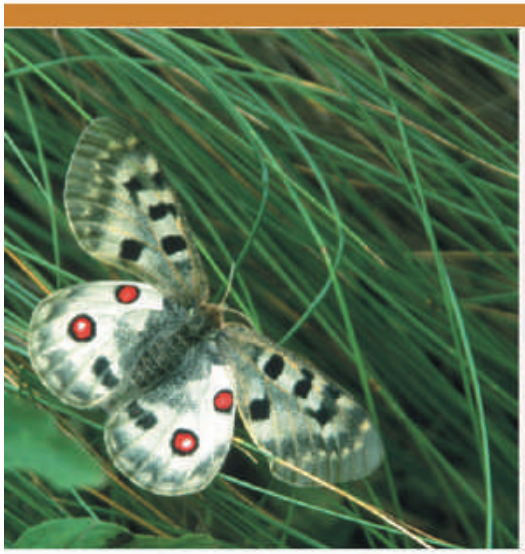
MICHAEL SUCCOW FOUNDATION
for the protection of nature



PRE-FEASIBILITY STUDY FOR NATURA 2000 IN AZERBAIJAN - A NATURE CONSERVATION STRATEGY

POTENTIAL ANALYSIS FOR FUTURE INVESTMENT IN NATURE CONSERVATION IN AZERBAIJAN

financed by MAVA FONDATION POUR LA NATURE

In memoriam
Prof. Dr. Martin Uppenbrink

Project leadership and management: Dipl. Biol. Sebastian Schmidt
Project supervision: Prof. Dr. Michael Succow, Prof. Dr. Martin Uppenbrink
Editing: Sebastian Schmidt, Constanze Tröltzsch and Hendrik Herlyn

Proposal for quoting: Schmidt, S. & Uppenbrink, M. 2009: Pre-Feasibility Study for NATURA 2000 in Azerbaijan. Michael Succow Foundation, Greifswald. 159 p.

Project duration: 03/2006-04/2009
Editing and compiling: Sebastian Schmidt
Maps: Stephan Busse, René Fronczek

Contact:
Michael Succow Foundation
Ernst-Moritz-Arndt University Greifswald
Insitute for Botany and Landcape Ecology
Grimmer Str. 88
17489 Greifswald
Germany

Tel: +49 3834 7754623
Fax: +49 3834 535743
www.succow-stifung.de
info@succow-stiftung.de

printed on FSC-certified paper, 08/2009
digital version available on www.succow-stiftung.de

Pre-Feasibility Study for NATURA 2000 in Azerbaijan

This document has been compiled from material (where not specifically attributed) contributed by:
Nigar Agayeva, Tavagül Iskanderov, Elshad Askerov, Fikret Gadjiev, Elshad Gurbanov, Ali Bayramov, Elena Tagieva, Naiba Allaverdiya, Tavgül Iskanderov, Ulvi Abasquliyev, Martin Uppenbrink, Tom Kirschey, Jan Peper, Sebastian Schmidt, Kai Gauger, Jonathan Etzold, Annett Thiele, Maria Langhammer, Michael Heiß, Hagen Gottschling, Michael Rietschel, Tobias Scharnweber, Frederik Noack and Michael Succow.
Nina Seifert, René Fronczek, Stephan Busse, Jessica von Stryk and Constanze Tröltzsch assisted in the publication of this report.

This project has been financially supported by:
MAVA Foundation, Switzerland

Further support under the umbrella of this project was given by:
Michael Otto Stiftung, Germany

and:
Ernst-Moritz- Arndt University of Greifswald
in particular the PUGASMOS Project of the Institute for
Botany and Landscape Ecology

Further supporters were:

- CIM (Centrum für Internationale Migration)
  with its specialists based in Azerbaijan: Dr. Hartmut Müller and Gila Altmann,
- grassroots foundation, Germany,
- Sonnenwiese Stiftung, Liechtenstein,
- Ursula Schulz Dornburg, Germany and
- DAAD (German Academic Exchange Service) supporting several graduates and interns

Greifswald, July 2009

CONTENT

PART V - Annexes

on CD-ROM attached or
via download from www.succow-stiftung.de

Annex I Report of subprojects
Annex II Fact sheet and background data of gap analysis
Annex III Maps and cross sections of region surveyed
Annex IV Selected graduate and intern ship works conducted in the frame of the project
Annex V Selected project publications
Annex VI Additional literature recommended for further reading

