over-exploitation of biodiversity	↔	↔	↔	↔	↔
Challenges of alien invasive species and biosafety	↗	↗	↗	↗	↗
Ecological footprint	↗	↘	↘	↗	↔
Forest and other wooded land, area	↗	↗	↗	↗	↗
Change in status of threatened species	↗	↗	–	↗	↗
Fish resources and catch: marine	↘	–	–	↘	↘
Fish resources and catch: freshwater	↘	↘	↘	↘	↘
Genetic resources of agrobiodiversity (domestic animals, plants)	↘	↘	↘	↘	↘
Food production	↗	↗	↗	↗	↗
Agricultural and forest areas under sustainable management	↗	↗	↗	↗	↗
Protected areas (number, coverage): terrestrial	↗	↗	↗	→	→
Protected areas (number, coverage): aquatic	↗	↗	↗	→	↗
Protected areas and ecological corridors: cross-border cooperation	↗	↗	↗	↗	↗
Protected areas: management and conservation efficiency	↔	↔	↔	↔	↔
Afforestation efforts, forest fires and diseases control	↔	↔	↘	↔	↔
Botanical gardens, zoos, nurseries, ex-situ conservation	→	→	↘	→	→
Policies and measures on biodiversity: planning	↗	↗	↗	↗	↗
Policies and measures on biodiversity: implementation progress	↔	↔	↔	↔	↔
Biodiversity monitoring, forest inventory	↔	↗	↔	↔	↔

Sources of information: the latest country biodiversity reports to the CBD, the latest UNECE environmental performance reviews, expert interviews. This table was distributed at the Istanbul regional workshop on biodiversity (17-20 October 2011, Turkey) to catalyse discussions on gaps, priorities and lessons for biodiversity conservation.

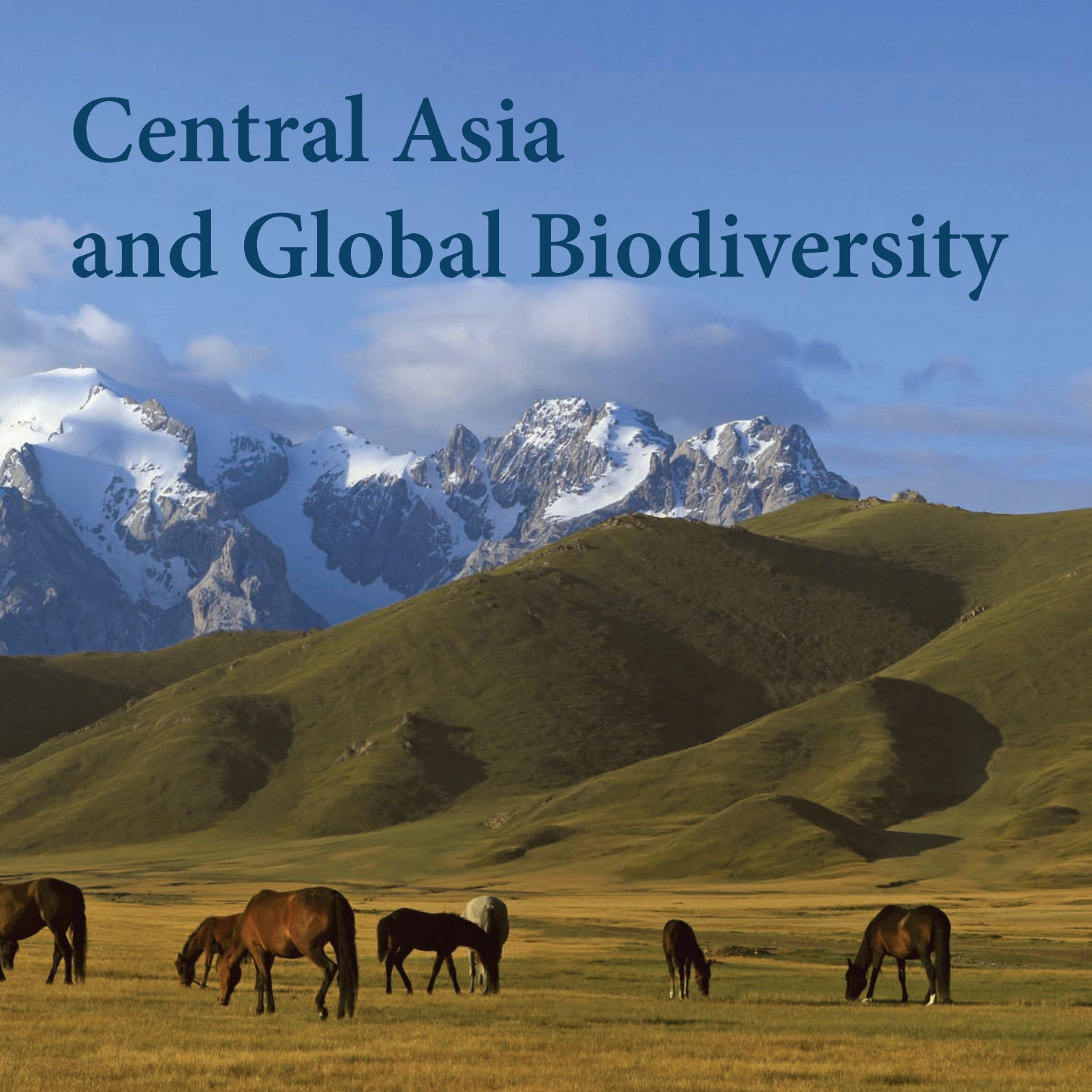
Positive or stable trends:
- ↗ increase, improvement
- → no negative changes
- ↘ reduction of pressures

Negative trends:
- ↗ growing pressures
- ↘ deteriorating capacities or effeciency

Mixed trends:
- ↔

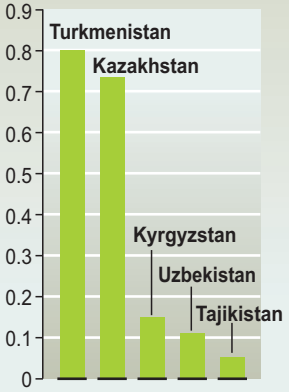
– no data

Central Asia and Global Biodiversity



Forest cover per person

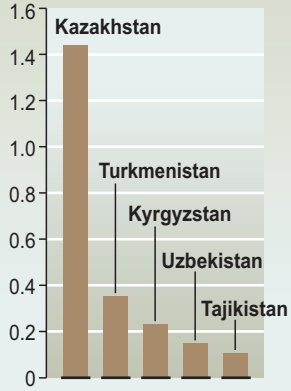
hectares per person



Source: FAOSTAT (faostat.fao.org), data for 2010

Arable land per person

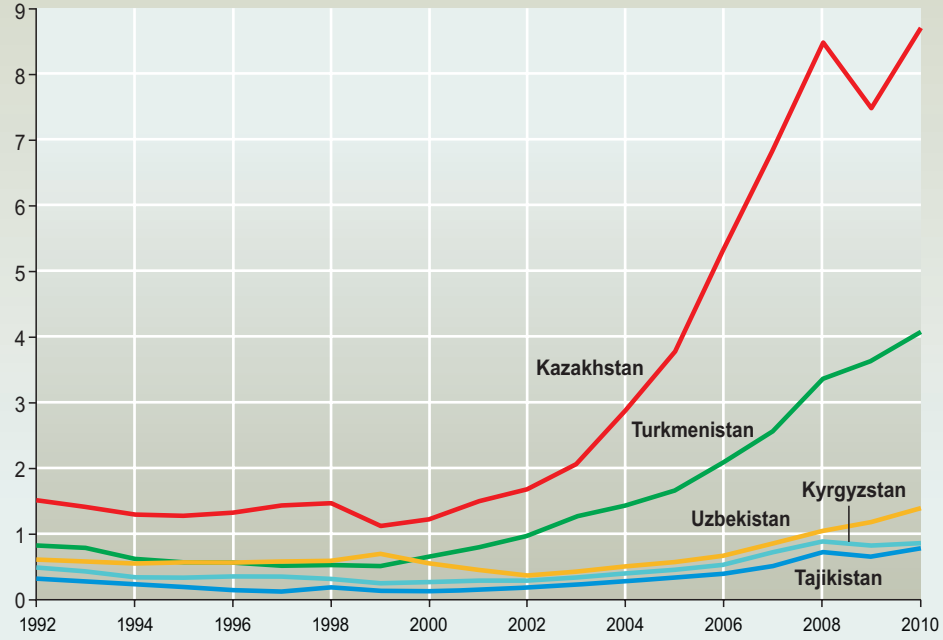
hectares per person



Source: FAOSTAT (faostat.fao.org), data for 2010

Gross National Income per person

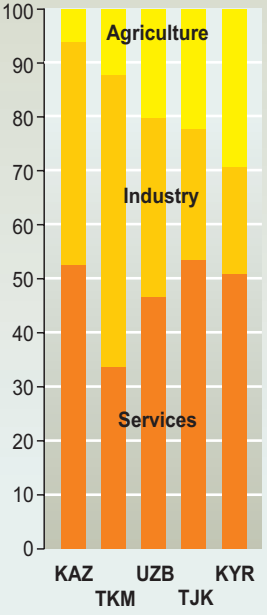
Current U.S. dollars per capita, thousand



Source: World Development Indicators (data.worldbank.org/indicator)

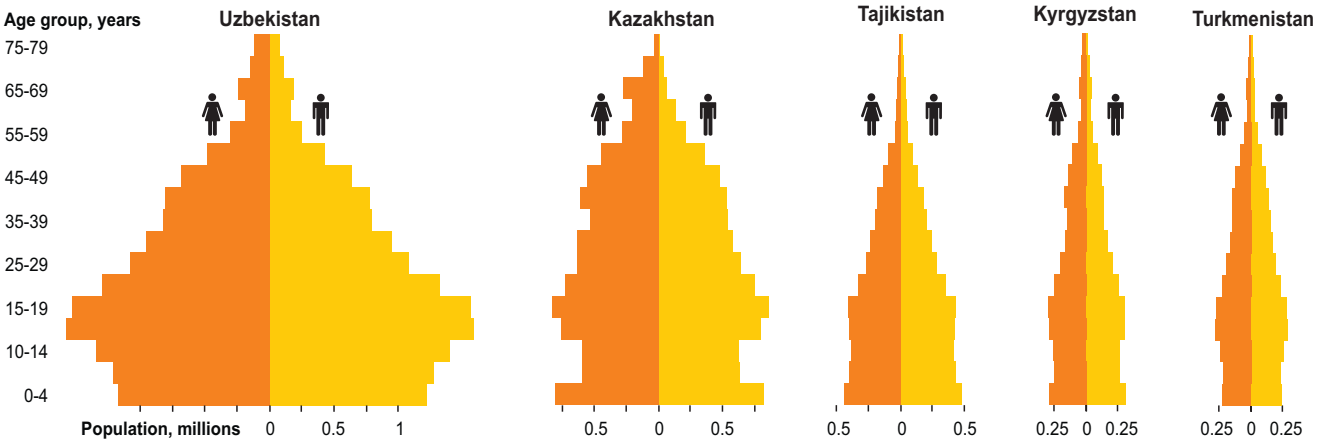
Gross Domestic Product inputs by sectors

per cent



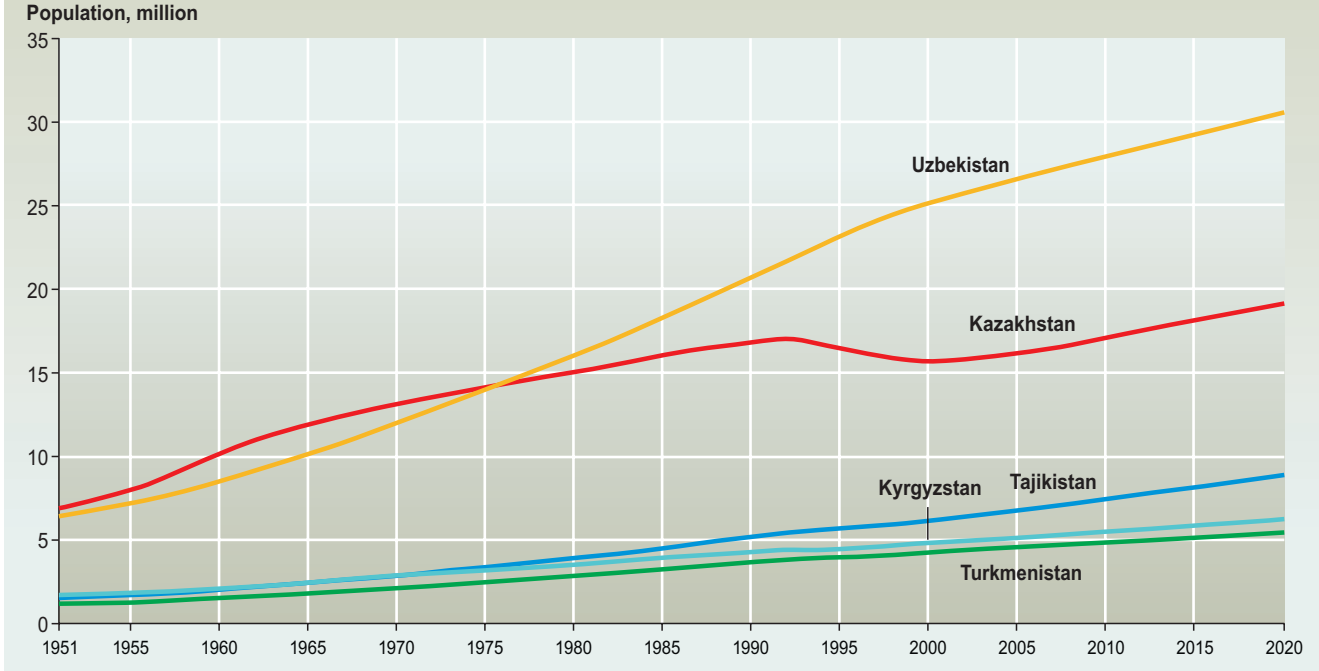
Source: World Development Indicators, data for 2009

Population pyramids: Central Asian nations in 2010

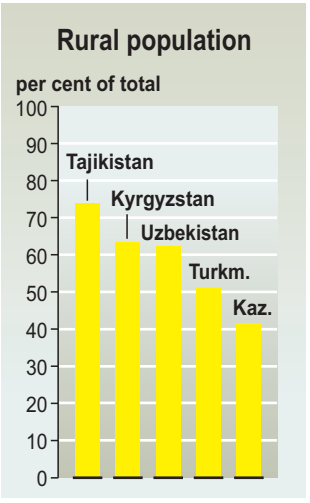


Source: U.S. Census Bureau (www.census.gov/population/international/data/idb/), data for 2010

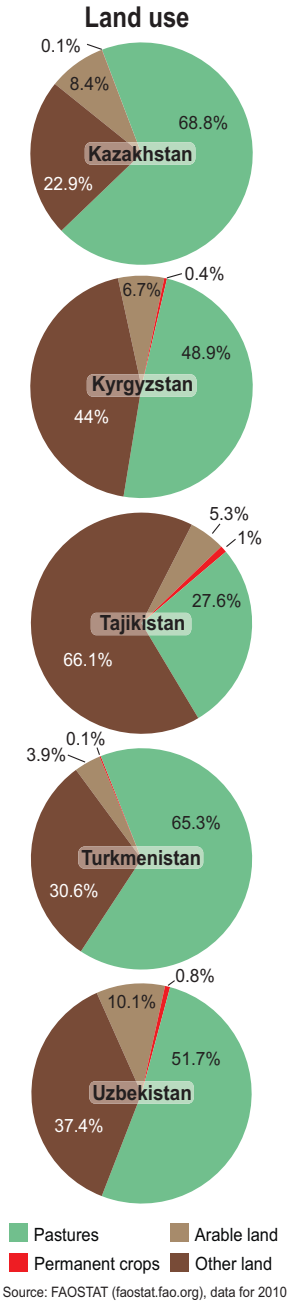
Population growth in Central Asia



Source: U.S. Census Bureau (www.census.gov/population/international/data/idb/), data for 2010



Source: World Development Indicators, data for 2010



Source: FAOSTAT (faostat.fao.org), data for 2010

Central Asia is a largely arid region consisting mainly of steppes, deserts and mountains, though with some more fertile parts, like the Ferghana Valley, which is shared by Uzbekistan, Kyrgyzstan and Tajikistan (the two other countries of the region are Kazakhstan and Turkmenistan). It stretches from the borders of China to the shores of the Caspian Sea, and from Russia to Afghanistan. Traversed by the ancient trade routes known as the Silk Road which linked China and Asia Minor, the region earned a reputation as a crossroads through which goods, people and ideas passed between the furthest reaches of Asia and the whole of Europe. Central Asia was formerly under Soviet rule, and 2011 marks the twentieth anniversary of independence of all five countries.

Kazakhstan and Turkmenistan have the most extensive pastures of the five, and specialize as well in the mining and extraction sectors. Uzbekistan, the most populous country, has a variety of industries, although many of its people work in agriculture. It is among the world's leading countries in cotton production. The mountain states of Kyrgyzstan and Tajikistan have huge potential hydropower reserves, but still have too little fossil fuel energy for their needs. A large part of the rural population of both countries has migrated abroad in search of work.

Despite difficult times immediately after the Soviet collapse, the Central Asian economies have grown rapidly in the past decade, and poverty has been reduced, although growing numbers of people mean there is less land, forest and water available per head (the region is home to more than 60 million people).

Central Asia possesses unique importance for the Earth's biodiversity. It is in the heart of the Eurasian landmass, it contains a very wide variety of landscapes and climates, and the ecosystems and different species it harbours are immensely varied. Many of them are of global as well as regional importance. Both the historical record of impacts on its ecosystems and current trends in the changes affecting them today show that Central Asia's water ecosystems and those affected by agriculture, together with forests, are the features most vulnerable to a mix of human influences.

Some of the most important of these are climate change, invasive species, the degradation of habitats, over-use of resources, and pollution. Many of the most harmful of the human impacts on Central Asia occurred during the decades of Soviet rule: one example is the treatment of the Aral Sea which straddles the border between Kazakhstan and Uzbekistan. The Aral Sea basin was designated by Moscow for growing cotton and now suffers the effects of massive loss of water caused by ill-judged irrigation projects, saturation by pesticide overload, high salinity levels and severe problems for human health.

There has been a direct impact on many of Central Asia's most distinctive species. The snow leopard is now extremely rare throughout most of its range. The last tigers in the region are thought to have been killed in the 1950s. The Caspian's sturgeons and seals have been severely over-exploited and the saiga antelope is critically endangered.

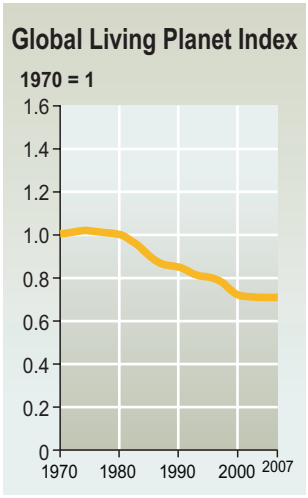
Relative importance of impacts on ecosystems and trends

	Habitat change	Pollution	Overuse	Climate change	Invasive species
Evergreen forests	↘	→	→	↗	
Wild fruit and nut forests	↘	→	↗	↗	↗
Desert forests	↘	→	→	↗	
Tugai and riparian forests	→	→	→	↗	
Deserts and semi-deserts	→	↗	→	↗	
Steppes	↘	→	→	↗	
High mountains (>2500 m)	↗	↗	→	↗	↗
Rivers, lakes, reservoirs	→	↘	→	↗	→
Aral and Caspian Seas	→	→	↘	↗	↗
Agroecosystems	↗	↘	↗	↗	↗

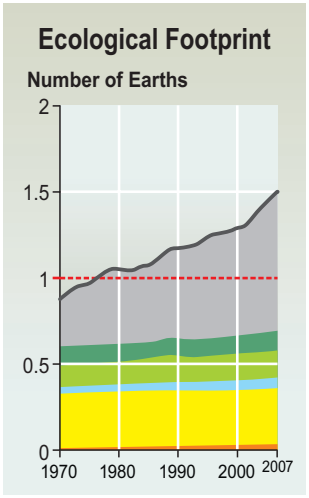
Historical impacts since the 1950s: High, Moderate, Low

Current and ongoing trends: ↗ Increasing impact, → Continuing impact, ↘ Decreasing impact

Sources of information: the latest country biodiversity reports to the CBD, the latest UNECE environmental performance reviews and expert interviews. This table was distributed at the Istanbul regional workshop on biodiversity (17-20 October 2011, Turkey) to catalyse discussions on gaps and priorities for biodiversity conservation. The regional situation may differ from country level. The authors hope that in the new generation of the national biodiversity strategies and action plans countries will report their specific situations in similar fashion.



Source: WWF Living Planet Report 2010

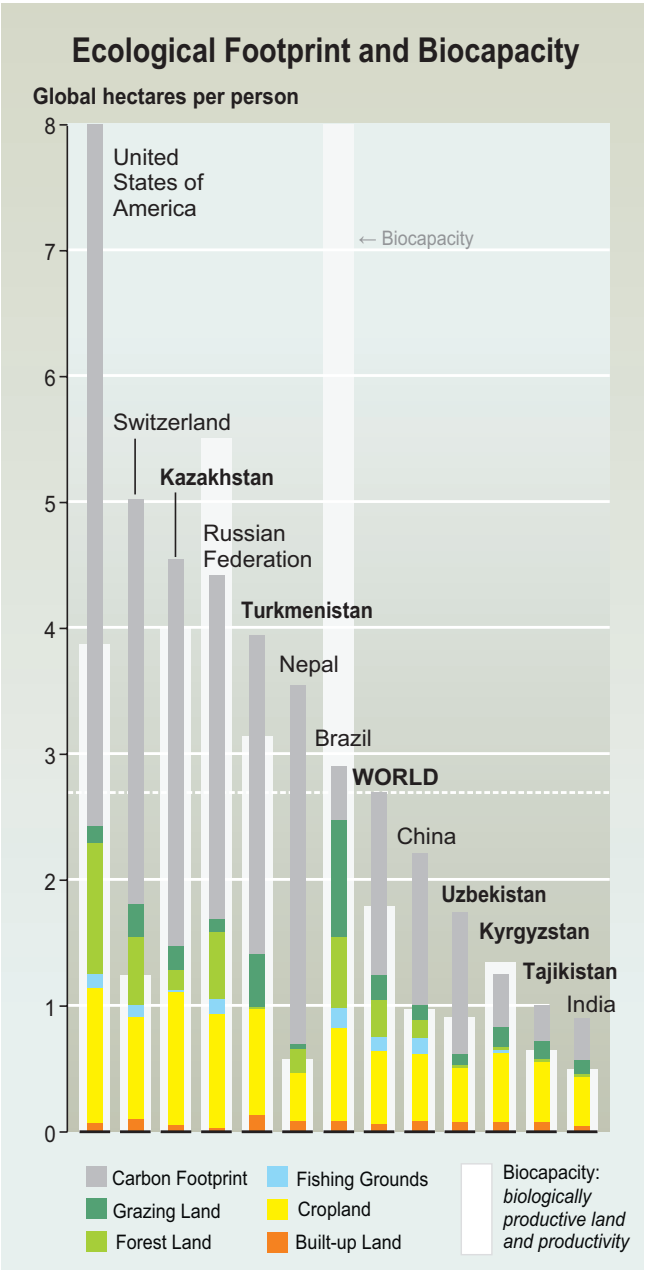


Source: Ecological Footprint Atlas 2010

The Living Planet Index assesses the state of biological diversity by measuring trends in global populations of vertebrates. The Index was developed by the conservation group WWF with the UN Environment Programme's World Conservation Monitoring Centre: WWF is now working with the Zoological Society of London. Between 1970 and 2007 the index fell by 28%, suggesting to scientists that humans are degrading ecosystems faster than ever before.

The ecological footprint measures human demands on planetary ecosystems. It represents how much biologically productive land and sea is needed to supply human consumption and to cope with the resulting waste. So it is possible to estimate how much of the Earth is needed to support the entire human population at a particular lifestyle. In 2007 the footprint was estimated at 1.5 Earths, meaning humans were consuming resources 1.5 times faster than the planet could renew them.

Kazakhstan and Turkmenistan have the highest ecological footprints in Central Asia, more than the world average, mainly due to their high carbon footprints (greenhouse gas emissions). Kyrgyzstan and Tajikistan have the lowest footprints. Of all the Central Asian states, only Kyrgyzstan's footprint lies within the country's biological capacity.



Source: Ecological Footprint Atlas 2010, data for 2007

Key ecosystem communities

1. Pontic steppe
2. Caspian lowland desert
3. Kopet Dag semi-desert
4. Kopet Dag woodlands and forest steppe
5. Kazakh forest steppe
6. Kazakh steppe
7. Kazakh upland
8. Kazakh semi-desert
9. Central Asian northern desert
10. Central Asian southern desert
11. Central Asian riparian woodlands
12. Badghyz and Karabil semi-desert
13. Alai-Western Tian Shan steppe
14. Gissaro-Alai open woodlands
15. Pamir alpine desert and tundra
16. Rock and Ice
17. Tian Shan montane conifer forests
18. Tian Shan montane steppe and meadows
19. Tian Shan foothill arid steppe
20. Emin Valley steppe
21. Altai steppe and semi-desert
22. Junggar Basin semi-desert
23. Altai alpine meadow and tundra
24. Altai montane forest and forest steppe

Source: World Wildlife Fund: Ecoregions of the World (→ www.worldwildlife.org/science/ecoregions/item1267.html)

The Aichi Biodiversity Targets

The world largely failed to meet the 2010 Biodiversity Target to halt the decline of biodiversity set 10 years ago. So a revised and updated Strategic Plan for Biodiversity, including the Aichi Biodiversity Targets, to run from 2011 to 2020, was adopted at the 10th conference of the parties to the Convention on Biological Diversity at its meeting in Japan, in October 2010. They represent a new approach, including tackling the drivers of change. Among their provisions, they require signatories to address the underlying causes of biodiversity loss "by mainstreaming biodiversity across government and society", to reduce direct pressures on biodiversity and promote sustainable use. They seek to improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity, and to enhance the benefits to all from biodiversity and ecosystem services. The Central Asian nations are determined to achieve the Aichi Biodiversity Targets, and a joint approach and synergies with socio-economic development priorities are important for success.

Strategic Goal A *Address the underlying causes of biodiversity loss by mainstreaming biodiversity across government and society*	**1.** People are aware of the values of biodiversity and the steps they can take to conserve and use it sustainably.
	2. Biodiversity values have been integrated into national and local development and poverty reduction strategies and planning processes and are being incorporated into national accounting, as appropriate, and reporting systems.
	3. Incentives, including subsidies,harmful to biodiversity are eliminated, phased out or reformed in order to minimize or avoid negative impacts, and positive incentives for the conservation and sustainable use of biodiversity are developed and applied, consistent and in harmony with the Convention and other relevant international obligations, taking into account national socio economic conditions.
	4. Governments, business and stakeholders at all levels have taken steps to achieve or have implemented plans for sustainable production and consumption and have kept the impacts of use of natural resources well within safe ecological limits.
Strategic Goal B *Reduce the direct pressures on biodiversity and promote sustainable use*	**5.** The rate of loss of all natural habitats, including forests, is at least halved and where feasible brought close to zero, and degradation and fragmentation is significantly reduced.
	6. All fish and invertebrate stocks and aquatic plants are managed and harvested sustainably, legally and applying ecosystem based approaches, so that overfishing is avoided, recovery plans and measures are in place for all depleted species, fisheries have no significant adverse impacts on threatened species and vulnerable ecosystems and the impacts of fisheries on stocks, species and ecosystems are within safe ecological limits.
	7. Areas under agriculture, aquaculture and forestry are managed sustainably, ensuring conservation of biodiversity.
	8. Pollution, including from excess nutrients, has been brought to levels that are not detrimental to ecosystem function and biodiversity.
	9. Invasive alien species and pathways are identified and prioritized, priority species are controlled or eradicated, and measures are in place to manage pathways to prevent their introduction and establishment.
	10. By 2015, the multiple anthropogenic pressures on coral reefs, and other vulnerable ecosystems impacted by climate change or ocean acidification are minimized, so as to maintain their integrity and functioning.

United Nations Decade on Biodiversity 2011-2020

Strategic Goal C

Improve the status of biodiversity by safeguarding ecosystems, species and genetic diversity

11. At least 17 per cent of terrestrial and inland water, and 10 per cent of coastal and marine areas, especially areas of particular importance for biodiversity and ecosystem services, are conserved through effectively and equitably managed, ecologically representative and well connected systems of protected areas and other effective area-based conservation measures, and integrated into the wider landscape and seascapes.

12. The extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained.

13. The genetic diversity of cultivated plants and farmed and domesticated animals and of wild relatives, including other socio-economically as well as culturally valuable species, is maintained, and strategies have been developed and implemented for minimizing genetic erosion and safeguarding their genetic diversity.

Strategic Goal D

Enhance the benefits to all from biodiversity and ecosystem services.

14. Ecosystems that provide essential services, including services related to water, and contribute to health, livelihoods and wellbeing, are restored and safeguarded, taking into account the needs of women, indigenous and local communities, and the poor and vulnerable.

15. Ecosystem resilience and the contribution of biodiversity to carbon stocks has been enhanced, through conservation and restoration, including restoration of at least 15 per cent of degraded ecosystems, thereby contributing to climate change mitigation and adaptation and to combating desertification.

16. By 2015, the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization is in force and operational, consistent with national legislation.

Strategic Goal E

Enhance implementation through participatory planning, knowledge management and capacity building

17. By 2015 each Party has developed, adopted as a policy instrument, and has commenced implementing an effective, participatory and updated national biodiversity strategy and action plan.

18. The traditional knowledge, innovations and practices of indigenous and local communities relevant for the conservation and sustainable use of biodiversity, and their customary use of biological resources, are respected, subject to national legislation and relevant international obligations, and fully integrated and reflected in the implementation of the Convention with the full and effective participation of indigenous and local communities, at all relevant levels.

19. Knowledge, the science base and technologies relating to biodiversity, its values, functioning, status and trends, and the consequences of its loss, are improved, widely shared and transferred, and applied.

20. The mobilization of financial resources for effectively implementing the Strategic Plan 2011- 2020 from all sources and in accordance with the consolidated and agreed process in the Strategy for Resource Mobilization should increase substantially from the current levels.

Target 20 will be subject to changes contingent to resources needs assessments to be developed and reported by Parties.

International and Regional Biodiversity-related Agreements

Convention on Biological Diversity

The **Convention on Biological Diversity** (CBD), an international legally binding treaty, aims to conserve biodiversity, to ensure that it is used sustainably, and to see that the benefits derived from genetic resources are shared fairly. Parties to the convention number 193 countries: they include all five nations of Central Asia. It was opened for signature at the Earth Summit in Rio de Janeiro on 5 June 1992 and entered into force on 29 December 1993. The convention recognizes that conserving biological diversity is "a common concern of humankind" and is integral to development. The agreement covers all ecosystems, species and genetic resources. It links traditional conservation efforts to the economic goal of using biodiversity sustainably. The convention insists that, where there is a threat of significant reduction or loss of biodiversity, lack of full scientific certainty can never be a reason for postponing action to avoid or minimize the threat. The convention encourages countries to develop national strategies for sustainable use and conservation of biodiversity and to report about progress. All Central Asian nations are about to update their national biodiversity strategies and action plans in the light of lessons learnt and of the Aichi Targets.

Cartagena Protocol

The **Cartagena Protocol** on Biosafety is an international agreement intended to supplement the Convention on Biological Diversity. It entered into force on 11 September 2003 and has more than 150 parties (countries), including Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan. The protocol aims to ensure the safe handling, transport and use of living modified organisms (LMOs) resulting from modern biotechnology that may have adverse effects on biodiversity, taking into account as well possible risks to human health. It makes clear that products from new technologies must be based on the precautionary principle and allows nations to balance public health against economic benefits. It also requires exporters to label shipments which contain genetically-altered commodities such as agricultural crops. Central Asian nations are currently developing their national biosafety frameworks and clearing house mechanisms for comprehensive legal and instrumental control of LMOs.

Nagoya Protocol

The **Nagoya Protocol** on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits arising from their Utilization (ABS) is an international agreement which forms part of the Convention on Biological Diversity. It was adopted by the tenth Conference of the Parties to the CBD in Nagoya, Japan, in 2010. The protocol aims to share the benefits arising from the use of genetic resources in a fair and equitable way, including by appropriate access to the resources and technology transfer. It seeks to do this by taking into account all rights over those resources and technologies, and by appropriate funding, contributing to the conservation and sustainable use of biodiversity. From the five Central Asian states, so far it has been signed only by the Tajik Foreign Minister, on 20 September 2011 in New York.

Ramsar

The **Ramsar Convention** (the Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty aimed at conserving wetlands and using them sustainably, by slowing encroachment on them and promoting recognition of their ecological importance. It takes its name from the Iranian city on the southern Caspian Sea where it was adopted on 2 February 1971, coming into force on 21 December 1975. The Ramsar Convention is the only global environmental treaty which addresses the needs of a particular type of ecosystem. The list of wetlands of international importance currently includes around 2,000 sites. Its broad definition of wetlands includes lakes and rivers, swamps and marshes, wet grasslands and peatlands, oases, estuaries, deltas and tidal flats, mangroves and coral reefs, and human-made sites such as reservoirs, and salt pans. The Convention has 160 parties (countries), including all the nations of Central Asia.

The **Convention on the Conservation of Migratory Species of Wild Animals** (the Bonn Convention or CMS) aims to conserve the world's migratory species on land, sea and in the air. The convention was signed in 1979 in Bonn and entered into force in 1983, and unites116 parties (countries), including Kazakhstan, Tajikistan, Turkmenistan and Uzbekistan. CMS parties try to provide strict protection to the 176 species (as of November 2011) threatened with extinction which are listed in the Convention's Appendix I, conserving or restoring the places where they live, reducing obstacles to migration and controlling other threats to them. Species which need or would significantly benefit from international co-operation are listed in Appendix II. The Convention encourages states where these species live to conclude regional agreements, which may be legally binding or less formal. Several existing agreements include ones which aim to conserve marine mammals, and birds which migrate between Africa, Asia and Europe. There are also memoranda of understanding on the protection of the Bukhara deer and the saiga.

CITES is the **Convention on International Trade in Endangered Species** of Wild Fauna and Flora. It aims to ensure that international trade in specimens of wild animals and plants does not threaten their survival. Parties to the convention number 175 countries: they include Kazakhstan, Kyrgyzstan and Uzbekistan. The convention entered into force on 1 July 1975. Species protected by CITES against over-exploitation by international trade number about 5,000 animals and 28,000 plants. Those listed on the convention's Appendix I are the most endangered and are threatened with extinction: international trade in them is banned except for certain non-commercial purposes, such as scientific research. Appendix II lists species that are not necessarily threatened with extinction now but which may become so unless trade is closely controlled, while Appendix III lists species included at the request of a country that already regulates trade in the species and that needs the cooperation of other countries to prevent unsustainable or illegal exploitation. Central Asia's species listed by CITES include snow leopard, brown bear and saiga antelope.

The **World Heritage Convention** Concerning the Protection of the World Cultural and Natural Heritage was adopted by the United Nations Educational, Scientific and Cultural Organization **(UNESCO)** on 16 November 1972. UNESCO has 193 member states, including all the nations of Central Asia. Currently UNESCO maintains a list of 936 World Heritage Sites, places such as forests, mountains, lakes, deserts, buildings and cities which it has identified as being of special cultural or natural significance. Kazakhstan has three sites, Kyrgyzstan and Tajikistan one each, Turkmenistan three and Uzbekistan four. Many more country sites are listed as tentative pending endorsement.

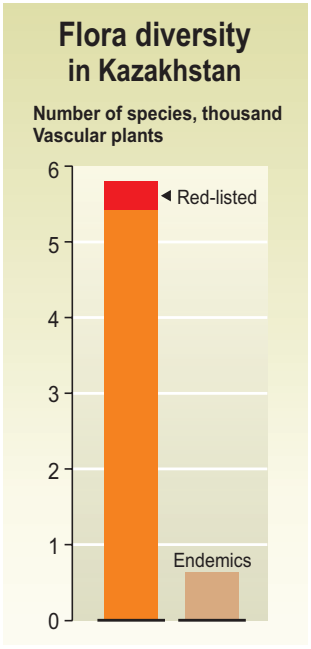
The **Framework Convention for the Protection of the Marine Environment of the Caspian Sea (the Tehran Convention)** was signed on 4 November 2003 in Tehran. The five Caspian countries, including Kazakhstan and Turkmenistan, are members. Its objective is to protect the Caspian Sea environment from pollution and to promote the protection, restoration and rational use of the biological resources of the Sea. The protocol concerning regional preparedness, response and cooperation in oil pollution incidents was signed in August 2011 and three other protocols are being discussed: on land-based sources of pollution, on transboundary environmental impact assessment, and on biodiversity protection.

The **Framework Convention on Environmental Protection and Sustainable Development in Central Asia** was adopted in November 2006. Aiming to strengthen regional environmental cooperation, it has five priorities: air pollution, water pollution, land degradation, waste management and mountain ecosystem degradation. Kyrgyzstan, Tajikistan and Turkmenistan have signed the convention. Another important regional process is the Aral Sea Basin Programme of the International Fund for Saving the Aral Sea (IFAS) which addresses environmental and socio-economic problems and biodiversity-related projects in the Aral Sea basin.

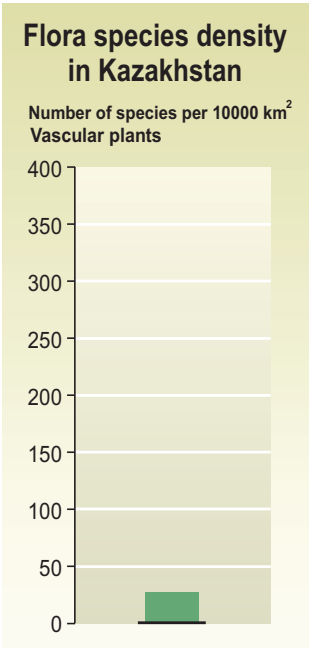
Protected areas in Kazakhstan

- Protected areas
- RAMSAR sites (Convention on wetlands of international importance especially as waterfowl habitat)
- UNESCO natural world heritage
- UNESCO cultural world heritage
- Tentative UNESCO natural world heritage
- Tentative UNESCO cultural world heritage

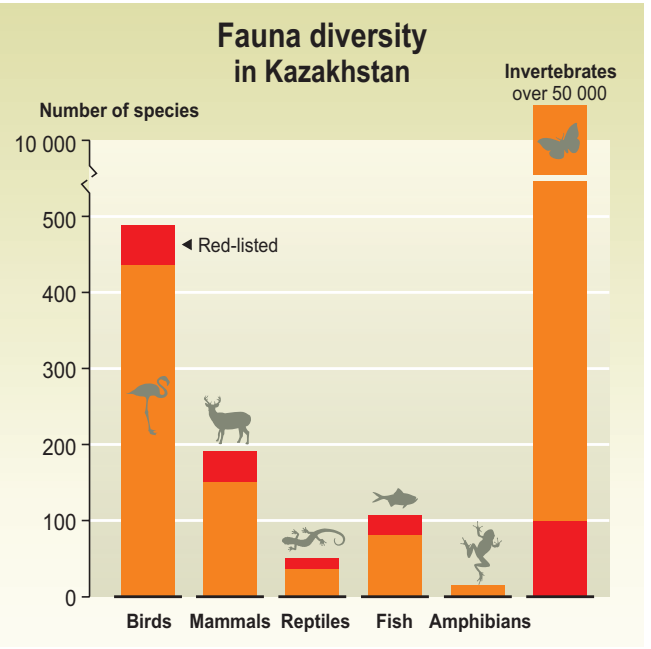
Kazakhstan, the largest country in Central Asia, contains a variety of habitats. Arid lowlands with steppes, semi-deserts, and deserts comprise more than 80% of the land area. Mountains occupy another 10% of the territory. Thousands of small lakes, rivers, Lake Balkhash, the Caspian and Aral Seas further add to the diversity of ecosystems. Forests occupy only 4.6% of the total land area, and artificial forest plantations make up 10% of all forests. The protected areas of Kazakhstan have nearly doubled in size and coverage over the last decade and now cover 8.6% of the country. Kazakh strategy for protected areas system expansion calls for a further increase of strict nature reserves and national parks. The current system includes: ten strict nature reserves (“zapovedniks”), twelve national parks, more than fifty species management areas, nine Ramsar



Source: Kazakhstan's Fourth National Report for the UN Convention Biodiversity (2010)



Source: Kazakhstan's Fourth National Report for the UN Convention Biodiversity (2010)

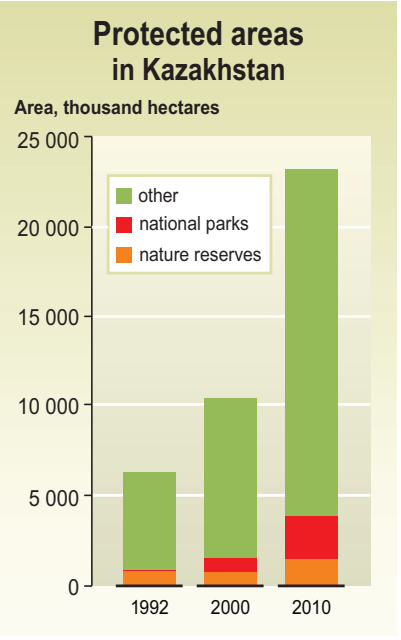


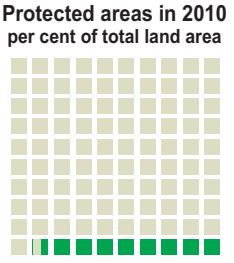
Source: Kazakhstan's Fourth National Report for the UN Convention Biodiversity (2010)

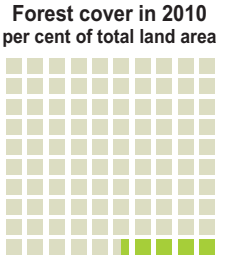
sites, several other protected landscapes, buffer zones around strict nature reserves and parks, sustainable nature use areas ("reservates") and nature monuments.

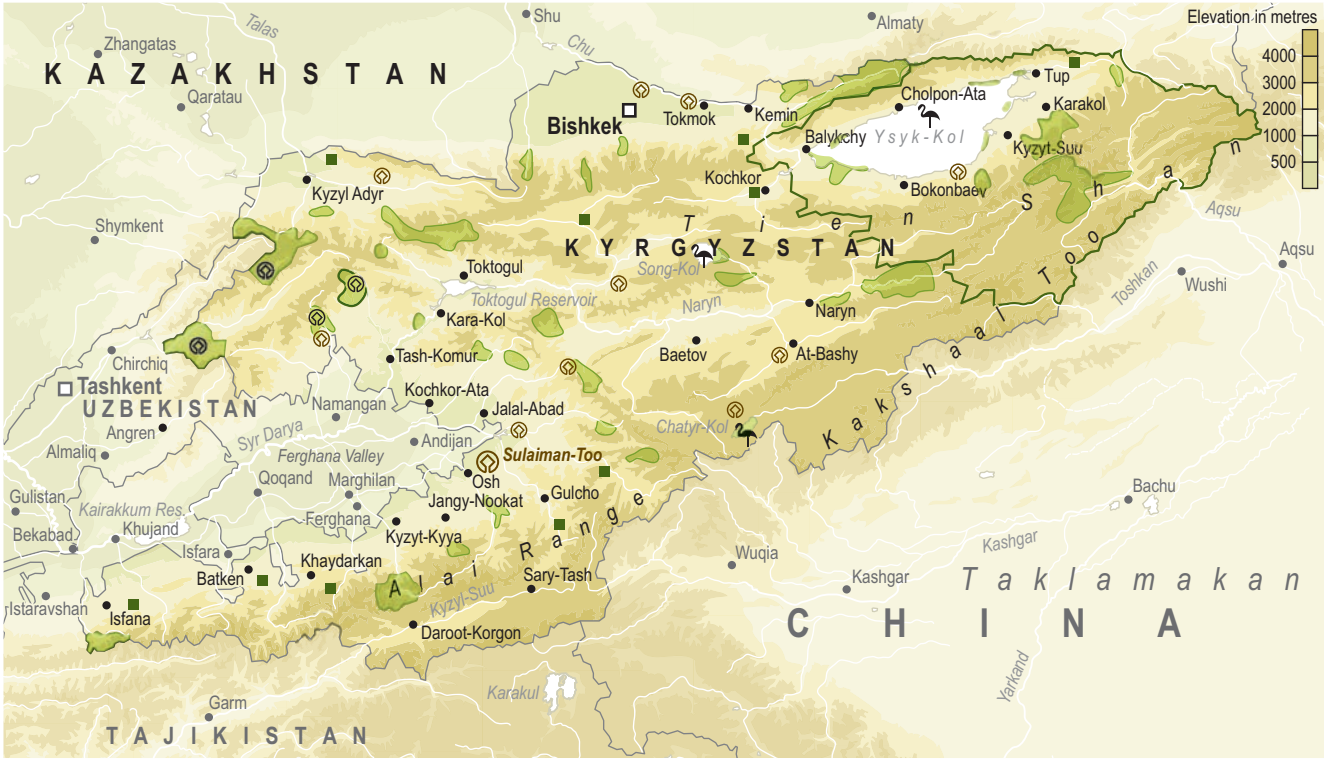
Large mammals in Kazakhstan have declined almost everywhere, mainly because of habitat loss. Some species are hunted - such as wolf and wild goat. Threatened and endangered mammals include the Bukhara deer, wild ass, goitered gazelle, desman, Central Asian otter and Menzbier's marmot. More positively, the saiga antelope living in the southern steppes and semi-deserts recovered from near-extinction. Among 12 amphibians is the unique Semirechye salamander. Rare mountain species are the endangered snow leopard, Tien-Shan bear, wild sheep and vultures. Wetlands host greater flamingoes and relict gulls. The Caspian Sea basin holds 90% of the world's sturgeons and the endemic Caspian seals. With extensive governmental and international support, the level of the northern Aral Sea has stabilized and fisheries slightly recovered.