Abbreviations and Acronyms

ADB	Asian Development Bank	
AZN	Azerbaijan New Manat - currency of Azerbaijan	
BfN	Federal Agency for Nature Conservation	Bundesamt für Naturschutz
BMU	Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, Germany	Bundesministerium für Umwelt, Naturschutz und Reaktorsicherheit
BMWi	Federal Minstry of Economics and Technology, Germany	Bundesministerium für Wirtschaft und Technologie
BMZ	Federal Ministry for the Economic Cooperation and Development, Germany	Bundesministerium für wirtschaftliche Zusammenarbeit und Entwicklung
BP	Beyond Petroleum (former British Petrol)	
BR	Biosphere Reserve	
BTC	Baku-Tiblisi-Cheyan	
CEPF	Critical Ecosystem Protection Fund	
CI	Conservation International	
CIM	Centre for International Migration	
CPAF	Caucasus Protected Area Fund	
EBRD	European Bank for Reconstruction and Development	
EC	European Commission	
ECP	Ecoregional Conservation Plan	
EIA	environmental impact assessement	
EU	European Union	
FFH	Flora-Fauna-Habitat	
GDP	Gross Domestic Product	
IBA	Important Bird Area	
IDP	Internal Displaced Person	
IUCN	World Conservation Union	
KfW	Kreditanstalt für Wiederaufbau	German Development Bank
MAB	Man and Biosphere	
MENR	Ministry of Ecology and Natural Resources	
NEAP	National Environmental Action Plan	
PA	protected area	
PCA	Priority Conservation Area	
PCA	Partnership Cooperation Agreement	
pSCI	proposed Sites of Community Importance	
SAC	Special Area of Conservation	
SCI	Site of Community Importance	
SOFAR	State Oil Fund of the Azerbaijan Republic	
TACIS	Technical Assistence to the Commonwealth of Independent Stated	
TJS	Transboundary Joint Secretariat	
UNDP	United Nation Development Programme	
UNECE	United Nation Economic Commission for Europe	
UNESCO	United Nations Educational, Scientific and Cultural Organization	
USAID	United States Agency for International Development	
WHO	World Health Organisation	

Preface

Nestled between the Greater and Lesser Caucasus, the Talish Mountain and the Caspian Sea, Azerbaijan boasts a surprising diversity of pristine habitats. Part of the Eastern-Mediterranean climatic region, the country's natural features include high mountains, forests, steppe, semi-desert, coast, floodplain and wetland ecosystems. Due to its highly diverse relief a tremendous biological diversity can be found within a very confined area.

As of today, there are eight national parks and several strictly protected nature reserves as well as several state sanctuaries in the country. All national parks have only been established within the last six years– a remarkable achievement! Yet, despite these efforts there is still a potential for further protection as several important regions and habitats are either unprotected or covered by an insufficient level of protection.

The following study analyses these gaps and the resulting potential for the extension of the protected area system.

Geographically at least partly belonging to Europe, Azerbaijan sees itself on the crossroads between Asia and the European Union. A strategic and stable partner of the EU in the Southern Caucasus, the country has been invited to the European Neighbourhood Policy programme in 2004. On this basis a deeper political relationship and economic integration is targeted. One of the priorities of the EU National Indicative Programme (2007- 2010) is the improvement of environmental legislative and administrative management, environmental protection, and the resulting „approximation of Azerbaijan's environmental legislation and standards to that of the EU". This topic has also been analysed in this study with a focus on protected areas, habitats and their conservation.

Financed by the MAVA Foundation (Switzerland), the Michael Succow Foundation (MSF), in cooperation with various experts from Azerbaijan, conducted a detailed gap analysis of potential future protected areas in Azerbaijan. This report presents the results of this project and constitutes a part of the strategy of the MSF: to provide sound background information on the biological value and its further potential for protection in Azerbaijan. From the very beginning of the foundation's engagement in Azerbaijan nine years ago, the science-based protection of landscapes and species has been the main focus of our work in the country.

The project reported has been conducted between 2006 and 2008; if not otherwise stated, information obtained till end 2008 were taken into account for compiling this report.

Without the support of several experts and contributors to this project it would have not been possible. Among the most valuable persons, others than named in the introduction, supporting and providing most valuable input to the project were: Dr. Hartmut Müller (CIM expert and temporary director of Shirvan National Park), Elnura Gurbanova, Gila Altmann (CIM expert and at the time of the project adviser to the MENR).