Disclaimer: the map and graph of protected areas show the entire protected area network and its evolution, including buffer zones and protected territories/ water areas both with and without a legal entity.





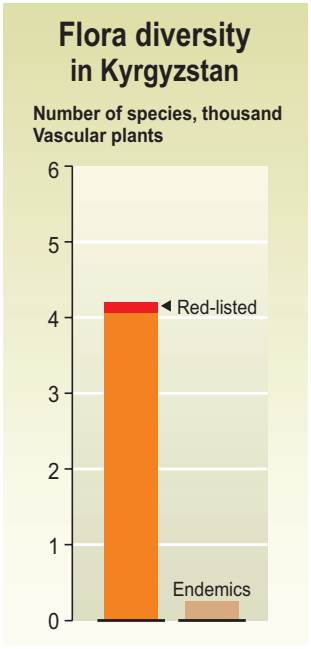




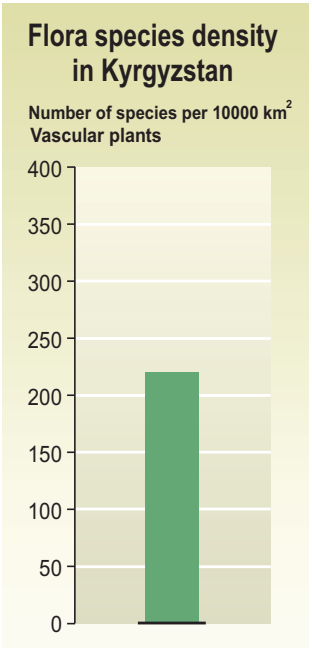
Protected areas in Kyrgyzstan

- Protected areas
- RAMSAR sites (Convention on wetlands of international importance especially as waterfowl habitat)
- UNESCO natural world heritage
- UNESCO cultural world heritage
- Tentative UNESCO natural world heritage
- Tentative UNESCO cultural world heritage

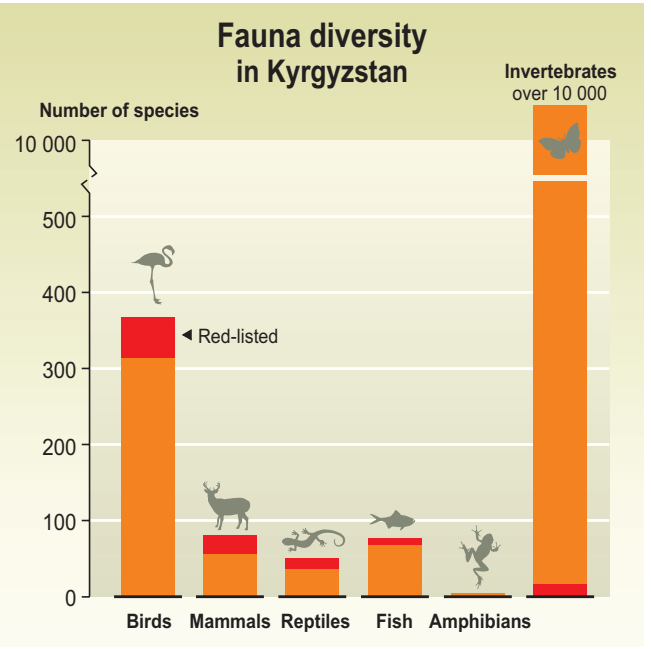
Kyrgyzstan is dominated by the mountains of the Tien Shan and Alai, important in providing fresh water to other Central Asian states and the western part of China. Mountains occupy over 90% of the territory, sheltering a unique and varied range of ecosystems. Local scientists distinguish more than 20 different ecosystems in Kyrgyzstan. Many have been affected by overgrazing and deforestation, and the Kyrgyz mountain forests have significantly declined in the 20th century, threatening many species with extinction and increasing risk of erosion and disasters. Forests currently cover about 4.5% of the land area of Kyrgyzstan. Spruce, juniper and fruit-and-nut forests are the main types of national forests.



Source: Kyrgyzstan's Fourth National Report for the UN Convention Biodiversity (2010)



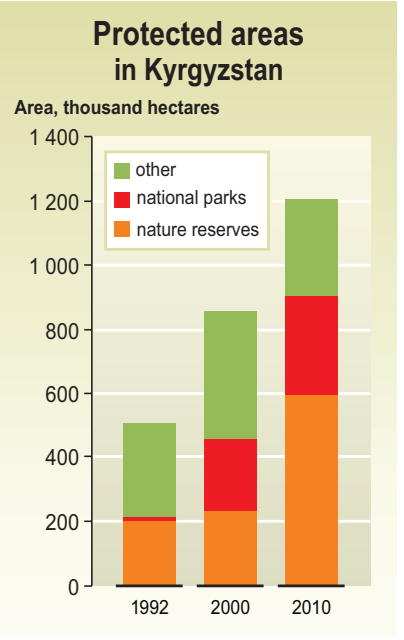
Source: Kyrgyzstan's Fourth National Report for the UN Convention Biodiversity (2010)



Source: Kyrgyzstan's Fourth National Report for the UN Convention Biodiversity (2010)

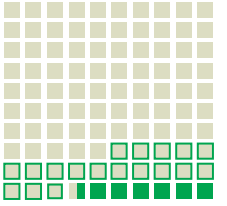
The existing network of protected areas in Kyrgyzstan includes ten strict nature reserves, nine national parks, more than forty species management areas and numerous nature monuments, covering 6.3% of the land area. In 2003 Kyrgyzstan assigned the special status of "biosphere territory" to the entire Issyk-Kul province in the eastern part of the country. If this territory is added, the ecosystems under protection would cover one quarter of the country. Since independence, many protected areas have been operating on reduced budgets, staffing and equipment. There has been some improvement in recent years to involve local communities in forest and pasture management and advance species monitoring and conservation in international projects.

Many species of animals like the goitered gazelle, great bustard and imperial eagle are no longer found. Critically endangered are wild pomegranates and several tulip varieties including the glitter tulip (*Tulipa nitida*), Ostrovskiy tulip (*T. ostrowskiana*), pink tulip (*T. rosea*). Rare species like the grey monitor lizard, marbled polecat, snow leopard and brown bear remain in an extremely dangerous situation.



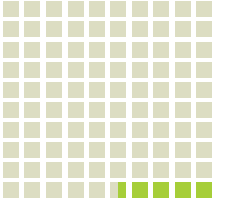
The graph does not include the Issyk-Kul biosphere territory.

Protected areas in 2010
per cent of total land area



▲ *Including the Issyk-Kul biosphere territory*

Forest cover in 2010
per cent of total land area

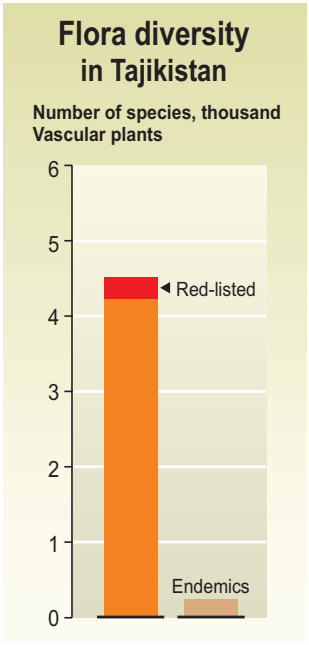


Protected areas in Tajikistan

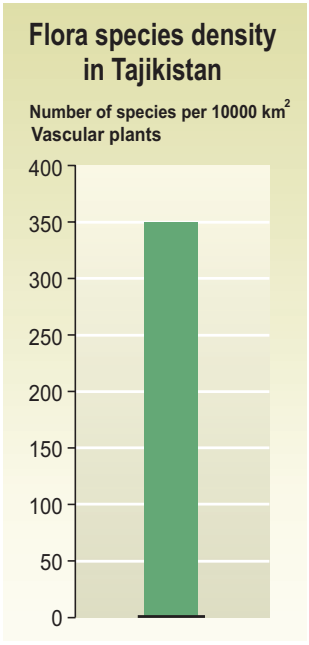
- Protected areas
- RAMSAR sites (Convention on wetlands of international importance especially as waterfowl habitat)
- UNESCO natural world heritage
- UNESCO cultural world heritage
- Tentative UNESCO natural world heritage
- Tentative UNESCO cultural world heritage

Tajikistan is the smallest country of Central Asia, dominated by the Pamir, Gissar and Alai mountains, with 93% of its land considered mountainous and over half above 3 000 m. It boasts a wealth of biodiversity and a broad range of habitats, reflected in high species diversity and local flora endemism. Tajikistan's ecosystems include nut, juniper, and broadleaf forests, alpine meadows and grasslands and high-mountain deserts.

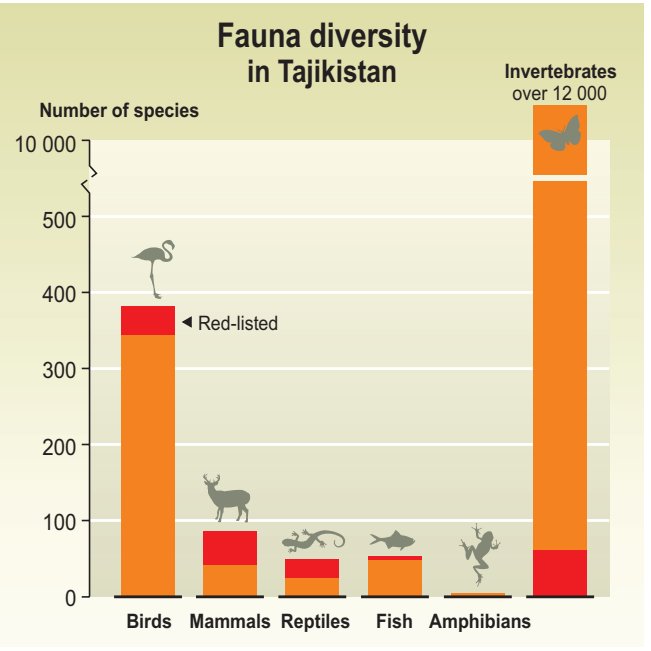
The protected area system includes four strict nature reserves, one national park (the Tajik National Park) covering nearly half of the Tajik Pamirs, Shirkent natural-historical park, five Ramsar sites, and more than a dozen species management areas. Overall, protected areas occupy 22% of the territory - the highest percentage in Central Asia. They cover almost all representative ecosystems, although many protected areas



Source: Tajikistan's Fourth National Report for the UN Convention Biodiversity (2010)



Source: Tajikistan's Fourth National Report for the UN Convention Biodiversity (2010)

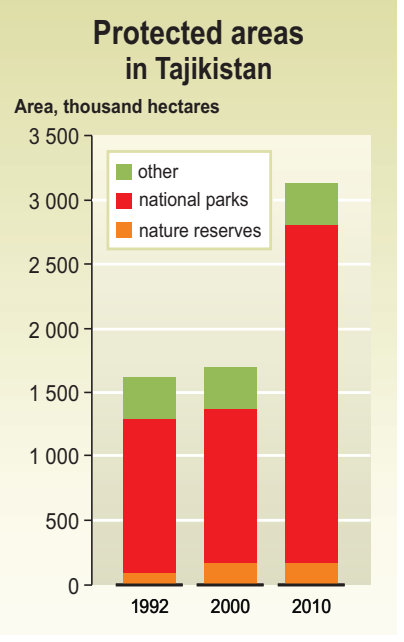


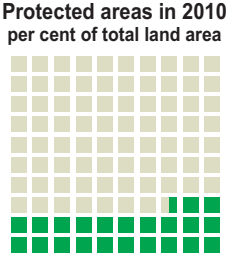
Source: Tajikistan's Fourth National Report for the UN Convention Biodiversity (2010)

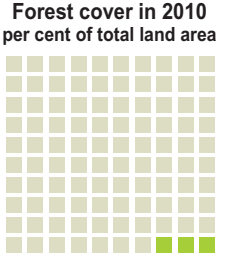
are too small for effective protection and lack management plans, equipment and adequate budgets. Several protected areas were negatively affected by the civil war in the 1990s.

Forest resources are slender, covering only about 3% of Tajikistan. Juniper forests make up nearly half of national forests and play a crucial role in erosion control and water regulation. Walnut forests mixed with wild fruit trees as well as pistachio and almond forests occur in central and southern Tajikistan.

The existing Red List of Tajikistan dates back to the Soviet era (1988), although the new Red List is under preparation. Almost half of all mammals and reptiles are included in the Red List. The status of the leopard and striped hyena is doubtful. Threatened species include the goitered gazelle, grey monitor, snow leopard, brown bear, argali (Marco Polo sheep) and markhor goat.







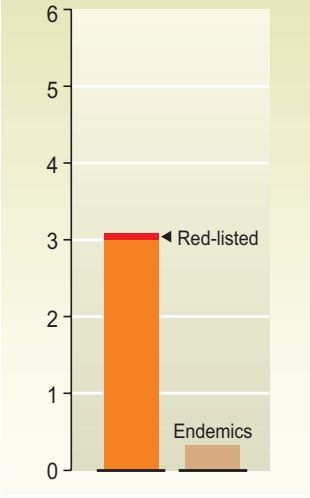
Protected areas in Turkmenistan

- Protected areas
- RAMSAR sites (Convention on wetlands of international importance especially as waterfowl habitat)
- UNESCO natural world heritage
- UNESCO cultural world heritage
- Tentative UNESCO natural world heritage
- Tentative UNESCO cultural world heritage

Most of Turkmenistan (80%) consists of sandy desert, although in the south the mountains of Kopet Dag and Kugitang lie along the Iranian, Afghan and Uzbek borders. Turkmenistan's deserts are dominated by xerophytic shrubs and salt-tolerant species. Other ecosystems are riparian wetlands, mountain forests and the Caspian Sea. Turkmenistan has many close relatives of domestic food plants, including wild pomegranate, grape, fig, apple, pear, cherries, plum, almond and melon.

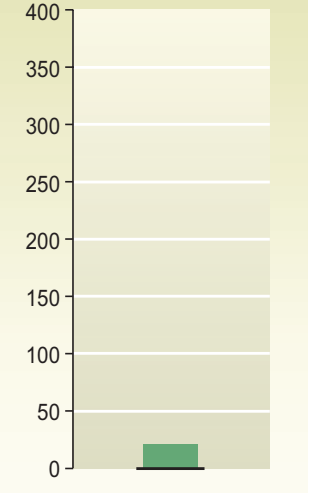
Turkmenistan's eight strict nature reserves cover more than 784,000 ha and include a range of ecosystems. Besides the strict reserves, there are 14 species management areas and 17 nature monuments. The country's first national park is in the process of establishment. One of the famous nature monuments in the Kugitang mountains has 2,000 fossilized dinosaur footprints.

Flora diversity in Turkmenistan



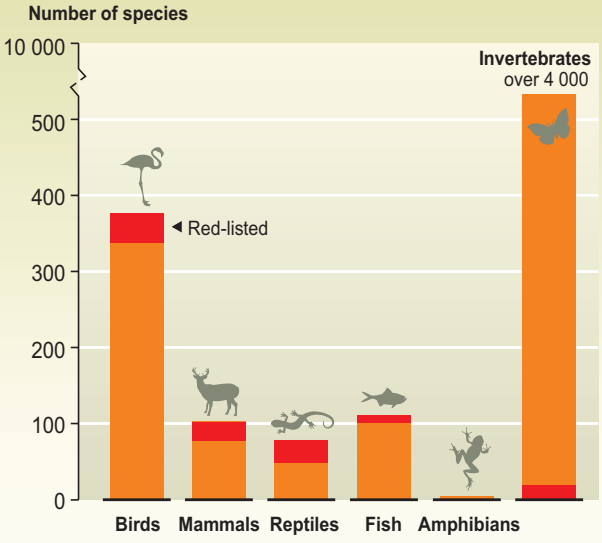
Source: Turkmenistan's National Report for the UN Convention Biodiversity (2010)

Flora species density in Turkmenistan



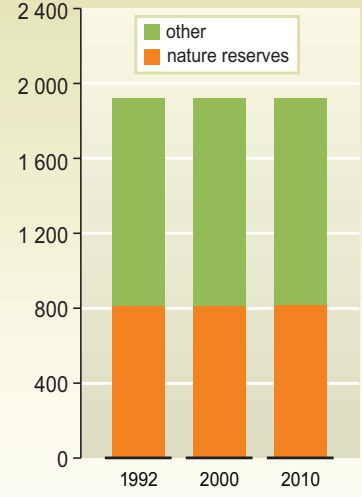
Source: Turkmenistan's National Report for the UN Convention Biodiversity (2010)

Fauna diversity in Turkmenistan

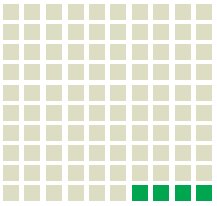


Source: Turkmenistan's National Repor for the UN Convention Biodiversity (2010), UNDP GEF (2009)

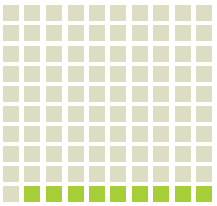
Protected areas in Turkmenistan



Protected areas in 2010
per cent of total land area



Forest cover in 2010
per cent of total land area



The Red List of Turkmenistan includes around 30 mammals, 30 reptiles, and many bird species. Since the 1950s the tiger, Syrian brown bear and lynx have vanished. The surviving populations of goitered gazelles, markhors, wild sheep, leopards, wild cats and wild goats are thought to be much reduced. Characteristic desert mammals include honey badgers, endemic sand shrews, ground squirrels and desert cats. There are many dry country bird specialists: Pander's ground jay, houbara bustard, sand-grouse, desert sparrow and several falcons. Desert reptiles abound in Turkmenistan and many are endemic to Central Asia. These include tortoises, lizards and snakes. Threats to biodiversity include habitat loss, deforestation, overgrazing and pollution. Hunting, over-exploitation and the introduction of alien species compound the damage.

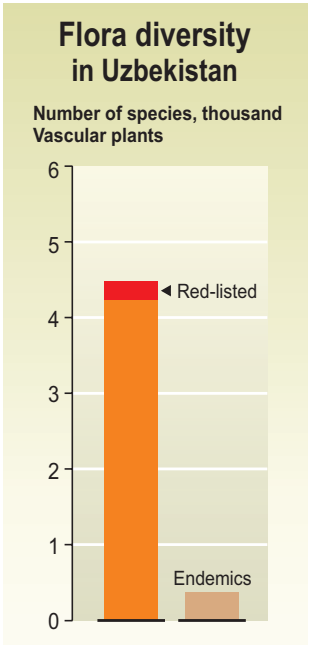
The Caspian Sea ecosystem around the Cheleken peninsula of Turkmenistan suffered years of environmental mismanagement during the Soviet era. Industrial waste and discharges led in those days to high levels of pollution in the Sea and on its shores. While pollution has fallen, many effects persist.

Protected areas in Uzbekistan

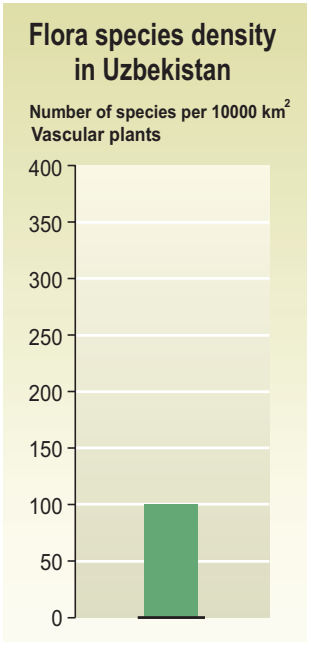
- Protected areas
- RAMSAR sites (Convention on wetlands of international importance especially as waterfowl habitat)
- UNESCO natural world heritage
- UNESCO cultural world heritage
- Tentative UNESCO natural world heritage
- Tentative UNESCO cultural world heritage

Uzbekistan's mountains, deserts, riparian wetlands and the Aral Sea (which in the past 50 years has shrunk dramatically) produce a diversity of habitats. More than four fifths of the country is desert and semi-desert which includes seven types of terrestrial ecosystems as well as wetlands. Mountains occupy nearly 20% of the total land area.