As part of the project, the assessment of biodiversity and the potential for further protection were being investigated on a national scale. The assessments are based on the Ecoregional Conservation Plan (ECP) and its Priority Conservation Areas (PCA), developed by WWF, KfW, CEPF, and the MacArthur Foundation between 2000 and 2005 but take their recommendations much further. Applying a landscape-ecological approach, a detailed inventory was conducted for selected regions in Azerbaijan, employing both fieldwork and the analysis of all available data. One example: As a result of this project, about 15 bird species were recorded in the country for the first time ever.

The overall results pro-actively provide sound ecological data and guidance and should enable Azerbaijan to continue its programme to extend its protected area system. In addition, to provide a long-term perspective, an initial comparison with the European protected areas network was conducted and recommendations towards this standard are presented here.

The following report is divided into five individual parts, which together describe the political context, the natural potential and the long-term trans-national perspective for the establishment of further protected areas in Azerbaijan.

Part I defined the national context of the project and is an introduction to the country, its biodiversity and its ecological situation. The main initiatives and the stakeholders dealing with protected area issues in Azerbaijan are described in brief.

Part II summarises the results of the intensive landscape-ecological inventory. It introduces fact sheets for all regions investigated that hold a potential for future protection, describes their biodiversity, compares the initially found habitats with European FFH types and

explains their significance for protection. The base data (species lists of animals and plants) are attached to this report.

Part III analyses the state of environmental law in Azerbaijan. Analysing this political and juristic precondition may be viewed as the first pre-feasibility check on how closely Azerbaijan's environmental legislation approximates that of the EU.

Part IV summarises the findings, concludes and gives recommendations and sketches a path towards bridging the gaps within the national PA system and synchronisation with EU standards.

Part V compiles major background data collected, gives species lists, all maps depicted in this report, provides literature used and recommends literature for further reading. It further provides graduate works which have been conducted in the frame of the project as well as publications prepared and published by the project team.

This project would not have been possible without the numerous support and voluntary contributions of Prof. Dr. Martin Uppenbrink, honory member of the board of the Michael Succow Foundation and head of the Azerbaijan office. Following long lasting illness, Martin Uppenbrink died in autumn 2008 and could unfortunately not experience the publication of this report. The entire foundation and in particular the project team owes him great respect as Martin Uppenbrink was a great mentor for everyone working with him.

Executive Summary

The present report is the result of a research project funded by the MAVA Foundation, Switzerland, and conducted by a team of Azerbaijani experts and the Michael Succow Foundation, Germany.

The goal of this study was to reveal the further potential for the extension of the protected area network in Azerbaijan. For the most valuable regions, in-depth surveys and assessments were conducted, and the results are presented here. The study further aimed at assessing Azerbaijan's potential to participate in one the European protected area networks under a medium-range perspective.

Azerbaijan hosts a rich biodiversity. The Southern Caucasus is regarded as one of the 25 most important hotspots of biodiversity and endangered ecosystems. Its high rate of endemism and a broad range of habitats are the result of the varied terrain and many different climatic conditions. In Azerbaijan, the coastal plain with dunes, large bays and several islands lies about 26m below surface and is characterised by dry, hot and semi-arid conditions. After passing through the semi-deserts and steppes of the central lowland and the foothills of the Greater Caucasus, the landscape takes on an increasingly lush appearance, from beech and oak forests at the montane level to sub-alpine meadows rich in herbaceous flora.

Under the umbrella of this project, several sub-projects were conducted, and their results have been published in various articles or project reports. All of these are available from the Michael Succow Foundation. The topics of these very detailed assessments were related to:

- The preparation of nomination documents for the RAMSAR nomination of Lake Sari Su – a wetland of international importance,
- The first nationwide overview of mires and peatlands of Azerbaijan,
- The assessment of Biodiversity and Protection value of coastal ecosystems of Azerbaijan (including islands). Funded by the Michael Otto Foundation
- Publication of a popular tourist guidebook: "Birdwatching in Azerbaijan - a guide to nature and landscape",
- The evaluation of the current status, threats and utilisation pattern of the Hyrcanian Forest (currently only in German), founded by Grassroots Foundation
- The inventory of lakes in the Greater Caucasus, Azerbaijan,
- The vegetation characterisation of the montane foothills of the Eastern Caucasus,
- The scientific description of forests of the Greater and Lesser Caucasus, Azerbaijan

(forest types, condition and threats; currently only in German).