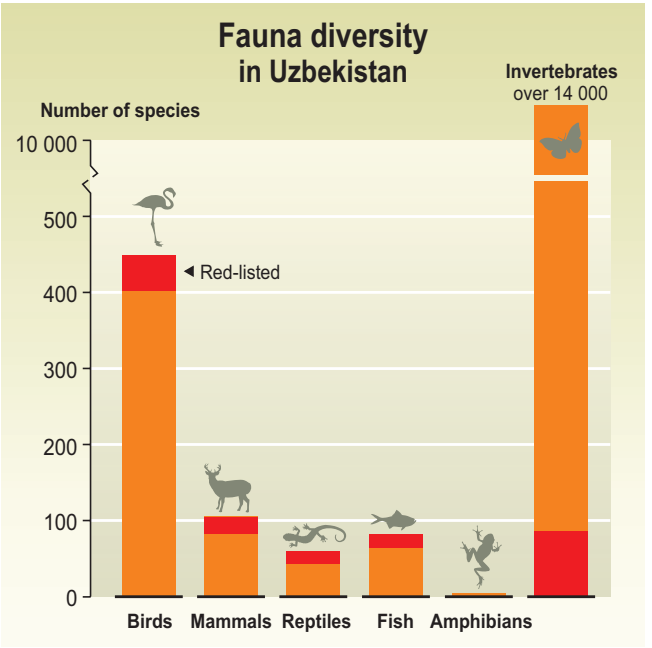
There are nine strict nature reserves, two national (natural) parks, 14 species management areas, five nature monuments and the Dzeiran centre for captive breeding of rare animals, including the goitered gazelle, wild ass, Houbara bustard and Bactrian deer. Most of these areas were established in the Soviet era and cover 5.8% of the country's



Source: Uzbekistan's National Report for the UN Convention Biodiversity (2008)



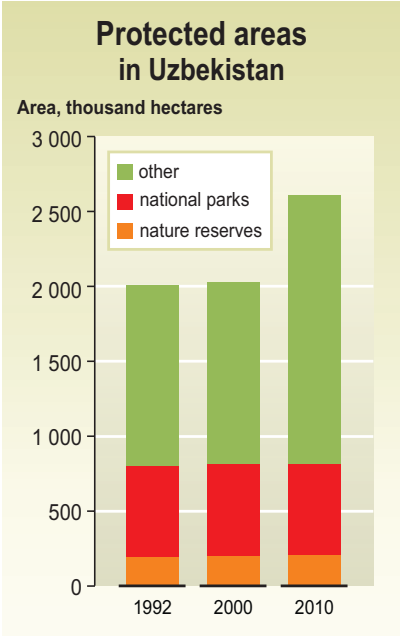
Source: Uzbekistan's National Report for the UN Convention Biodiversity (2008)

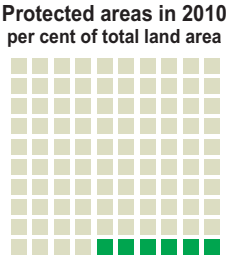


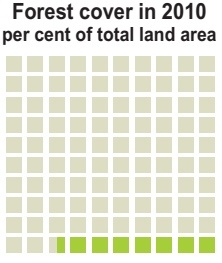
Source: Uzbekistan's National Report for the UN Convention Biodiversity (2008); http://www.cbd.uz/

area. New categories of protected areas covering groundwater and river zones are being introduced in the country. In the past decade, more than 25 such water protection zones along or upstream of the main rivers and lakes have been designated. Protected areas of Uzbekistan are managed by various state authorities: the Ministry of Agriculture and Water Resources, the State Committee for Nature Protection, and the Tashkent ProvincialAdministration (Hokimiyat). The Kitab geological reserve is supervised by the State Committee for Geology and Mineral Resources. Forests cover 7.7% of the land area: junipers constitute the principal mountain forests and saxaul natural and artificial forests are typical for deserts and are extensively used for reforestation of the Aral Sea surrounding areas. More than 25% of all national forests are planted.

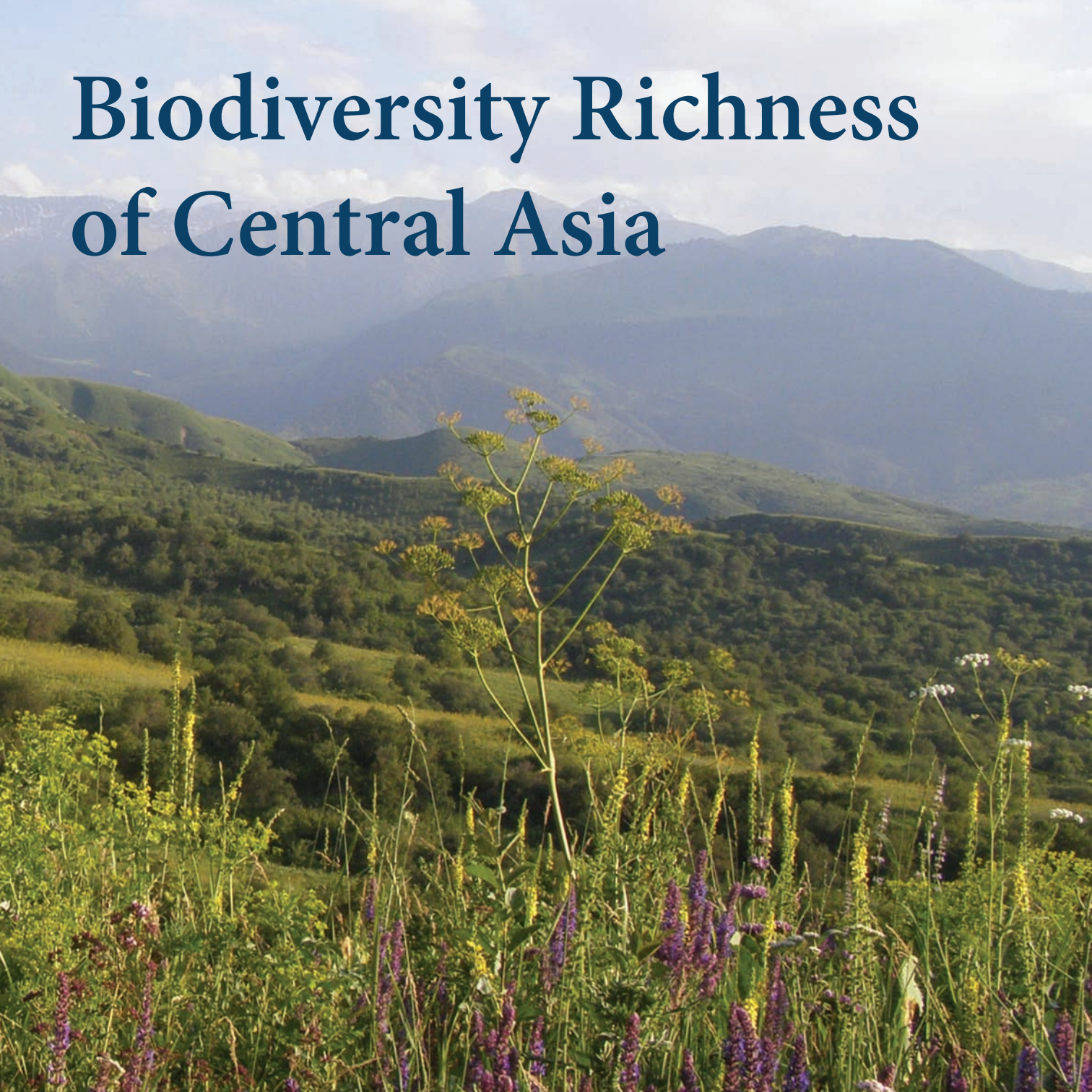
Rare animals include the saiga antelope, goitered gazelle, desert monitor, Tien-Shan brown bear, snow leopard, mountain urial, Menzbier's marmot, Dalmatian pelican, glossy ibis and heron.







Biodiversity Richness of Central Asia



Steppes

Steppes are grassy and largely treeless plains. The climate is usually too dry to support the growth of forests but not dry enough to qualify as a desert, though some steppes may be semi-deserts. They often experience very marked differences of temperature between day and night, and between summer and winter. The steppes of southwestern Russia and northern Central Asia are the world's largest steppe ecoregion. Steppes have developed their own suite of species, both resident and migratory. The Saryarka ecoregion is an area of the Central Asian steppe with both freshwater and saltwater lakes in northern Kazakhstan. A World Heritage Site, it is outstanding for its wetlands that receive millions of water birds migrating between Africa, Europe, and South Asia and their breeding areas in Siberia. Up until the 1950s Kazakhstan's steppes were considered sustainable. In the next two decades, however, 35 million hectares of virgin and fallow steppe lands were ploughed for Soviet agriculture. The soil lost over 30% of the humus which helps it to retain water and nutrients and the ecological balance became increasingly disturbed. Wind erosion triggered massive dust storms. After collective farms vanished soil rehabilitation stopped and herders soon overcrowded steppe pastures and depleted them.

Deserts

The Central Asian deserts and semi-deserts include several sandy, stony and clay deserts that stretch from the eastern shore of the Caspian Sea to Lake Balkash and to the foothills of the Kopetdag, Tien Shan and Pamir mountains. Rainfall, totaling 70–125 millimetres per year, is greatest during the winter and spring, with a long summer drought. The difference between night and day surface air temperatures in the Central Asian deserts could be as high as 30°C. The large Karakum Desert deserves special mention: it occupies more than two-thirds of Turkmenistan and covers some 350,000 square kilometers, more than the total area of Kyrgyzstan and Tajikistan combined. Under its arid surface are rich oil, gas, and sulphur deposits that are now being fully exploited. The spread of agriculture in the deserts, especially irrigated farming and grazing, in combination with energy infrastructure, is the main threat to the local biodiversity. The unsustainable use of plants, especially saxaul forests, for firewood is also damaging.

Forests

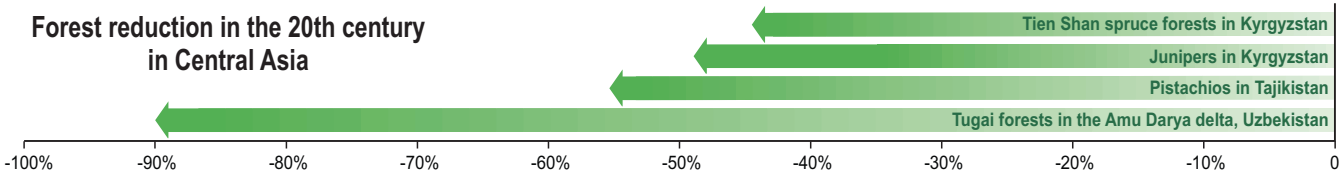
Fir, spruce
Juniper, pine, larch
Broadleaf, fruit-nut
Birch, aspen
Saxaul
Tugai and floodplain forests
Forest steppe, mainly pine and birch

0 100 200 300 km

Map produced by ZOÏ Environment Network, October 2011

Source: World Wildlife Fund (→ www.worldwildlife.org/science/data/item6373.html)

Forest reduction in the 20th century in Central Asia

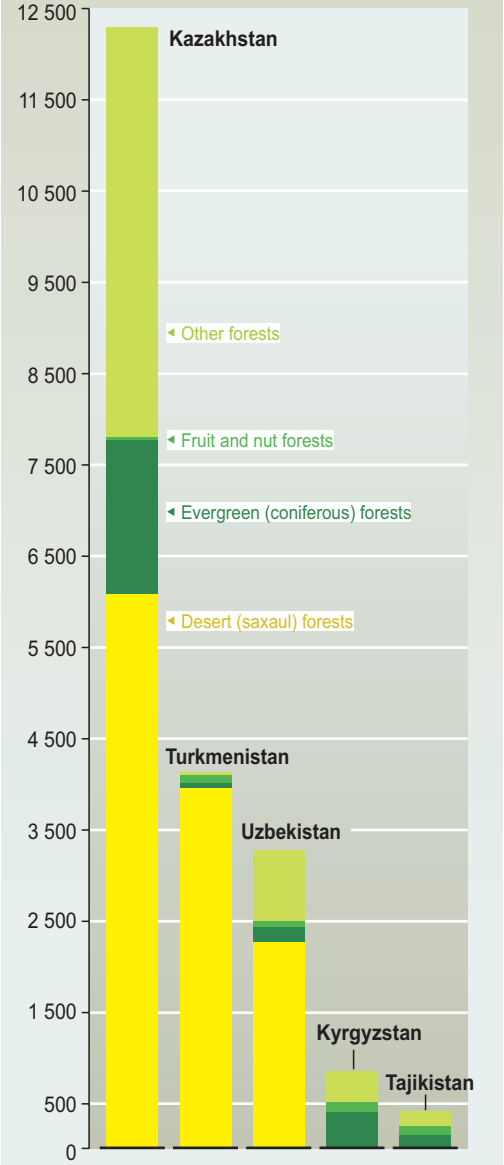


Forests

Some of Central Asia's forests are sparse, like the saxaul woodlands of the deserts, while others are traditional dense forests. All play key roles as indicators of species diversity, core ecosystem elements, and carbon sinks. They offer not only timber but many non-wood products, including fruit, nuts and honey, as well as refuges for wildlife. Most of Tajikistan's and Kyrgyzstan's forests, in fact, are protected, with timber felling forbidden. Some forests harbour trees which tolerate high aridity and salinity, and others which are close relatives of domestic food plants: both could be useful as climate change and biodiversity loss intensify. Much of the region's forests was lost in the early Soviet years (the 1930s-1940s). Today's main threats are grazing and trampling, fires, and illegal cutting for fuel and sale.

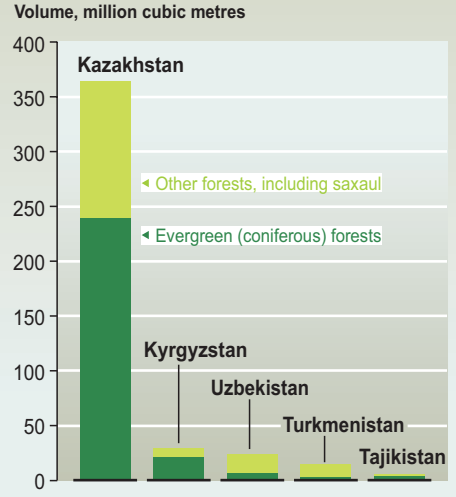
INTERNATIONAL YEAR OF FORESTS • 2011

Forest cover in Central Asia



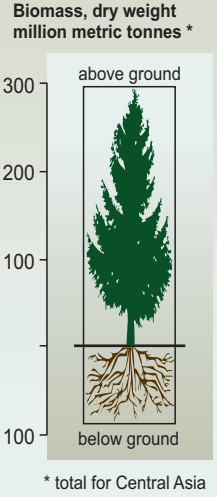
Source: FAO Global Forest Resources Assessment 2010, data for 2005-2010

Forest stock in Central Asia



Source: FAO Global Forest Resources Assessment 2010, data for 2005-2010

Forest biomass



Source: FAO 2010, data for 2005-2010

Saxaul trees grow in the deserts of Central Asia. The biggest saxaul forests, which are composed primarily of white and black saxaul, are in southern Kazakhstan where they cover six million hectares. Turkmenistan has about four million hectares, Uzbekistan two million, and small areas are also found in Tajikistan. Saxaul trees are important for protecting soil and helping prevent sand from filling channels, oases and covering roads, and so help to regulate water supply. They benefit pastures by providing shade and increasing pasture productivity. They are extensively used for reforestation efforts around the Aral Sea to mitigate dust storms and halt desertification. The saxaul has extensive root systems reaching down as deep as 10 metres to find moisture. Saxaul trees grow up to 10-12 metres high and live 50 years.

Tugai forests are floodplain forests of Central Asia, found in river valleys where the groundwater is close to the surface. They can include a range of tree species, among them poplar, willow, tamarisk, birch, salt tree and buckthorn. They were once widespread, but the area occupied by tugai has shrunk dramatically because of floodplain reclamation and low water levels in rivers and deltas. Those that are left are vital for wildlife. The largest remaining tugai forests are found in the lower Amu Darya river delta. Floodplain forests in the mountains are increasingly threatened by the gold development projects along nearby river beds. Tugai forests have a high value for soil protection, and serve as grazing lands, fire barriers and habitats for wildlife.

Spruce, firs and juniper woods are found in the Central Asian mountains at altitudes up to 3,700 m above sea level. Juniper trees grow at about 2 cm annually, and some specimens are estimated to be more than 1,000 years old. Most juniper forests are found on the northern slopes of the Turkestan, Alai, Zeravshan and Gissar mountains. The Tien Shan spruce forests are typical of the Issyk-Kul Lake's surroundings. All mountain forests play a vital soil-protection and water-regulating role and they are strictly protected. They attenuate erosion processes, stabilize the soil against mud-and-stone landslides and regulate runoff.

Wild apple forests

The mountains of Kazakhstan and the other countries of Central Asia are key for the world's apples. Scientists believe Central Asia produced the ancestor of most cultivated apple species, which then spread East and West along the Silk Road. But the wild apple forests are not adequately managed to conserve biodiversity, and there are fears they are losing their genetic distinctiveness. Kazakhstan is now working to conserve its wild apples in situ - in their native habitats, in addition to research stations and botanical gardens. Kyrgyzstan and Tajikistan also have significant wild fruit and nut forests.

On the eastern slopes of the Fergana Valley in southern Kyrgyzstan are the largest areas of **natural walnut forests** in the world, composed mainly of walnut but also including other fruit trees and shrubs, among them varieties of apple, pear and plum. The forests have extremely rich biodiversity - more than 180 tree species, 150 bird species and 40 mammal species. After studying traditional forest management schemes, Kyrgyzstan with Swiss support introduced community fruit-and-nut forest management, an experimental approach that engaged community groups and local authorities to manage forests. In addition to Kyrgyzstan, walnut forests also grow in central and southern Tajikistan.

The pistachio is a tree which is salt- and aridity-tolerant and can also cope with wide temperature fluctuations, from -10°C to 40°C. Well-known in southern Turkmenistan and Tajikistan, it grows as well in Kyrgyzstan and Uzbekistan. Many of today's pistachio forests are planted rather than natural growth. Wild pistachio nuts are prized for their flavour. Each hectare of pistachio forest on average provides 80 kg of nuts and in some areas 300 kg. But pistachio trees are valuable for more than their harvest. They can protect the soil and prevent the formation of gullies and the destruction of mountain slopes.

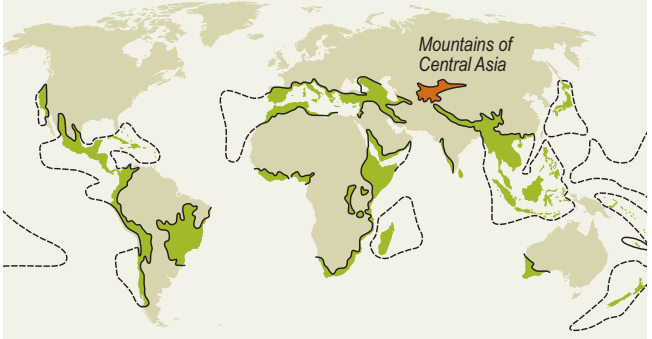

Pamir and Tien Shan
Altitude in metres
1000
2000
3000
4000
5000
0
100
200
300 km
Map produced by ZOÏ Environment Network, November 2011
Lake Balkhash
Taldykorgan
K A Z A K H S T A N
Ghulja
Chu
Kapchagay Lake
Almaty
Talgar Peak
4979
Syr Darya
Talas
Turkestan
Taraz
Bishkek
Ysyk-Kol
Tien Shan
7439
Jengish (Pobeda) Peak
Aksu
Shymkent
K Y R G Y Z S T A N
5982
Danköva Peak
Naryn
Tashkent
Namangan
Ferghana Valley
Kokand
Osh
Hotan He
U Z B E K I S T A N
Kujand
Ferghana
Jizakh
Kashgar
C H I N A
Samarkand
5509
Piramida Peak
7134
Lenin Peak
Yarkant He
T a k l a m a k a n
7495
Ismoil Somoni Peak
7719
Kongur Shan
T A J I K I S T A N
6974
Independence Peak
Dushanbe
Vakhsh
Panj
P a m i r
Hotan
Termiz
Amu Darya
7282
Muztag
Distnegil Sar
7885
Mazar-e Sharif
8611
K2
P A K I S T A N
7788
Rakaposhi
A F G H A N I S T A N

Mountain Ecosystems

Diverse mountain ranges described by the early Persians as the “Roof of the World” and by the Chinese as the “Heavenly Mountains” have always played a pivotal role in Central Asia. The mountains provide an astonishing array of essential ecosystem goods and services that serve not only the mountain inhabitants but also those in the lowlands and people around the globe: forest products and land for food production; watershed protection; habitat for flora and fauna of local and global significance; the regulation of natural hazards and climate; natural areas for leisure and recreational activities; and perhaps most important of all, the storage and release of water.

Two of Central Asia’s major mountain ranges – the Pamirs in Tajikistan and the Tien Shan in Kyrgyzstan – make those countries the most mountainous in the region, with an average elevation of about 3,000 metres above sea level, peaks exceeding 7,000 metres and more than 90% of their national territories considered as mountainous.

Global biodiversity hotspots



The Kopet Dag, also known as the Turkmen-Khorasan mountains, run along the border of Turkmenistan and Iran, a region characterized by foothills, dry and sandy slopes, plateaus and steep ravines. Mountains comprise only 5% of Turkmenistan’s land area but hold about two thirds of the country’s biodiversity.

Mountain ecosystems also cover parts of east Kazakhstan (the Kazakh uplands, Djungar Alatoo, Tarbagatai and Altai), south-east Uzbekistan (Western Tien Shan and Gissar), and extend into Afghanistan (Hindu Kush) and China. Overall, mountains cover 800,000 square kilometres or 20% of the total area of Central Asia.

Most of the population in Central Asia relies on water that falls in the mountains where it is stored in glaciers and snow before making its way downstream to population centres. The densely populated valleys and oases of the vast drylands of Central Asia depend on mountain water transported by numerous rivers and streams. Global warming is slowly melting mountain glaciers, affecting snow reserves and at the same time increasing the water requirements of basic agricultural crops.

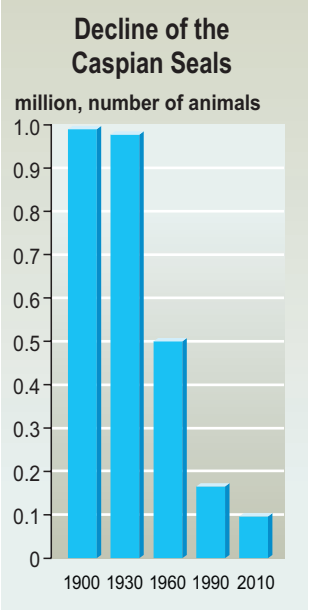
The Central Asia mountains host at least 20 distinct ecosystems and 4,500–5,500 species of vascular plants, almost one quarter of which are unique (endemic) to the region. At lower altitudes and in the foothills, dryland ecosystems prevail. At higher altitudes, grasslands, shrubs and forests are widespread. Meadows and tundra-like ecosystems are found at the high mountain plateaus.

Globally endangered species resident in the mountains include the snow leopard (with more than half of the global population) and the Marco Polo sheep. The numbers of these species have declined, however, as a result of poaching, hunting and the depletion of the food base. The high biodiversity richness and endemism of flora and fauna of the mountains of Central Asia is exemplified by the fact that the number of vascular plant species found in the Pamir-Alai or the Tien Shan Mountains is four times higher than that of the nearby lowland Karakum Desert, which has twice the area.

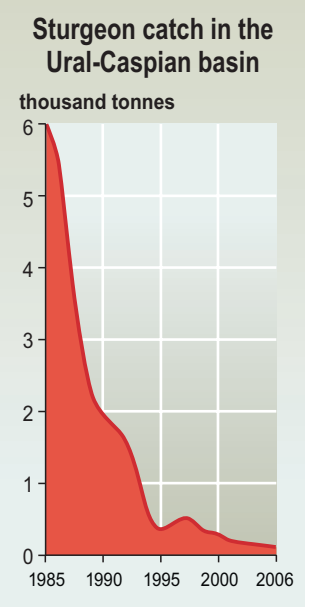
Caspian Sea

The Caspian Sea is the world's largest enclosed body of water by area: it covers 371,000 sq km. The Caspian seal is endemic to the Sea, which is also home to many sturgeon species, now endangered by overfishing for the caviar trade. The commercial value of the Caspian's biodiversity is estimated by the Caspian Environmental Programme at US $5 bn annually. The Volga River, Europe's largest, provides 80% of the Caspian's fresh water, much of it polluted. Offshore hydrocarbon exploration and exploitation poses other risks. The other main river flowing into the northern Caspian is the Ural: the wetlands around the Ural delta are important to migrating birds.

The Khazar nature reserve near Turkmenistan's Caspian coast, is home to 18 mammal species and more than 370 birds, nearly half of them waterfowl. The Kara-Bogaz-Gol is a shallow water ecosystem in north-west Turkmenistan, forming a lagoon of the Caspian about 18,000 sq km in extent but separated from it by a small rocky ridge with a very narrow opening. The salinity of the bay is about 35%, against the Caspian's 1.2%, and 3.5% for the world's oceans. In the Soviet era, the Kara-Bogaz-Gol was artificially separated from the Caspian, which led to negative environmental impacts.



Sources: Caspian Environmental Programme; Russian Wildlife Conservation Centre



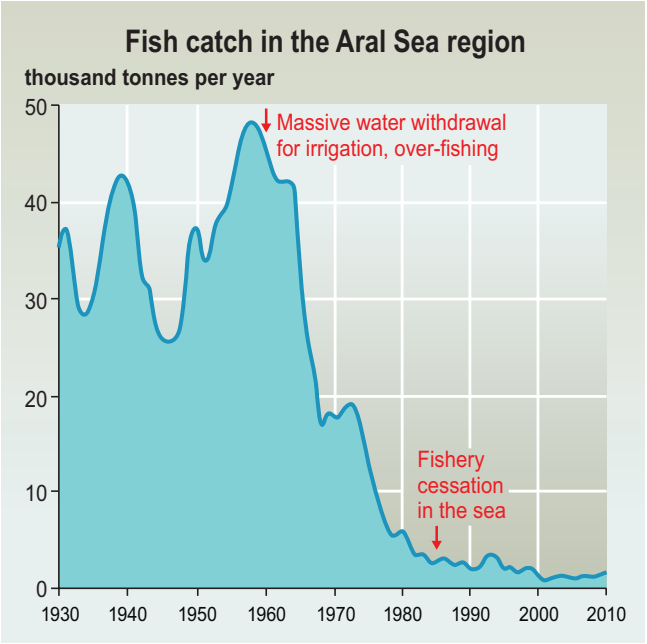
Source: Transboundary Diagnostic Analysis of the Caspian Environmental Programme 2007

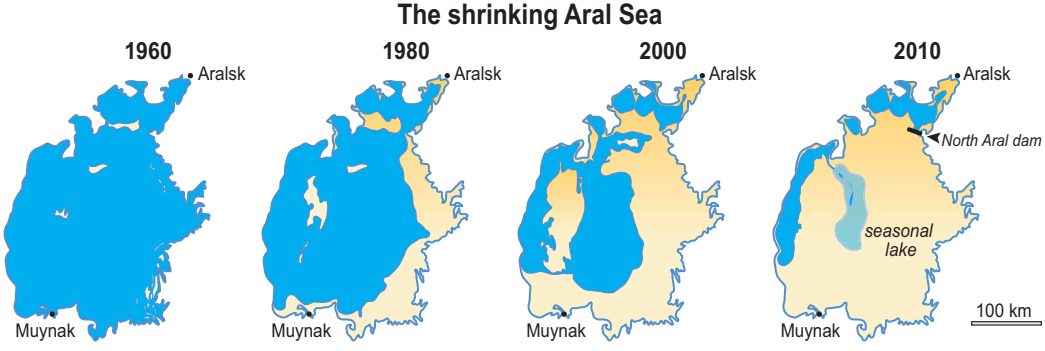
Aral Sea

The Aral Sea region in Kazakhstan and Uzbekistan is suffering a severe environmental disaster. In the early 1960s, the waters of the Amu Darya and Syr Darya rivers that fed the Sea were diverted for irrigation mainly to grow cotton, causing the gradual disappearance of the Sea. Despite numerous local and international rescue efforts it continues to shrink, as overall water consumption patterns persist. The exposed seabed has left salt, sand, dust and agricultural chemicals blowing as far as 300 km. Water, land, crops and human health all suffer, with chronic respiratory and kidney disorders and liver diseases increasing.

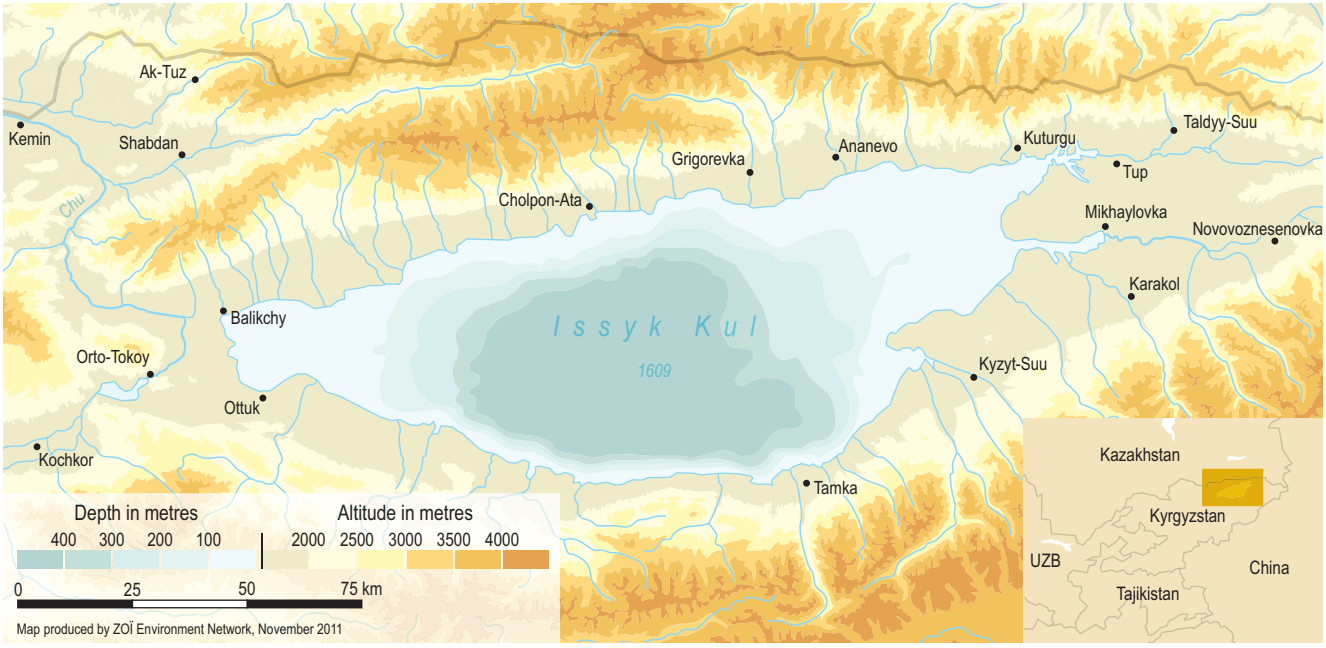
The Sea can no longer moderate the increasingly extreme climate. The economy, based on fisheries, livestock grazing, hunting and fur production, is devastated. Four decades ago the annual fish catch was 35,000 tonnes, but fishing stopped altogether in the mid-1980s, although Kazakhstan has partly managed to restore water levels and fisheries with an extensive artificial dam in the northern Aral Sea.

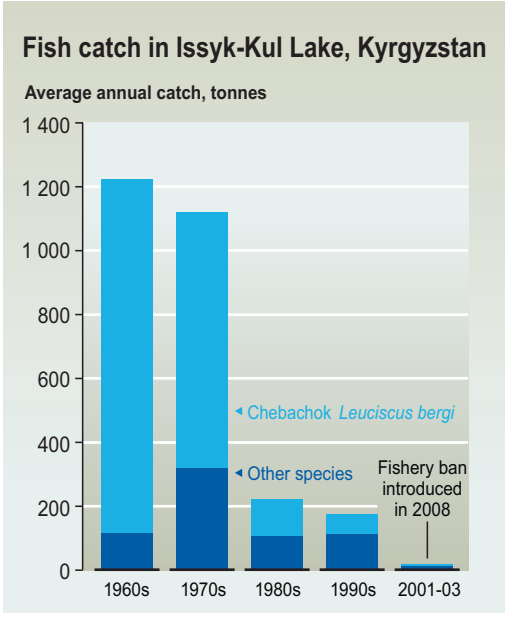
Many lakes and wetlands dried up or were drastically reduced, causing the disappearance of 90% of the tugai (floodplain) woodland. Poaching and habitat fragmentation caused further stress and led to the extinction of the Turan (Caspian) tiger, other large predators and a significant drop in the Bukhara (Bactrian) deer.





Source: http://earthobservatory.nasa.gov/Features/WorldOfChange/aral_sea.php; Climate Change Central Asia: a visual synthesis report (2009)





Source: V. Pivnev Fish of Kyrgyzstan 1990"; J. Ismanbaeva 2008

Issyk-Kul Lake

Issyk-Kul Lake ("hot lake" in Kyrgyz - it never freezes) lies in eastern Kyrgyzstan. Issyk-Kul, with a surface area of 6,236 square kilometers is the region's largest mountain lake. It is on the Ramsar Convention's list of globally significant wetlands and forms the core of a biosphere reserve. Once a Silk Road staging post, it was a popular tourist resort and a flourishing fishing ground. In the last decade, however, fisheries declined to negligible levels, and many fish, including endemic species, are threatened, because of over-fishing, predation by introduced species, and the end of restocking with juvenile fish. The government banned all fishing here in 2008. In spite of this, thousands of illegal fishing nets are detected annually. While agricultural runoff into the lake and oil leakages from navigation have much reduced over the past 20 years, the poorly treated wastewater from urban and tourist areas continues to pose pollution risks to the lake's ecosystem. Community based and eco-friendly tourism is now developing around the lake. The restoration of the lake's ecosystem depends in large part on the restocking of the lake with juvenile endemic fish from hatcheries and on tighter control of illegal fishing.

Tulips of Central Asia

Central Asia is home to the wild tulip, forebear of the carefully nurtured blooms which now beguile gardeners across the world. But in their heartland many are under severe pressure from agriculture and plant collectors. In Kazakhstan and Kyrgyzstan, more than 20 species are included in the national Red Lists as rare and endangered. Of more than 100 tulip species known globally, roughly half are found in Central Asia.

Central Asia selected flagship species

Mountains
Grasslands
Deserts
Persian leopard
Snow leopard
Mountain sheep (Marco polo sheep)
Mountain goat (Markhor)
Bactrian deer
Saiga antelope
Caspian seal
Varan (Desert Monitor)
Steppe eagle

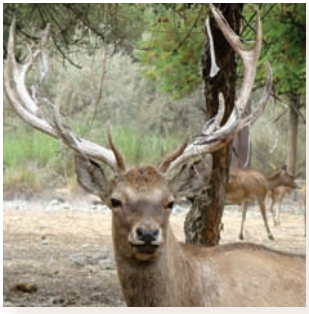
0 100 200 300 km

Map produced by ZOÏ Environment Network, November 2011

Snow Leopard
Symbol of the 2011 Winter Asian Games and motif of the coat of arms of Central Asia cities, this stealthy nocturnal hunter with its huge furry tail is well adapted to life at high elevations. But poaching and loss of prey and habitat mean at most 7,000 wild survivors remain worldwide.

Marco Polo Sheep (Argali)
The largest wild sheep, a coveted trophy with its curling horns, this is a sub-species of the argali sheep. The 13th century explorer described them in his autobiographical book The Travels of Marco Polo. Argali inhabit high mountain plateaus of Kyrgyzstan and Tajikistan and move across borders to other countries.

Markhor
This large wild goat is an excellent climber and cliffhanger and has screw-shaped 1.5 m long horns. Endemic to the Pamir-Hindu Kush region, it has no more than 4,000 wild survivors worldwide, which are estimated to be declining. Several nature reserves in Tajikistan have been established to protect this and other species.



Bactrian Deer
Formerly hunted by royalty and for its gorgeous horns, this red deer occupies river corridors surrounded by deserts, and is now highly endangered because of the loss of this habitat (the tugai floodplain forests). Fewer than 500 animals remain in the wild.

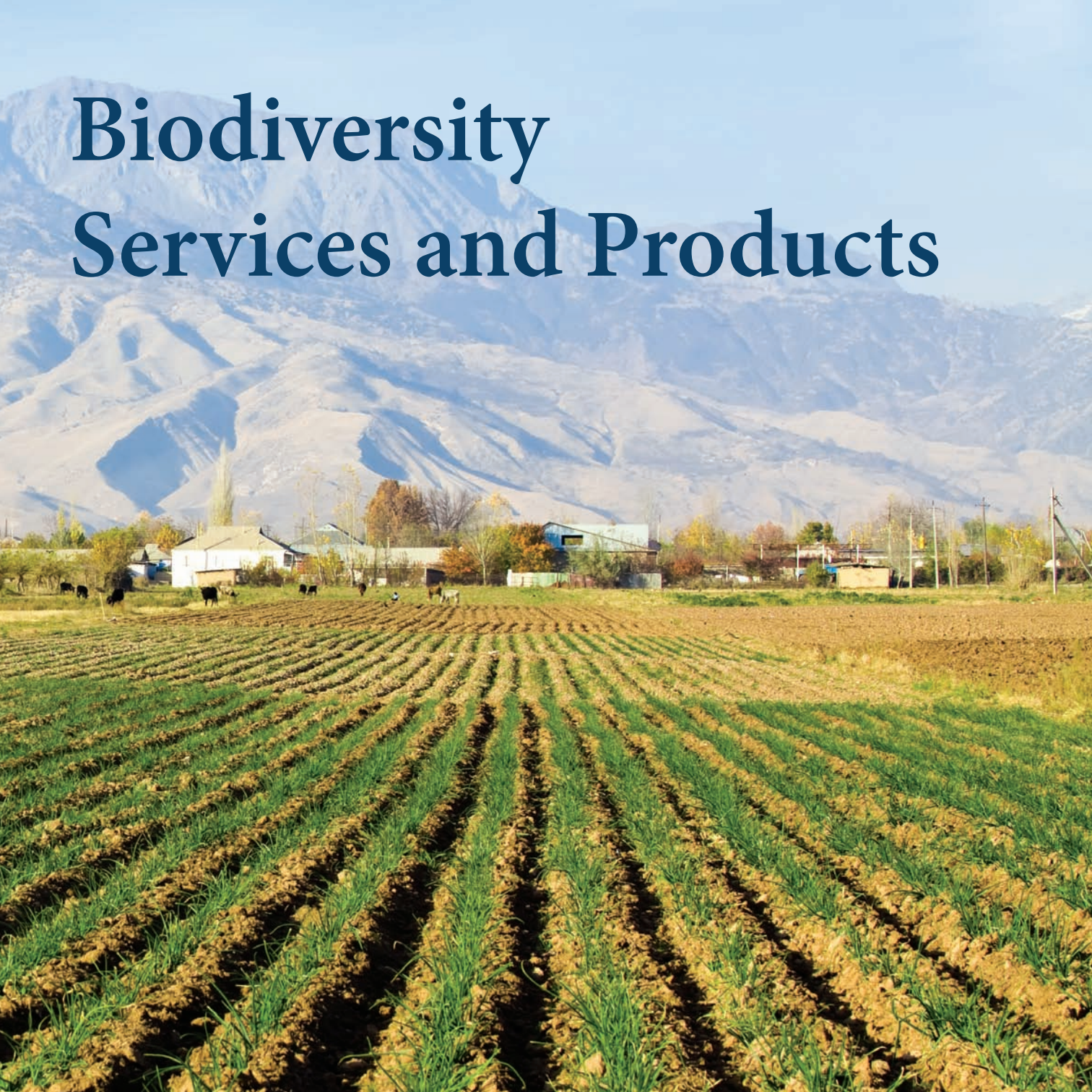
Saiga
These antelopes have huge inflatable noses and migrate in large groups over long distances. They have adapted to survive the harsh, windy winter steppes. Habitat loss, poaching, drought and disease have reduced them from several million to under 50,000 in 20 years.

Caspian Seal
Found only in the Caspian Sea, these exotic animals depend on its ice, now threatened by climate change. Regarded as indicators of the Sea's health, they migrate to the deeper and cooler southern Caspian in the summer. The Caspian seals' numbers are estimated at 100,000 animals: 10 times less than a century ago.

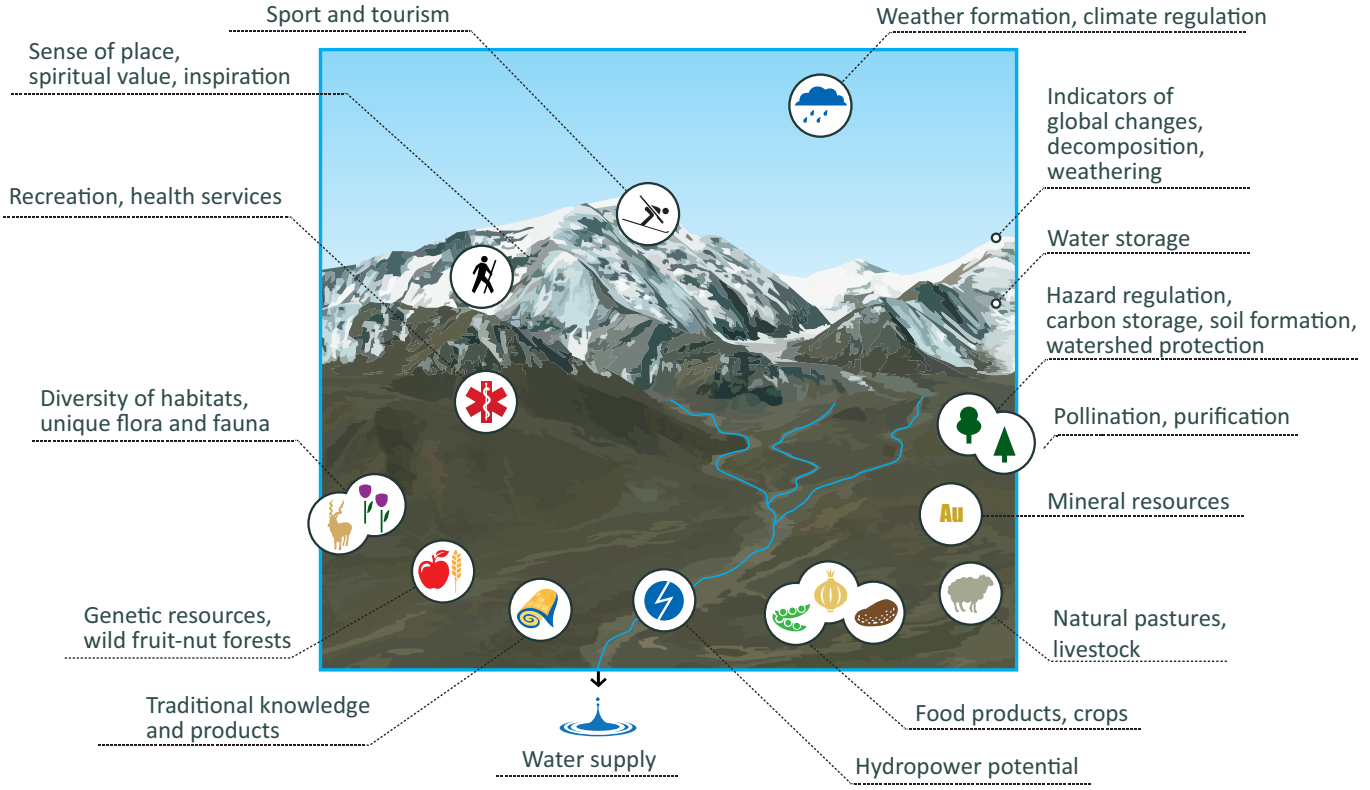
Varan (Desert Monitor)
This monitor lizard, found also in other parts of the world, is known locally as the desert crocodile and is the stuff of legend for its size and appetite. It uses its long, powerful tail like a whip in defence. In the early 20th century, massive hunting due to high demand for its skin drastically reduced its numbers.

Steppe Eagle
This bird of prey, Kazakhstan's national symbol, relies on its very sharp eyes. It prefers desert, steppe or savannah, and Central Asian populations winter in Africa. Habitat destruction, persecution and power line collisions are causing a slow decline.

Biodiversity Services and Products



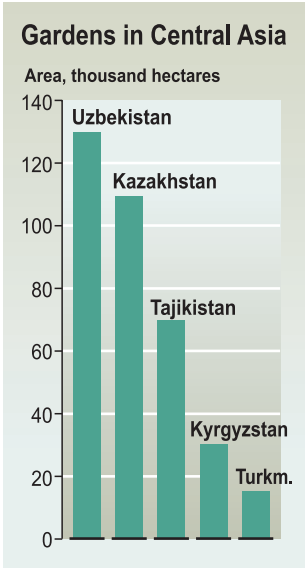
Day in, day out, the natural world provides many vitally important services and products. Different species and ecosystems keep the Earth friendly to human existence, oxygenating the atmosphere, purifying water, fixing nitrogen, recycling nutrients and waste and pollinating crops (one estimate says bees alone provide about a third of human nutrition). The economic value of biodiversity services and products at regional and national levels in Central Asia has not been assessed yet, but global studies show that these can be much higher than the gross national product.