The gap analysis for further protected area establishment, presented herewith, is based on the Ecoregional

Map 1: Priority conservation areas of the Southern Causasus, as defined in the Ecoregional Conservation Plan. Source: http://maps.grida.no/go/graphic/protected-areas-priority-conservation-areas-and-wildlife-corridors-in-the-caucausus

Conservation Plan and its Priority Conservation Areas, elaborated by a consortium of WWF, KfW, CEPF and MacArthur in 2005.

Within the project, about twelve regions were surveyed and assessed in depth, and the results are presented here. In addition, the report includes the results for four of about 24 islands surveyed. All major biomes, such as forest, steppe, semi-desert, high mountains, coast and wetlands were investigated. Detailed records and lists of animal and plant species can be found in the annexes of this report. In particular for the surveys on bird species occurence more than 15 first time records for the country could been given (e.g. Radde's Warbler (*Phylloscopus schwarzi*), Taiga Flycatcher (*Ficedula albicilla*) or Dead Sea Sparrow (*Passer moabiticus*).

As part of the fieldwork, bird counts and herpetofaunistic/ zoological surveys were conducted along the main ecological gradients in the investigated areas, and spatial distribution of plant communities was documented. The numbers of all birds were counted or estimated and the observed species were classified as breeding, migrating or wintering. All species and their habitats were compared to international/European categories, such as IUCN, Bern convention, Bonn convention. These data were supported by remote sensing interpretation and classification for vegetation and habits, and semi-structured interviews with local inhabitants were conducted to gain a full overview of the local ecological situation. Literature and institutional analyses, particularly the strong input by national experts concerning the clarification of the situation of environmental law in Azerbaijan were also part of the project.

The survey revealed the continuing potential for the establishment and extension of protected areas in Azerbaijan. At present, eight national parks exist in the country, all established within the last six to seven years. However, these national parks are often restricted to protecting one single habitat-type and do not reflect the natural gradient and its potential for protection. For example, Lake Ag Göl National Park protects a wetland in the semi-desert but only encompasses small parts of this semi-arid ecosystem. Apart from National Parks, several State Nature Sanctuaries and State Nature Reserves exist, protecting about 8% of the country's area in total. Especially State Nature Sanctuaries (Zakazniks) are seen as good basis for the extension of and stricter protection within the national PA network.

It is to state, despite its short existence as an independent country, Azerbaijan has already gained an impressive experience in selecting and creating national parks. There is, however, a huge discrepancy between simply creating and actually managing protected areas, especially National Parks. The general weakness in implementing and managing specific areas is a remarkable handicap for good government and hence for matching the conditions of the most important contract partner, the EU.

Azerbaijan faces serious environmental challenges and threats to its biodiversity. This is due to the continuous construction boom, absence of norms and regulations and in part an open-access situation. Irrespective of the extension of the protected area network, the conservation system needs to be strengthened. To reach this goal, an increase of the awareness for environmental and particularly conservation issues is urgently needed. As a consequence, the authors consider it one of the most important challenges in the near future to build a successful, long-term communication network and programme - dedicated to raising the national awareness on biodiversity, nature conservation and the

environment.

This need has been recognized by the Azerbaijani government in principle, and a National Action Plan[1] has been developed. Major threats mentioned are:

- loss or change of habitats;
- commercial und unsustainable use of biological resources (e.g. forest use, poaching);
- unregulated or uninterrupted cattle grazing in pastures, failure to meet grazing standards, insufficient action towards the recovery of grasslands;
- contamination of the environment (soil and water resources) in industrial zones and adjacent areas by industrial wastes;
- contamination of soil by oil and oil products, etc.;
- unregulated building and construction;

Based on this, the following major requirements were announced by the Ministry of Ecology and Natural Resources[2] – however, little information was available to the authors concerning their status of implementation.

- Enhancement of the legislation on biodiversity;
- Expansion of the area of specially protected nature sites;
- Enhancement of mechanisms of making biodiversity inventory;
- Strengthening the capacity of scientific research for the assessment of biodiversity within the country;
- Enhancement of a system for raising public awareness of biodiversity conservation issues;
- Enhancement of a forest management mechanism

Yet, the fulfillment of this action plan is hardly to assess to a foreign observer, the authors can not estimate if and how national authorities reach their self-defined goals.