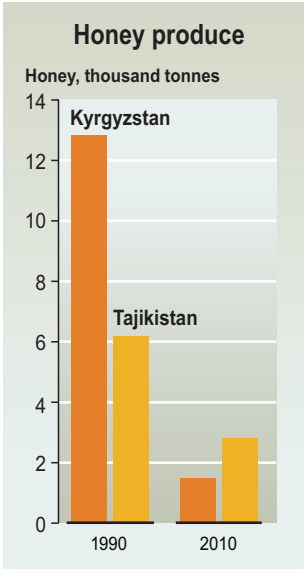
Nikolai Vavilov was a Soviet botanist and geneticist credited with describing the centres of origin of cultivated plants. In 1931 he identified Central Asia as one of the eight most important of these centres, the region richest in diversity both within and between species.

The region is rich in highly variable domesticated crops with many unique landraces. The main cultivated crops are cereals, food legumes, vegetables, melons, industrial and stimulant crops. Fruits include apple, apricot, peach, pear, plum, grape, almond, pistachio, pomegranate and fig. Many landraces and old local cultivars survive.

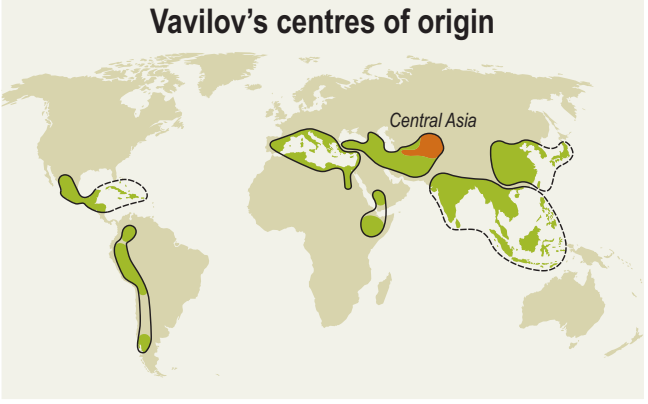
The native genetic diversity of fruit species has been eroded, through overgrazing, deforestation and industrialization. Following the Soviet collapse, people have overused fruit crops, worsening genetic erosion. But the high diversity of cultivated plant species remains important globally as well as for Central Asia itself.

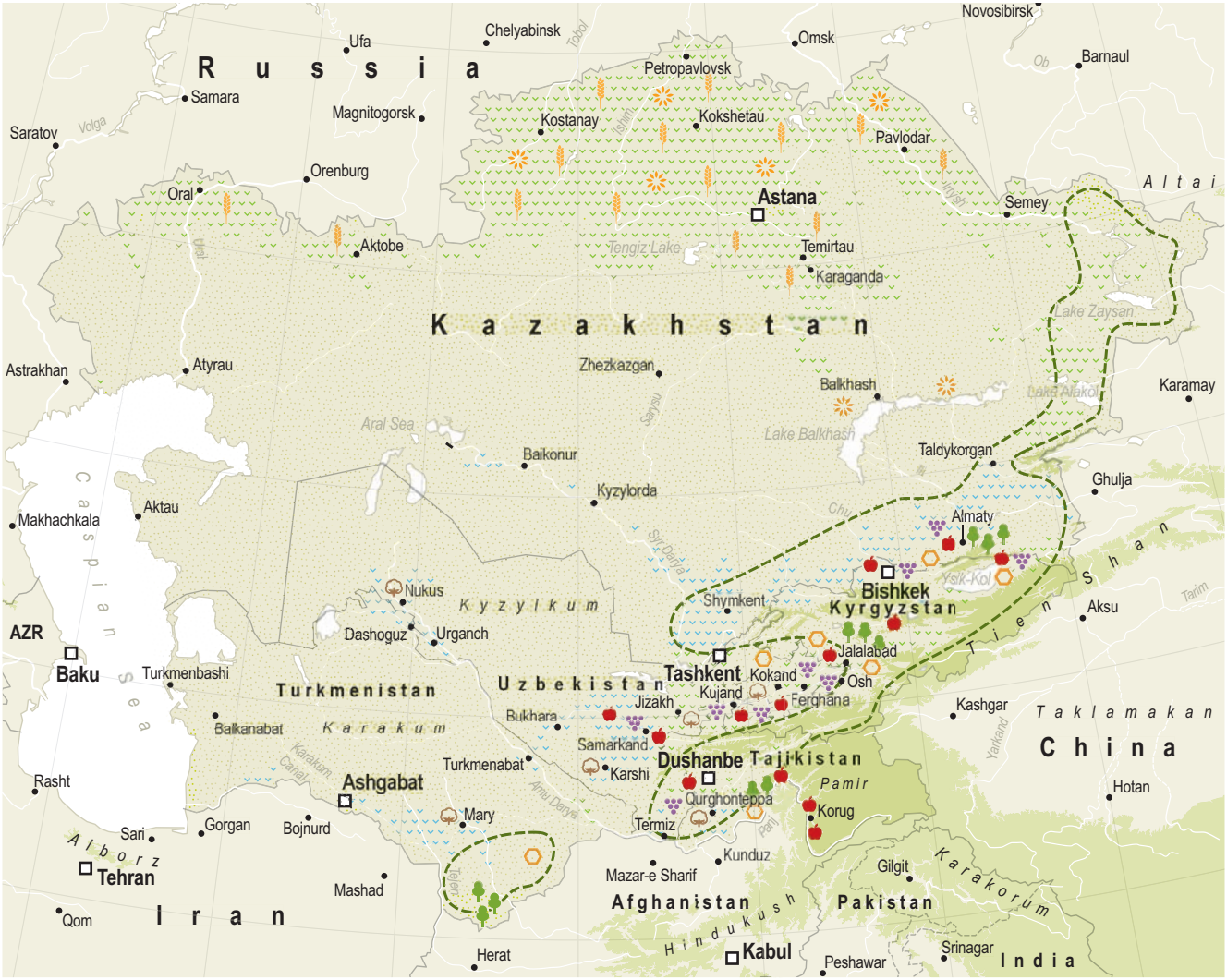


Source: land use and agrostatistics. Data for 2010



Source: agrostatistics of Kyrgyzstan and Tajikistan





Agrobiodiversity

- Rainfed croplands
- Irrigated croplands
- Grazing lands
- Areas abobe 3000 metres
- Intense grazing
- Orchards
- Vineyards
- Wheat
- Sunflowers
- Cotton
- Fruit- and nut forests
- Honey production

0 100 200 300 km

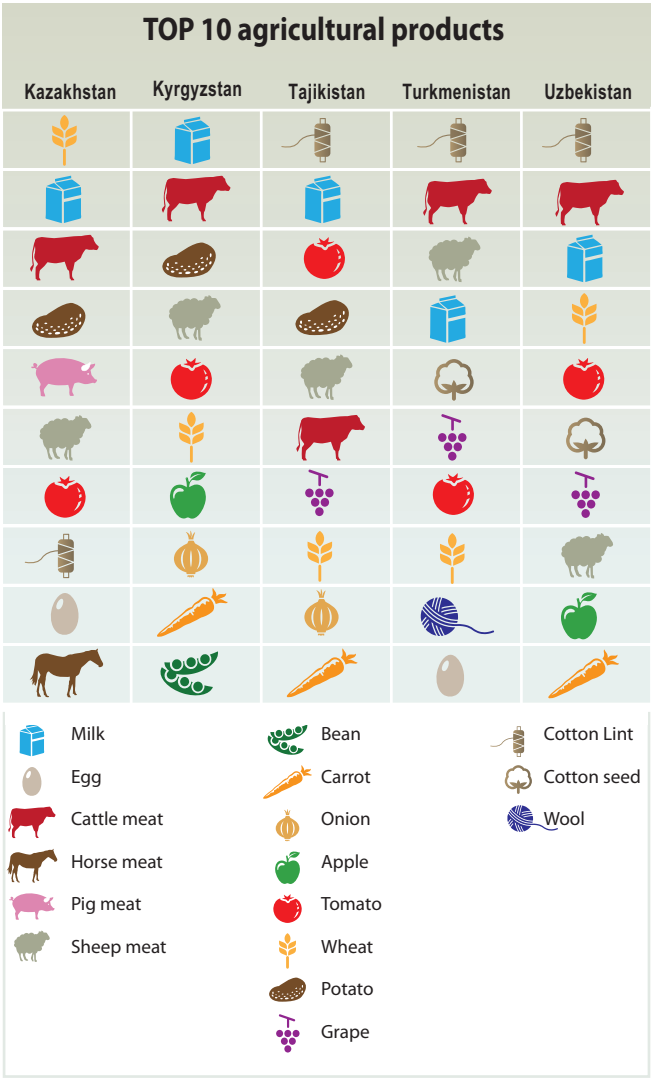
Map produced by ZOÏ Environment Network, October 2011

Source: Interactive Agricultural Ecological Atlas of Russia and Neighboring Countries (→ www.agroatlas.ru/ru/content/vegetation_maps/Arable)

Agrobiodiversity

Most land in Central Asia, apart from glaciers and sheer rock faces, is used for agriculture. This form of farming is known locally as agrobiodiversity, meaning that it includes traditionally cultivated lands as well as natural pastures on the deserts and steppes and in the mountains, and also areas such as wild fruit and nut forests.

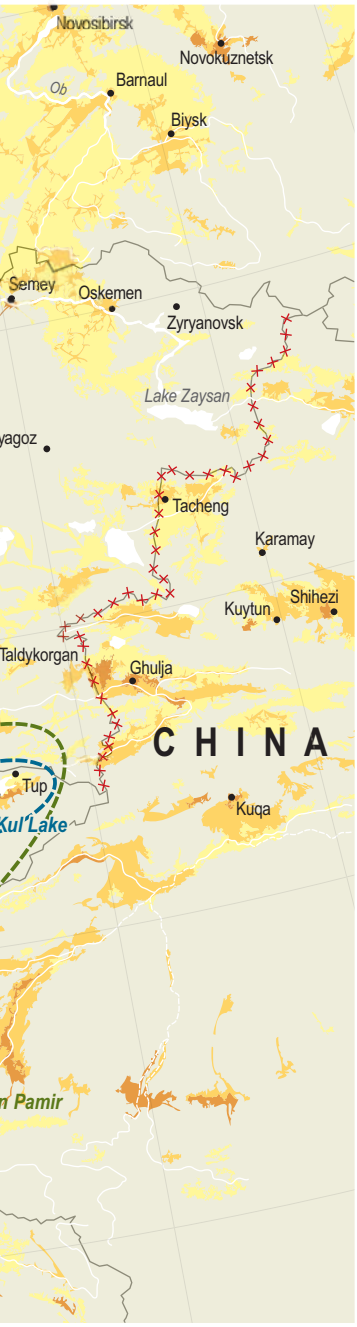
The map and table showing the top ten agricultural products of each country of Central Asia illustrate how they have adapted to their individual topography, climate and traditions. Kazakhstan, for example, puts its rolling steppes to good use for growing wheat, while beef and milk are both high on the list because of the extensive grazing available. Horsemeat also makes an appearance, because there are so many horses used in other forms of agriculture that a market has been found for them. In mountainous Kyrgyzstan, however, wheat is much further down the list, but root vegetables (potatoes, carrots and turnips) enjoy more prominence. Kyrgyzstan's Talas Valley is the largest producer of beans in Central Asia. Cotton production is clearly dominant in the other three countries of Uzbekistan, Turkmenistan and Tajikistan.



Source: FAOSTAT

Challenges for Biodiversity


RUSSIA
KAZAKHSTAN
TURKMENISTAN
UZBEKISTAN
TAJIKISTAN
KYRGYZSTAN
IRAN
AFGHANISTAN
PAKISTAN
Caspian Sea
Northern Caspian Sea
Amu Darya Delta and Aral Sea
Aral Sea
Cheleken Penninsula
Kara-Bogaz-Gol
Northern Kazakhstan
Southern Turkmenistan
Central Uzbekistan
Tashkent region
Ferghana valley
Southern Tajikistan and Uzbekistan
Foothills and Mountains of Pamirs and Tien Shan
Lake Balkhash
Issyk-Kul
Central Eastern
Astana
Bishkek
Tashkent
Dushanbe
Ashgabat
Baku
Tehran
Penza
Tolyatti
Samara
Saratov
Volga
Ufa
Buzuluk
Kumertau
Orenburg
Oral
Aktobe
Ural
Chelyabinsk
Magnitogorsk
Orsk
Petropavlovsk
Omsk
Kokshetau
Kostanay
Rudniy
Stepnogorsk
Pavlodar
Atbasar
Arkalyk
Temirtau
Karaganda
Irtysh
Volgograd
Astrakhan
Atyrau
Aktau
Makhachkala
Derbent
Zhanaozen
Mingachevir
Shirvan
Turkmenbashi
Balkanabat
Aral
Baikonur
Zhezkazgan
Kyzylorda
Syr Darya
Balkhash
Ili
Chu
Kentau
Zhanatas
Turkestan
Taraz
Almaty
Balykchy
Issyk-Kul
Nukus
Dashoguz
Urganch
Uchkuduk
Shymkent
Toktogul
Naryn
Angren
Namangan
Jalalabad
Kokand
Osh
Ferghana
Navoiy
Jizakh
Kujand
Kashgar
Bukhara
Samarkand
Karshi
Turkmenabat
Amu Darya
Rasht
Gonbad-e Kavus
Sari
Gorgan
Karaj
Bojnurd
Mary
Termiz
Qurghonteppa
Korug
Kunduz
Mazar-e Sharif
Gilgit
Neyshabur
Mashad
Hamadan
Qom
Arak
Mingora



Synthesis of biodiversity challenges

Population density (inhabitants per km²)

1 5 50

Sensitive water ecosystems with complex manmade pressures on biodiversity including climate change, pollution, habitat disturbance, overexploitation and invasive species

Environmental crisis area: ecosystem-change and degradation due to massive water withdrawal for agriculture with negative implications for life quality, economic performance, health and environment

Sensitive ecological regions intensely used for agriculture (crop cultivation and grazing) and experiencing high pressure from climate change, habitat disturbance and overexploitation

Densely populated and industrialized regions

Fortified borders

0 100 200 300 km

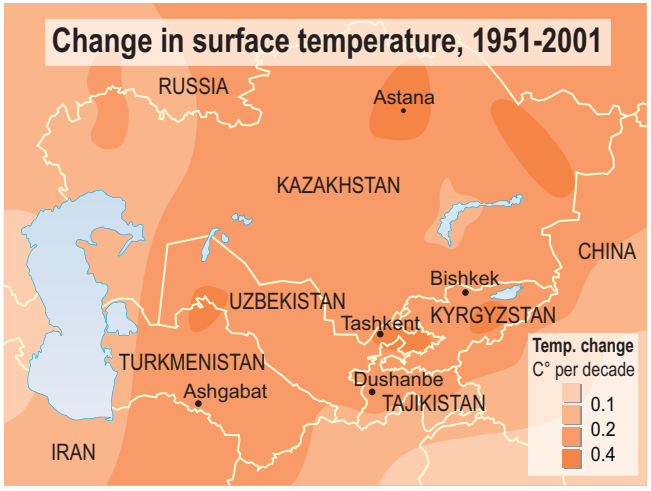
Map produced by ZOÏ Environment Network, October 2011

Source: LandScan Global Population Database 2007, Oak Ridge, TN, Oak Ridge National Laboratory (→ www.ornl.gov/sci/landscan)

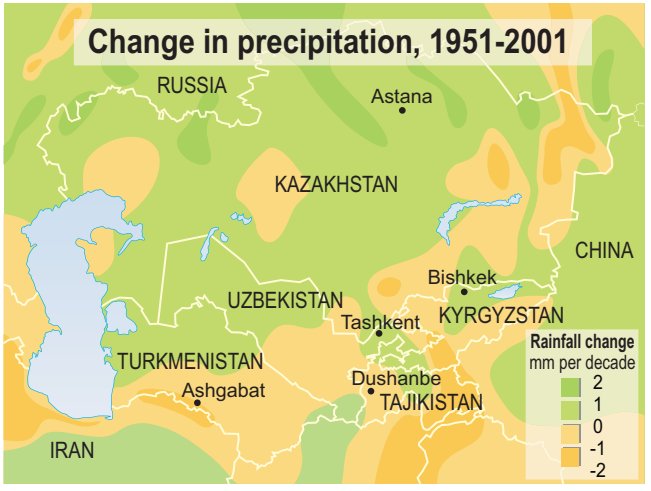
The map (left) shows starkly how multiple pressures are affecting Central Asia's biodiversity. Underlying the distinct pressures it shows the fact that much of the region is scarcely-populated mountain or desert, so there is a relatively small area where the problems are concentrated.

Climate change is a real and growing global problem which is affecting Central Asia already. Beyond that, four sorts of pressure are discernible. One is the deterioration of water ecosystems because of pollution, invasive species and other factors: this is evident in the Caspian Sea and Lake Issyk-Kul. Another is the massive loss of water in the Aral Sea basin caused by thoughtless and unplanned nature exploitation and large-scale irrigation projects over the past five to seven decades. Then there is the extensive damage from habitat loss and overexploitation. Last, there is the inevitable pressure of population and industry. Fortified borders and energy and transport infrastructure augment biodiversity impacts through habitat fragmentation.

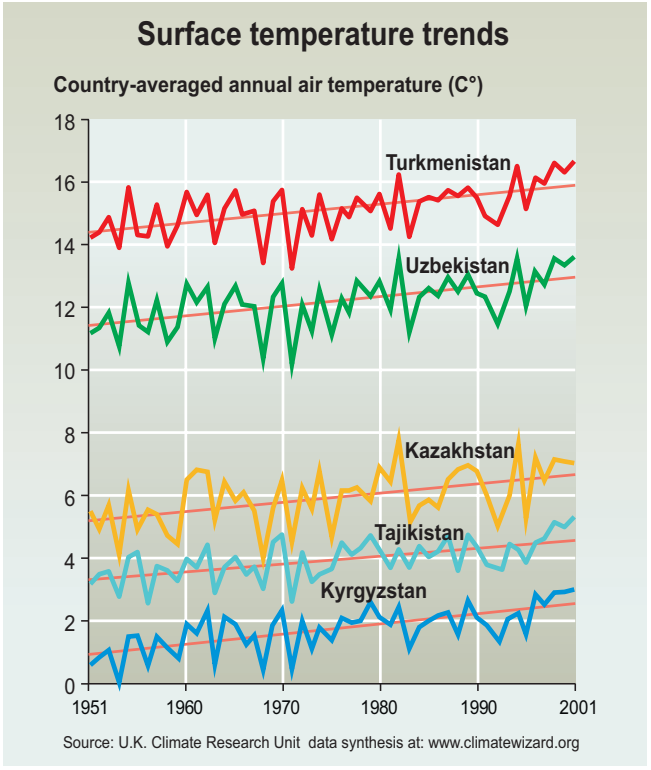
Probably all of the above pressures can be relieved by careful planning and rigorous enforcement, though remediating the existing damage would be very expensive. The problems may appear intractable, unless the countries of Central Asia can together make very rapid progress towards balancing population growth, greening their industries, energy sectors and agriculture and protecting their natural ecosystems effectively. As all of this will need to happen not only quickly but in the context of a warming climate, the prospect is challenging.



Sources: U.K. Climate Research Unit (data synthesis is available at: www.climatewizard.org), compilation of information from the Second (and the First) National Communications



Sources: U.K. Climate Research Unit (data synthesis is available at: www.climatewizard.org), compilation of information from the Second (and First) National Communications



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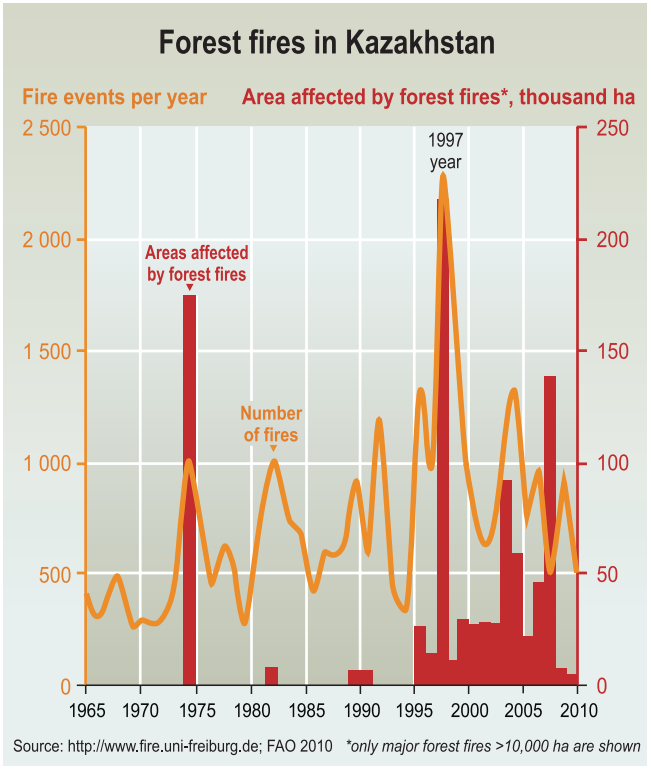
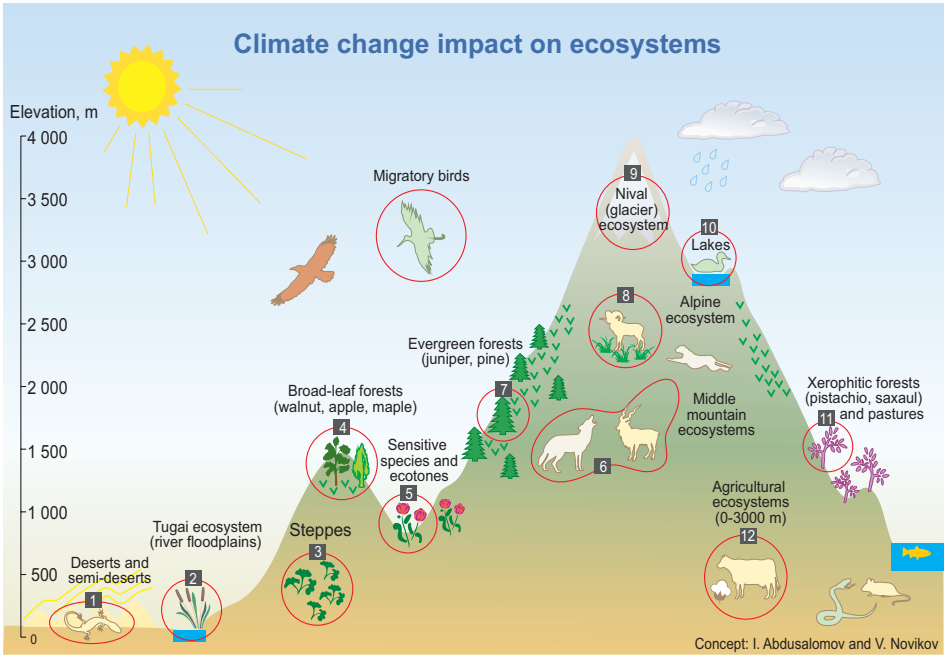


Source: http://www.fire.uni-freiburg.de; FAO 2010 **only major forest fires >10,000 ha are shown*



1 - Increased climate aridity, expansion of desert areas

2 - Ecosystem degradation due to reduced river flow, increased risk of fires and diseases

3 - Increased ecosystem productivity in northern parts of Central Asia, northward shift of vegetation

4 - Forest degradation due to reduced runoff, increased risk of droughts and diseases

5 - Changes in species composition, risk of extinction of endangered and vulnerable species

6 - Alteration of food-chains, change in the balance of predators and herbivorous animals

7 - Shift of forest communities to higher altitudes, risk of fires

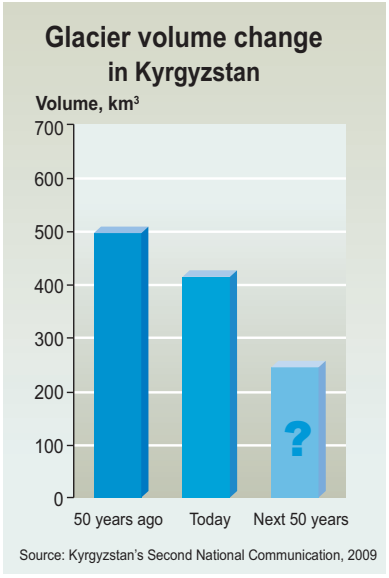
8 - Degradation and reduction of habitats, reduction of forage

9 - Glacier melt and vegetation succession, alpine habitat loss

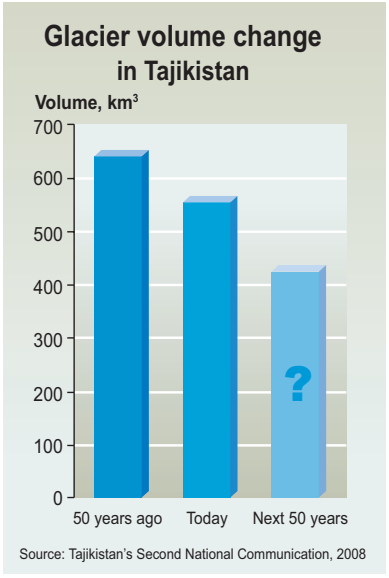
10 - Physical and biological changes in high mountain lakes

11 - Changes in phenology (earlier ripening, fading), pest attacks

12 - Mixed negative and positive effects of climate warming



Source: Kyrgyzstan's Second National Communication, 2009



Source: Tajikistan's Second National Communication, 2008

Weather records confirm that the surface temperatures in Central Asia are growing, but precipitation trends are different. Almost everywhere, climate warming in winter is more pronounced than in other seasons.

Climate change scenarios for Central Asia envisage a 1°C–3°C increase in temperature in the next two to four decades. If global greenhouse gas emissions are unmitigated, scientists project that temperatures could exceed today's by 3°C–6°C by the end of the century while rainfall amounts in southern parts of Central Asia could reduce. The impacts of these weather changes, especially in the mountains, are still unknown.


RUSSIA
KAZAKHSTAN
TURKMENISTAN
UZBEKISTAN
KYRGYZSTAN
TAJIKISTAN
AFGHANISTAN
IRAN
PAKISTAN
Caspian Sea
Aral Sea
Lake Balkhash
Volga
Ural
Irtysh
Syr Darya
Amu Darya
Kura
Murghab
Atrek
Chu
Ufa
Chelyabinsk
Omsk
Penza
Tolyatti
Samara
Petropavlovsk
Saratov
Buzuluk
Kumertau
Magnitogorsk
Kostanay
Kokshetau
Rudniy
Stepnogorsk
Pavlodar
Orenburg
Oral
Atbasar
Orsk
Astana
Volgograd
Aktobe
Arkalyk
Temirtau
Karaganda
Atyrau
Astrakhan
Zhezkazgan
Balkhash
Aral
Baikonur
Kyzylorda
Aktau
Zhanaozen
Makhachkala
Derbent
Kentau
Zhanatas
Almaty
Bishkek
Kara-Balta
Taraz
Turkestan
Balykchy
Nukus
Uchkuduk
Shymkent
Toktogul
Naryn
Mingachevir
Kara-Bogaz-Gol
Dashoguz
Urganch
Tashkent
Angren
Jalalabad
Shirvan
Baku
Turkmenbashi
Balkanabat
Navoiy
Jizakh
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Rasht
Ashgabat
Dushanbe
Qurghontappa
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Gorgan
Karaj
Tehran
Mazar-e Sharif
Kunduz
Gilgit
Neyshabur
Mashad
Hamadan
Qom
Arak
Mingora

Climate change

- Increased river flow
- Reduced river flow
- Risk of flooding due to sea level fluctuation
- Reduction of ice cover
- Increased productivity of wheat crops and pastures
- Severe drought impacts
- Increased risk of natural disasters in the mountains
- Hazardous waste sites and industries potentially affected by disasters
- Environmental crisis area
- Bushfires
- Locust invasions
- Potential risk of cross-border spread of invasive species and new diseases

0 100 200 300 km

Map produced by ZOÏ Environment Network, September 2011

The changing climate, especially since the 1950s, has had a negative effect on glaciers, snow cover and permafrost. Numerous small glaciers (smaller than 0.5 square km) at lower altitudes have totally melted. The high altitude glaciers appear more stable and have shrunk only a little. Today's rate of glacier loss in Central Asia is 0.5–1 per cent per year. In the last 50–60 years, between 15 per cent and 35 per cent of the Tien Shan and Pamir glaciers have melted, depending on their location, size and elevation.

Climate change is increasingly becoming a factor defining the future conditions of the region's ecosystems and adds to environmental stress on sensitive flora and fauna. Vegetation succession can be observed at many alpine sites of Central Asia, which were covered by ice and permanent snow until recently. Mountain species see their ecosystems changing. Droughts, a more arid climate and the reduction of water flow in the rivers strongly affect aquatic and tugai floodplain forest ecosystems.

The areas annually affected by locusts (mainly in southern Central Asia) have significantly increased. Pest attacks in southern Tajikistan in 2003-05 halved the cotton harvest in the worst-hit districts. They have also brought challenges to Turkmenistan and Uzbekistan. The risk of forest fires and of spreading forest diseases has amplified. Scientists warn that the forests and steppes of Kazakhstan are exposed to higher fire risk due to climate warming.

Certain agricultural crops may not adapt to a more arid climate. On the other hand, climate warming could be potentially favourable for some types of agricultural activities, including wheat production and grazing in northern Central Asia. However, extreme weather events may outweigh these positive effects. For example, Kazakhstan in 2011 harvested a record 29 million tonnes of grain. In contrast, in 2010, the severe drought reduced the crop to 12 million tonnes, almost a record low.


RUSSIA
KAZAKHSTAN
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UZBEKISTAN
TAJIKISTAN
IRAN
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PAKISTAN
Caspian Sea
Aral Sea
Ufa
Chelyabinsk
Petropavlovsk
Omsk
Penza
Tolyatti
Samara
Volga
Saratov
Balavoko
Buzuluk
Magnitogorsk
Kostanay
Rudniy
Kokshetau
Pavlodar
Ekibastuz
Stepnogorsk
Kumertau
Orenburg
Oral
Orsk
Atbasar
Astana
Arkalyk
Temirtau
Karaganda
Volgodonsk
Volgograd
Ural
Aktobe
Astrakhan
Atyrau
Zhezkazgan
Aral
Balkhash
Trans-Asia Gas pipeline
Lake Balkhash
Taldykorgan
Baikonur
Kyzylorda
Syr Darya
Chu
Almaty
Makhachkala
Aktau
Aktau
Zhanaozen
Derbent
Kentau
Zhanatas
Turkestan
Taraz
Kara-Balta
Bishkek
Balykchy
Mingachevir
Nukus
Uchkuduk
Shymkent
Toktogul
Naryn
Kara-Bogaz-Gol
Dashoguz
Urganch
Tashkent
Angren
Namangan
Kamparata
Jalalabad
Shirvan
Baku
Trans Caspian Gas pipeline
Turkmenbashi
Balkanabat
Navoiy
Jizakh
Kujand
Kokand
Ferghana
Osh
Kashgar
Projected Kyrgyzs
Bukhara
Amu Darya
Samarkand
Karshi
Turkmenabat
Rogun
Nurek
Dushanbe
Rasht
Ashgabat
Gonbad-e Kavus
Sari
Gorgan
Bojnurd
Mary
Termiz
Qurghonteppa
Korug
Karaj
Tehran
Neyshabur
Mashad
Mazar-e Sharif
Kunduz
Gilgit
Hamadan
Qom
Arak
Serhetabad
TAP Gas project
Mingora

Infrastructure and pollution

- Railway
- Projected railway
- Major roads
- Oil or gas pipeline
- Projected oil or gas pipeline
- Oil or gas field
- Coal mining
- Mining in sensitive areas
- Recently constructed new tunnels
- Thermal power plant (coal, oil, gas)
- Hydroelectric power plant
- Nuclear power plant
- Projected hydroelectric power plant
- Projected nuclear power plant
- Radioactive contamination and limitations for landuse
- Concentration of industrial pollution

0 100 200 300 km

Map produced by ZOÏ Environment Network, September 2011

Sources: Pipeline Infrastructure Map of Europe & the CIS, The Petroleum Economist Ltd., London (→ www.petroleum-economist.com); Resources and Energy Atlas of Russia

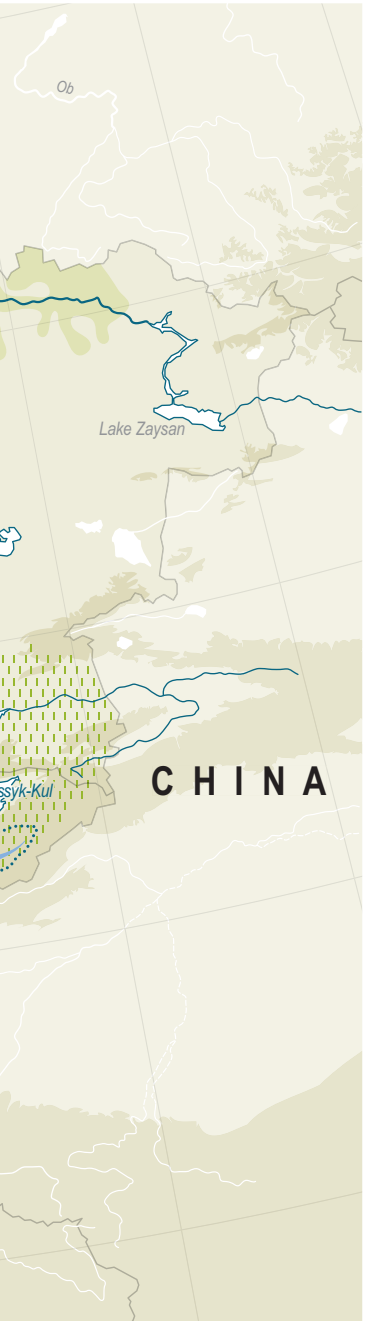
Habitat Fragmentation

There is extensive mining across much of Central Asia - in steppes, deserts and in mountainous areas - for coal, uranium, gold, mercury and other minerals. There is also the highly-developed and still growing oil and gas industry in the Caspian Sea. Mineral and hydrocarbon extraction is never risk-free, and the ravages of past accidents and neglect still disfigure parts of Central Asia. Examples are the damage to Caspian seals and sturgeons and the high concentrations of hazardous pollutants found in slag, sludge and tailings from uranium and mercury mining in Kyrgyzstan and Tajikistan. These may significantly affect the surrounding farmlands, natural waterways and the health of people and wildlife.

Soil compaction, reduction of vegetation and increased erosion of mountain slopes also contribute to higher sediment formation and silt loading of the rivers with implications for the useful life and effectiveness of the reservoirs and irrigation canals and the operation of hydroelectric turbines.

The improvement of national roads and the addition of new international roads has increased accessibility to remote mountain areas. This new accessibility has brought both additional pressures from visitors and from business development, and new income opportunities in terms of tourism and hospitality and the trade of native products. The increase in the number of people who have cars has improved mobility and connectivity, but has also brought increased risks to previously unreachable mountain ecosystems, and the additional traffic has contributed to environmental noise and air pollution.


RUSSIA
Volga
Ural
Astana
Irtysh
KAZAKHSTAN
Lake Balkhash
Ili
Chu
Syr Darya 5
(38)
Aral Sea
(70.2)
Amudarya 15.4
KAZ 10
Karakalpakstan 7.9
Prospective Collector
Arys 1
Bishkek
UZBEKISTAN
KYRGYZSTAN
Caspian Sea
Kara-Bogaz-Gol
Baku
Horezm 4.4 (UZB)
Tashauz 6.5
Tashkent
Chirchik-Charvak 9
(37)
UZB 10
KYR 3
Naryn 15
TJK 2
Kara Darya 4
Rivers of Ferghana Valley: 8
Lebap 3.9
Amu-Bukhara 5.2
UZB 5.3
Zarafshan 5.3
UZB 10
TURKMENISTAN
Ahangaran 1
KYR 0.1
Kashkadarya 1.2
0.3
TJK 6.6
Dushanbe
TAJIKISTAN
Karshi 4.2
UZB 1.4
0.6
1.5
0.5
Ashgabat
Murgab 1.5
Vakhsh 13.3
High water losses along Karakum Canal
Karakum Canal 11.0
Sherabad 0.2
Tehran
Tejen 1.0
Surhandarya 3.4
Panj 31.9
Prospective expansion of irrigation
Other rivers: 6.2
Kafarnigan 5.0
PAKISTAN
IRAN
AFGHANISTAN



Water-land management

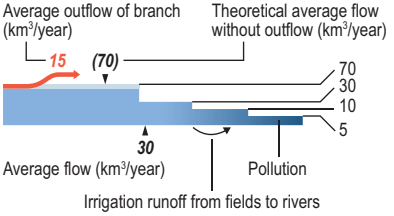
Impacts from intense grazing and land cultivation in sensitive soils or steep slopes

Croplands in the former steppes and virgin lands of northern Kazakhstan

Mountain regions above 2000 metres

Major decline in fisheries

Aral Sea basin



Environmental crisis area

Aral Sea basin

Irrigated lands

0 100 200 300 km

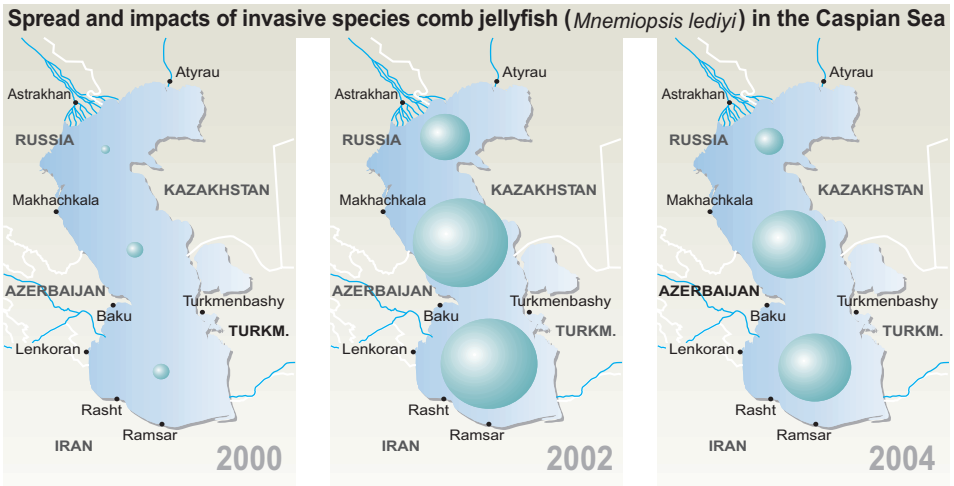
Map produced by ZOÏ Environment Network, October 2011

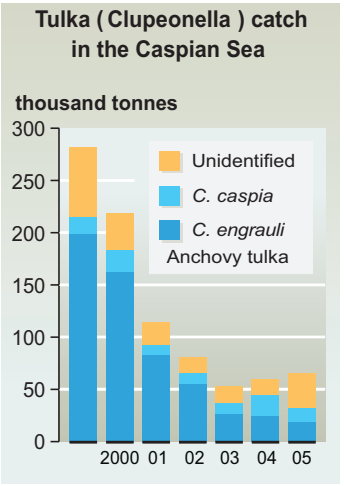
Source: CAWATERinfo (→ www.cawater-info.net); Interactive Agricultural Ecological Atlas of Russia and Neighboring Countries (→ www.agroatlas.ru/ru/content/vegetation_maps/Arable)

Over-exploitation

Water management affects water-dwelling species, but can also affect terrestrial wildlife at some distance. The diversion of the rivers which fed the Aral Sea to serve large-scale irrigation projects led to the drastic shrinkage of the Sea itself, and also exposed huge quantities of salt and chemicals which have devastated human health and ecosystems across the entire region. The Aral Sea fishing industry, which had reportedly produced one-sixth of the Soviet Union's entire fish catch, has been ruined.

Concerns over food security promoted the growth of rainfed crop cultivation in the mountain areas, especially in Tajikistan. This cultivation often increased soil erosion on steep slopes. With the abrupt end of the Soviet era, the people in the mountains faced sudden poverty and the risk of famine, and responded by hunting wild animals for meat and trophies. The increase in hunting caused a corresponding increase in the pressures on wildlife. The cessation of Soviet supplies of solid and liquid fuels to the Tien Shan and Pamir mountain communities had similar consequences – woody biomass and dried dung became major sources of energy for cooking and heating, and the widespread collection throughout the 1990s and into the early 2000s of slow-growing shrubs, such as artemisia and teresken, as well as forest cuttings, diminished mountain forests, soil cover and biodiversity.





Sources: Transboundary Diagnostic Analysis of the Caspian Environmental Programme (2007); Environment and Security in the Eastern Caspian (2008); Vital Caspian Graphics II (2011)

Invasive Alien Species

Alien species which invade new habitats are thought to be a main direct driver of biodiversity loss across the world. Water ecosystems of Central Asia in the heart of Eurasia are especially vulnerable to aliens because they are naturally isolated from strong competitors. They often have ecological niches that have remained empty because of their distance from possible colonists. In much the same way, mountains have a diverse but geographically narrow range of habitats, and invasive species may bring great disturbance to them.

Increasing travel, trade, and tourism associated with globalization and the growth in human numbers have made intentional and unintentional movements of species beyond natural biogeographical barriers much easier, and many aliens have become invaders. They can change the community structure and species composition of native ecosystems directly by out-competing indigenous species for resources. Alien species in the Caspian Sea include comb jellyfish and others, which in the past decade have severely affected local commercial fish species such as tulka. Issyk-Kul Lake in Kyrgyzstan has also suffered from the past intentional release of non-native fish species into its sensitive water ecosystem.

Biosafety and Living Modified Organisms

The most common genetically modified organisms (GMOs and LMOs) are crop plants which are altered to resist pests, diseases or herbicides. They include soya, wheat, corn (maize), cotton, sugar beet, walnuts, potatoes, tomatoes, peas and salad crops. Supporters of GMO technology argue that engineered crops can improve nutrition, that those resistant to drought or salt can flourish in poor conditions, and that crops able to resist insects help to protect the environment by reducing the use of pesticides.

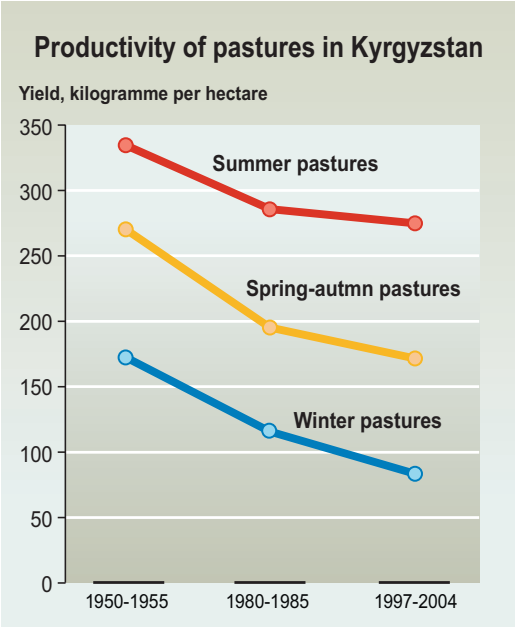
Critics fear that GMOs could adversely affect the health of those who eat them, producing toxins or transferring antibiotic resistance and other genetic material into the human gut. So far little evidence to support them has been reported. There are also fears that GMOs could become superweeds or that they could accidentally breed with wild plants or other crops. Plants that are insect-resistant are thought likely to hasten the development of pests able to resist insecticides. GMOs may help to grow more crops and so could be part of the answer to world hunger. But in an increasingly globalised world they could, their critics say, help the agricultural industry to create monopolies. Detecting the presence of genetically-modified material in seed imports is possible, though it needs specialist equipment and trained staff.

Unsustainable Use and Consumption: Implications for Biodiversity

However efficiently an economy is managed and run, there will still be a potential risk for biodiversity. The most careful irrigation methods, the most modern energy efficiency approaches and energy production technologies, cannot eliminate the human factor. And while that remains the ultimate determinant of the fate of habitats and systems there will always be a need for stringent protection of biodiversity.