Irrespective of management constrains in existing protected areas, the authors in principle recommend the investment into the establishment of further protected areas in the near future. Safeguarding remaining biodiversity hotspots and valuable landscapes should have priority.

However, for further investment, either political or financial, a clear political commitment for cooperation by the Azerbaijan authorities is seen as a pre-condition.

Based on this, a priority ranking for further protection measures was developed, which, from an ecological point of view, reads as follows:

- Establishment of Gobustan Biosphere Reserve
- Upgrading Zuvand Zakaznik and connection to Hirkan National Park
- Protecting one of the alluvial gravel fans with its river dynamic and the associated specific forest communities (Gakh or Oguz)
- Uniting several existing protected areas around Mingächavir Reservoir into one protected area and filling gaps in between, in particular including the floodplain forests at Alisan, Iori, and the mouth of the Kura into the reserve. Setting up one central administration and strengthening protection measures.
- Establishment of a coastal reserve, including the Kura River mouth on the Caspian Sea, coastal waters, and several islands

There exists an initial basis in Azerbaijan for participation in an EU-protected area network. A pilot project for the participation within the European Council's Emerald network was established. Within the project, a team of representatives of the Ministry of Ecology and Natural Resources, scientists from WWF Azerbaijan and the National Academy of Sciences designated five areas in Azerbaijan that meet the requirements of the Emerald Network. The findings explicitly built on the national legislative framework and identify 21 types of endangered natural habitats in addition to the potential Emerald Network area. Unfortunately, those habitats are not described in detail and are not spatially linked to the priority conservation areas.

Small-scale international projects focusing on environmental aspects are regularly carried out in the country. However, success control is still lacking and large-scale support from international donor organisation is either strongly underdeveloped or

1 According to the National Action Plan on Strengthening Capacity to Respond to Challenges of Biodiversity Conservation, Climate Change and Desertification / Land Degradation (2006-2015), Baku 2005

2 as above

failed to reveal a long-term visible and sustainable impact. Despite being a partner country of the German Caucasus Initiative, hardly any relevant action under this programme could be implemented over the last years. Following some remarkable initiatives and the development of several planning documents (see above), the international cooperation within the environmental sector has declined since 2007. A very progressive and open phase, taking place between 2000 and 2006, now appears to have been replaced by an increasing set of constrains and impeding factors for the implementation of joint projects.

NGOs, both national and international, faced increasing restrictions over the past two years. Access to protected areas, implementation of projects or acceptance of independent national experts at the relevant national institutions were subject to new restrictions. In spring 2009, a legal amendment that would have severely restricted national NGOs eventually did not pass legislation, but was seen internationally as an attempt to limit and restrict the capacities of the NGOs (Eurasianet NGO Amendments put civil society at risk)[3]. Only recently, a former project member and critic of the national politics was arrested under questionable circumstances and accused of hooliganism (EU Statement on the arrest of two Azerbaijani youth organisation members)[4]. These tendencies should not be accepted. Currently, it is very difficult to predict whether this is of temporary character or a general state policy, but the situation will presumably become clearer within the months to come.

In 2002, after about 10 years of independence, Azerbaijan continued to describe itself as "a nation in transition to democracy." This process continues today. Azerbaijan still appears to be in a phase of self-definition, finding its role in the international and regional community. Nevertheless, the basic political and legal parameters for the institutionalisation of democracy have been established and are being refined and enacted. This process involves the dismantling of institutions, revising of existing laws and defining new ones to bolster an open, market-oriented society.

Yet, the country's ambitions are not clear. Does Azerbaijan vote for participation in the European Union and its ideals? Is a good and constructive relation of Azerbaijan toward the EU bond to a low price of oil[5]? Apart from the international representation, are democracy, civil society, free speech and expression of interest a true and honest option for the country? Will environmental protection follow international standards? Is nature conservation more than a catch phrase in this booming country?

While the environment is protected by law, and pollution is controlled by regulations, in reality, concern for the environment has been secondary to economic development. The implementation as well as steady improvement of environmental legislation as well as environmental management should be given a higher priority to meet the future needs of Azerbaijan.
Nevertheless, in certain segments of public law, e.g. the Environmental Impact Assessment and Freedom of Information, the country already possesses a basis. Even weak instruments can be updated, renewed and improved, although it may not be possible to compare them directly to EU standards. The Azerbaijani basis can be used for a possible approximation of the environmental law to the EU standards, especially the Habitats Directive.