In Central Asia this universal difficulty is compounded by the region's acknowledged poor record of wasteful water use in agriculture and energy inefficiency in households. Many grasslands have been affected by the overgrazing of 20 years ago. During the economic transition, the number of livestock initially declined, and herding practices centred around settlements. This development led to overuse of so-called winter and autumn pastures in the lower mountains near populated areas as the regular fodder supply was no longer available or affordable to most households. At the same time, the condition of summer pastures in the high mountains improved, but the growth of unpalatable grasses increased. The conflicts over pasture use in the near-border areas have increased.

One way forward for Central Asia could be the recognition and enforcement of cooperative, integrated and efficient water, energy and pasture use as a way to serve the interests of the economy, society and nature. Growing populations, demands for better living standards and more water, energy and food, and a less predictable climate mean biodiversity requires stronger protection and consideration.



Source: FAO 2010

Safeguarding Biodiversity


RUSSIA
KAZAKHSTAN
TURKMENISTAN
UZBEKISTAN
KYRGYZSTAN
TAJIKISTAN
IRAN
AFGHANISTAN
PAKISTAN
Caspian Sea
Aral Sea
Lake Balkhash
Volga
Ural
Irtysh
Syr Darya
Amu Darya
Kura
Chu
Ili
Atrek
Murghab
Kara-Bogaz-Gol
Ufa
Chelyabinsk
Omsk
Penza
Tolyatti
Samara
Saratov
Buzuluk
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Magnitogorsk
Kostanay
Rudniy
Petropavlovsk
Kokshetau
Stepnogorsk
Pavlodar
Orenburg
Oral
Orsk
Aktobe
Atbasar
Astana
Arkalyk
Temirtau
Karaganda
Volgograd
Astrakhan
Atyrau
Zhezkazgan
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Aral
Baikonur
Kyzylorda
Aktau
Zhanaozen
Makhachkala
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Zhanatas
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Bishkek
Balykchy
Taraz
Turkestan
Shymkent
Toktogul
Naryn
Nukus
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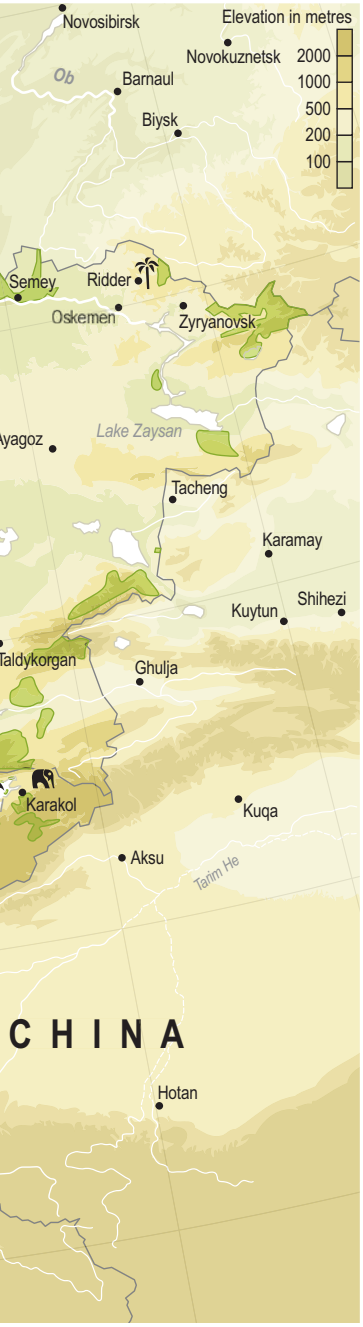


Biodiversity conservation

- Protected areas
- Reforestation initiatives
- Zoological parks
- Botanical parks
- Wildlife sanctuaries and nurseries
- RAMSAR sites (Convention on wetlands of international importance especially as waterfowl habitat)

0 100 200 300 km

Map produced by ZOÏ Environment Network, October 2011

Source: Protected Planet (→ http://protectedplanet.net); UNESCO World Heritage Conventon (→ http://whc.unesco.org) ADB Nature Atlas (→ http://beta.adb.org/publications/central-asia-atlas-natural-resources); Ramsar Convention on Wetlands (→ www.ramsar.org)

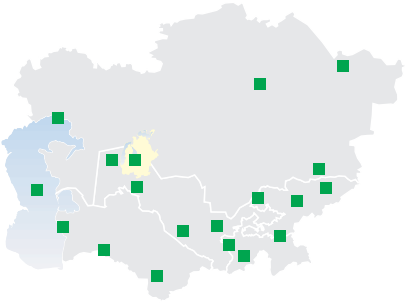
As the map (left) shows, there is an encouraging trend in much of Central Asia towards extending the network of protected areas and forests inherited two decades ago after independence from the Soviet Union - and in the countries which have recorded little actual increase (Uzbekistan, Turkmenistan), at least there has been no loss of protection. But it is a matter of more than the simple extent of the areas under protection. To show effective concern for biodiversity and forests, governments need to improve the efficiency with which they are managed, the enforcement of the legislation designed to secure their future, the engagement of the communities of which they are a part, and the effectiveness of financing mechanisms.

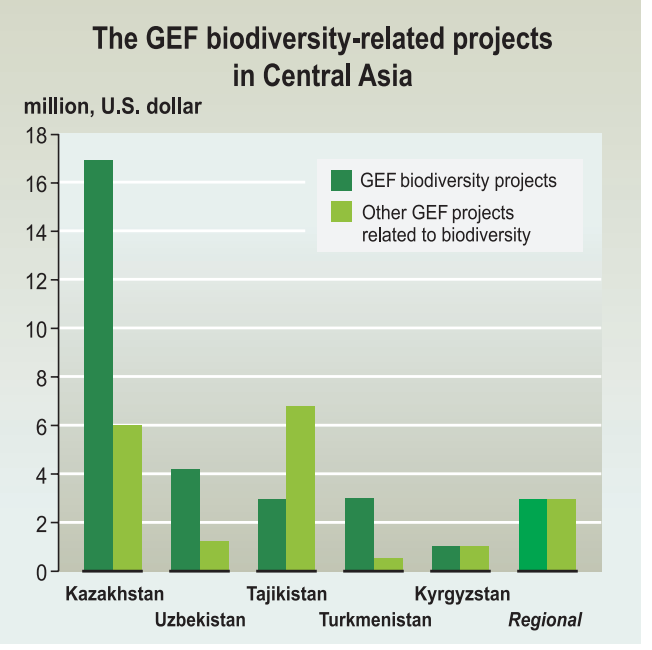
Global Environment Facility in Central Asia

The Global Environment Facility (GEF) is the largest funder of projects to improve the Earth's environment. The GEF was established in 1991 and since then has allocated $9.5 billion, supplemented by more than $42 billion in co-financing, for 2,700 projects in more than 165 developing and transition countries. The GEF projects cover not only biodiversity, but also climate change, international waters, land degradation and other global environmental priorities. All these projects benefit the global environment, linking local, national, and global environmental challenges and promoting sustainable livelihoods. The GEF supported more than 40 biodiversity-related projects in Central Asia over the past 15 years and allocated more than $50 million. In addition to national projects, several regional initiatives supported by the GEF are helping to build cross-border cooperation and efficient nature resource management. Selected examples of recent GEF projects and their accomplishments are described below.

The goal of the Sustainable Land Management in the High Pamir and Pamir-Alai Mountains GEF project (known locally as "PALM") is to restore the productive and protective functions of the transboundary mountain ecosystems in Tajikistan and Kyrgyzstan. The project is improving rural well-being through better management of pastures, sustainable land management, and lessening land degradation's causes and consequences.

The West Tien Shan GEF project initially assisted three countries - Kyrgyzstan, Kazakhstan and Uzbekistan - to strengthen local and cross-border mountain ecosystem and watershed conservation. The new phase of the GEF project aims to improve forestry and biodiversity management and increase local peoples' access to biodiversity resources and earnings from ecotourism.





Source: www.thegef.org

Data for 2000-2010

The biodiversity of Kazakhstan's steppes is threatened by habitat degradation. Protected areas have a significant role to play, but they cover only a limited part of steppe ecosystems and their management effectiveness is limited. The GEF project is currently working to expand protected areas containing representative samples of steppes, to integrate buffer zones into the protected areas network, to introduce wildlife corridors, and to promote community-based conservation areas. New approaches to ecological monitoring are also tested in the project. In spring 2011, a new national park, Buiratau, covering 89,000 ha was established. Another GEF project in the mountains of southern Kazakhstan that harbour more than 75% of the country's agrobiodiversity is assisting in conservation efforts targeting wild crop relatives, namely wild apples (*Malus sieversii*) and wild apricots (*Armeniaca vulgaris*).

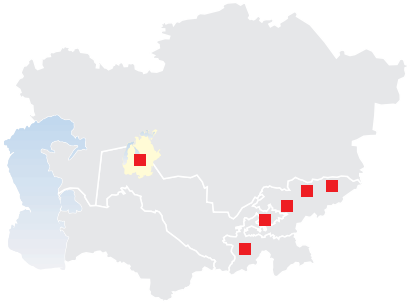
GEF's project to sustain agricultural biodiversity in the face of climate change in Tajikistan recognises that many local species of plants and their wild relatives may offer resistance to or tolerance of pests, diseases and severe weather shocks. Tajikistan's agricultural biodiversity is important for rural communities' well-being, for ensuring their food security and for the conservation of globally significant genetic diversity and crop varieties. The project is testing how rural communities can benefit from agrobiodiversity conservation and how they can adapt to climate change. The project catalyses international research collaboration in soil and plant modelling and assists local communities in diversification of crops and other coping strategies.

Fish in mountain lakes of Kyrgyzstan are threatened by alien species and overfishing. The GEF project addresses these problems through legal and institutional reforms in fishery management, introducing biodiversity-friendly fishery management regimes, conserving endemic fish species and controlling introduced species in Issyk-Kul Lake and addressing socio-economic root causes. Restocking of native species is another important priority. Natural pastures play a key role in Kyrgyzstan's rural economy. The ongoing GEF project on sustainable pasture management in the Suusamyr Valley aims to demonstrate how scientific and traditional knowledge and community involvement can reduce pressure from overgrazing.

Another GEF project aims to lock biodiversity into Uzbekistan's oil-and-gas sector policies and operations in the Ustyurt Plateau. The few surviving strongholds of dry temperate grasslands are threatened by growing hydrocarbon exploration and pipeline infrastructure and the country's protected areas cannot safeguard the vast area remaining outside. The long-term goal is for all oil-and-gas operations to minimize their adverse impacts on biodiversity, including ecosystem fragmentation. An ongoing GEF project in the Amu Darya delta region is helping tugai forest conservation through more efficient biodiversity protection combined with community-based forestry and energy and water-efficient agricultural activities. The recently completed Nuratau-Kyzylkum GEF project improved national regulations, promoted modern approaches for nature conservation involving local communities, and contributed to sustainable pasture, forest and tourism development. Awareness-raising among children, farmers and tourists is continuing with GEF support.

Protected areas covering nearly 4% of its territory safeguard Turkmenistan's biodiversity. But the protection is not comprehensive, the protected areas network is fragmented and planning management is under-developed. The ongoing GEF project assists Turkmenistan in improving efficiency of the existing protected areas system and enabling conditions for - developing a network of national parks as part of the country's protected areas system. National parks are not only meant for strict biodiversity conservation, but also for environmental education and eco-tourism. The project covers a range of desert and mountain ecosystems and slows threats to biodiversity, such as cutting woodlands, draining water meadows, overgrazing, and over-exploiting species. The recently completed Hazar nature reserve GEF project on the Caspian Sea coast has improved biodiversity conservation and monitoring efficiency, and helped to alleviate population pressures on the local ecosystem.

Biodiversity-related Initiatives Supported by Switzerland



Switzerland seeks to help Central Asia's countries in sustainable development, transition from authoritarian rule and central planning to pluralism, democracy and a market economy. Its projects in Central Asia are in five main areas: public institutions and services, basic water and energy infrastructure, private sector development, water management and disaster risk reduction, and health care reform. Currently, Switzerland supports over 20 projects in Kyrgyzstan and Tajikistan (plus 10 more implemented regionally) where it spends about US$ 14-15 million annually per country.

Forest depletion by individuals and business groups jeopardizes rural livelihoods in Kyrgyzstan and threatens the world's largest natural walnut forests. Since independence two decades ago the Kyrgyz Government has invested less in conserving these forests, lacking resources and an effective legal framework. So Switzerland has been financing the KIRFOR project based on the idea that farmers, foresters, government authorities, local communities and business should decide jointly how to manage and sustainably use the forests. The project aims also to support research and training and to contribute to the new forest law and inventory.

The project designed to explore the potential of Payment for Ecosystem Services (PES) is centred on the Chon-Aksu small river basin of Lake Issyk-Kul, in Kyrgyzstan. It aims to show the feasibility of applying the PES concept in integrated water resources management. The project activities which started in 2010 by the Regional Environmental Centre include: improving the practice of land use within a small river basin; reconstructing a water pipe-line network and cleaning up irrigation facilities to save water; developing a biological filtration scheme for water; identifying how many livestock pastures a small river basin can support; and modernising a village's access to water.

In 2000 Switzerland launched the Central Asian Mountain Partnership initiative (CAMP) in Kyrgyzstan, Tajikistan and Kazakhstan with the aim of promoting sustainable mountain development that should lead to better living conditions for the poor majority of mountain people. CAMP activities promote group learning and action on priority topics related to pasture management, water resource management, integrated local risk management, energy efficiency, conflict over natural resources and other topics. Mountain-focused NGOs, initially supported by Swiss researchers and collaborators, involve various levels of stakeholders from central governments to village institutions and the general public. They often communicate "mountain voices", advocate interactive and open processes of policy formulation and act to bridge any gaps between new legislation and strategies and the realities in mountain communities.

Cotton is starting to regain its importance in Kyrgyzstan. In selected areas, it is now grown with far fewer chemicals than during Soviet times, and organic cotton is seen as an opportunity to enter a new niche market and to increase incomes. The BioCotton project promotes organic farming in Central Asia and the trade in organic products on the international and domestic markets. The project has developed a system to ensure that organic cotton complies with international standards.

Other Initiatives

There are many other initiatives on biodiversity conservation and sustainable use, as these examples show. Some concentrate on top predators like the big cats, the creatures at the apex of the food chain whose wellbeing is essential for an entire ecosystem. Others focus on species which are commercially important or which bestow other benefits on the environment, like the saiga antelopes whose long migrations help to disperse seeds across the steppe. Many aim to help local people to recover skills which were undervalued in previous decades and to use natural resources sustainably.

The World Wildlife Fund (WWF) is working in Central Asia to develop and promote the ECONET, which links core nature protection and priority areas with transit areas (eco-corridors) and buffer zones. Combining all three elements should guarantee the long-term sustainability of ecosystem development. WWF has also helped to research the possible reintroduction of tigers in Uzbekistan and Kazakhstan (something it considers feasible in a few years' time), the conservation of cheetahs in Turkmenistan, and Bukhara deer in Uzbekistan, Tajikistan and Kazakhstan.

The German international development organization GIZ (Deutsche Gesellschaft fur Internationale Zusammenarbeit) is working with governments, NGOs and academia in Central Asia in a programme on sustainable use of natural resources. In Kyrgyzstan it is working to encourage sustainable pasture management; in Tajikistan and Turkmenistan it is also promoting sustainable forest management. GIZ is also supporting water resource and water ecosystem projects, including reforestation in the dry Aral Sea. The German Nature and Biodiversity Conservation Union (NABU) is supporting wildlife centres in Kyrgyzstan's Issyk-Kul province. Germany's Michael Succow Foundation is assisting Uzbekistan and Turkmenistan in planning buffer zones for nature reserves and introducing new management concepts that involve the local population. Another GIZ-supported project in Tajikistan and Kyrgyzstan is focusing on ibex, markhor, urial and Marco Polo sheep.

The project collaborates with traditional hunters, private conservancies, hunting concessionaires, scientists, NGOs and state nature protection authorities. The project is helping to manage hunting grounds and wildlife stocks in a sustainable way and to monitor biodiversity.

The Central Asian region stands at the crossroads of several flyways and hosts at least 530 bird species. With support from the UK Government's Darwin Initiative, the Royal Society for the Protection of Birds and German Nature and Biodiversity Conservation Union, more than 230 sites covering over 20 million hectares of steppes, deserts, mountains and wetlands have been mapped and incorporated into a comprehensive Important Bird Areas (IBAs) list of Central Asia. In Turkmenistan the IBA initiative was a driving force behind the country's signing of the Ramsar Convention.

Fauna & Flora International's (FFI) work in Kyrgyzstan aims to protect the snow leopard at the Sarychat-Ertash and Naryn state nature reserves in the central Tien Shan mountains. FFI helps the reserve's staff to combat poaching, monitor the animals and involve communities, with input from the Snow Leopard Trust. FFI helps to conserve fruit and nut forests, and has recently prepared the Red List of Trees of Central Asia.

The Saiga Conservation Alliance (SCA) works in Central Asia to conserve these critically endangered antelopes in Kazakhstan and Uzbekistan. SCA monitors saiga numbers, identifies poacher profiles and motives, and in Uzbekistan has successfully negotiated a consensus and an action plan between the Government and local people. It aims to establish local ranger groups to monitor saiga populations and raise public awareness and increased support from communities for the plight of the saiga. The Association for the Conservation of Biodiversity of Kazakhstan and Frankfurt Zoological Society focus on the recovery of saiga in central Kazakhstan.

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Note: In Central Asia: Strict Nature Reserves "zapovedniks" are equivalent to IUCN category (I); National Parks are equivalent to IUCN category (II); Natural Monuments are equivalent to IUCN category (III); Species Management Areas (botanical, zoological, complex reserves) "zakazniks" are equivalent to IUCN category (IV); the protected zones of strict nature reserves, "reservates" and water protection zones are equivalent to IUCN category (V).

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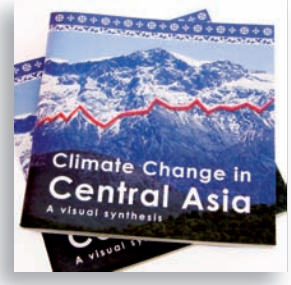

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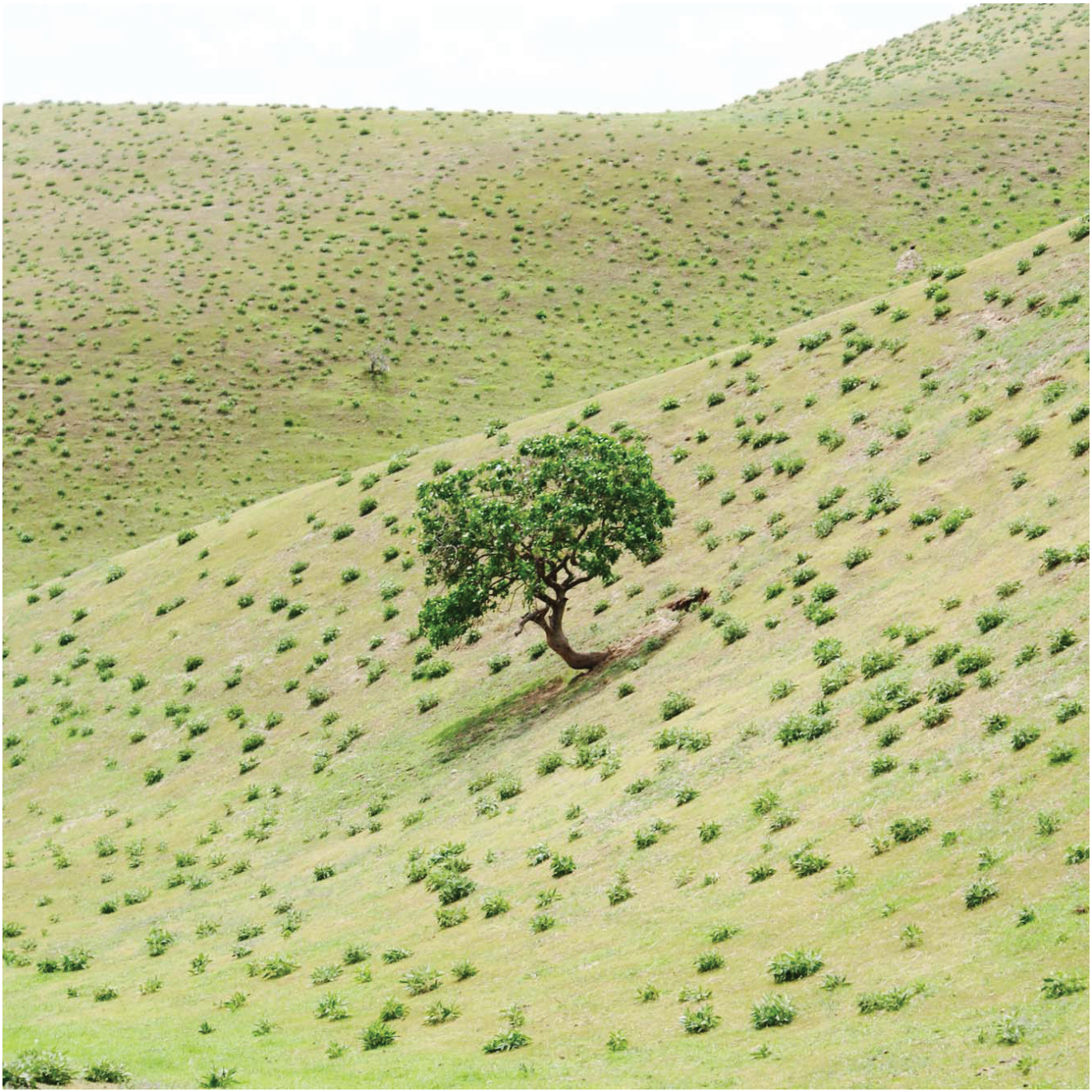

People hunted the saiga in Moyunkum desert. Before they came on horseback, dressed in skins, armed with arrows; then they came with guns, galloped to and fro, and antelope crowds rushed first one then another way... the time passed and people switched to motorised raids, intensifying attrition like a pack of wolves, shooting the saiga on the run... then they began to use helicopters to search for the saiga herds in the steppe, and ground-based snipers racing at a hundred kilometres per hour to pursue the animals, giving them no chance to escape. Cars, helicopters, rapid-fire rifles, all turned life in the Moyunkum desert upside down.

Chingiz Aitmatov, "The Executioner's Block", 1987

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