To strengthen the bond between the EU and Azerbaijan, the two parties signed a formal Partnership and Cooperation Agreement (PCA) in April 1996, which took effect at the beginning of July 1999. The EU, through the consultative bodies established under the PCA, has attached particular importance to holding free and fair elections, the pluralism of political parties, and freedom of the media. Addressing these three issues under the PCA may be the key for Azerbaijan to strengthen not only its democracy but also its legislative framework, its legal institutions and the degree of compliance of those in power with the law.

Based on the PCA, Azerbaijan (together with Armenia and Georgia) was included in the European Neighborhood Policy, at its request and following a recommendation by the European Commission in June 2004. As a consequence, the European Commission recommended a significant intensification of relations with Azerbaijan through the development of an Action Plan under the European Neighborhood Policy (ENP).

3 http://www.eurasianet.org/departments/insightb/articles/eav061709.shtml accessed 21/07/2009

4 http://ol.azerbaijan.googlepages.com/EUStatement23July2009.pdf accessed 22/07/2009

5 see: F. Guliyev (2009): Oil wealth, patrimonialism and the failure of democracy in Azerbaijan. Caucasus Analytical Digest No2. 2009

The new Country Strategy Paper (CSP) 2007-2013 covers EU financial assistance to Azerbaijan under the new European Neighbourhood and Partnership Instrument (ENPI). It is accompanied by a new ENPI National Indicative Programme (NIP) for 2007-2010 whose main priorities are: (1) Democratisation, rule of law and fundamental freedoms; (2) Socio-economic reforms and legal approximation to the EU; (3) Energy and transport.

The ENP with its Indicative Programme goes beyond the PCA and offers the prospect of an increasingly close relationship with the EU, involving a significant degree of economic integration and a deepening of political cooperation. Key objectives for the action plan under the ENP include, among others:

- Implementation of effective reform of the rule of law (judiciary, law enforcement agencies)
- Progress in poverty reduction, sustainable development and environmental protection
- Progress in conflict resolution and enhanced regional cooperation.

Regarding the first and most prominent issue within the action plan, a team of specialists produced a "Draft National Plan of Legal Approximation". In that context, a Scoreboard Report on "Environment, Exploitation and Utilization of Natural Resources" was prepared and published. Within the Scoreboard report, elaborated major overlaps and present differences are highlighted.

In general, the low level of approximation of the relevant Azerbaijani legislation to the Council Directives 79/409/EEC[6] and 92/43/EEC[7] is emphasized. Consequently the recommendations are:

- To adopt the appropriate mandatory rule on the conservation of wild birds
- To amend the legislation on conservation of natural habitats and of wild flora and fauna

It is up to the Azerbaijani Government and the EU to further organize and finance an in-depth study or smaller studies to compare the laws and to prepare Azerbaijan in detail for a possible approximation of its legal environmental basis to the EU standards.

A pragmatic and logical sequence for this would be the following, with an approximated timeline of about 15 years:

a. A clear commitment of Azerbaijan's responsible authorities to support the approximation of Azerbaijan's principles, legal basis and implementation with regard to EU standards and examples of best practise
b. Active participation in EU nature conservation-related Twinning projects and bilateral cooperation
c. Continuation of the establishment of close ties with the Emerald network. This first step will lead to familiarisation of Azerbaijan with EU conservation standards and implementation as it develops guidelines for respective habitat protection.
d. Since the Council of Europe offers a rather weak mandate for a general approximation of the EU and Azerbaijan, and few instruments are available to parallel Emerald, a large-scale Twinning project should be implemented with the following main aspects:
   - Revision of species list including Red list update
   - Establish a scientific working group of EU and Azerbaijani experts to map, assess and compare all Azerbaijan habitats with Annex I types of FFH guideline and develop recommendations for the respective update. Selection and Assessment of SACs/pSCIs (Stage 1) (In Stage 1, each member state is required to submit a list of sites (proposed sites of Community importance or pSCIs) that meet the objectives and criteria set out in the Habitats Directive (Article 4 (1)). Suitable sites must be proposed for all natural habitat types listed in Annex I and for the species listed in Annex II.
   - Establish a working group of environmental law experts and focus on the relevant laws and directives for nature, habitats, and protected areas.

6 Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.
7 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

PART ONE

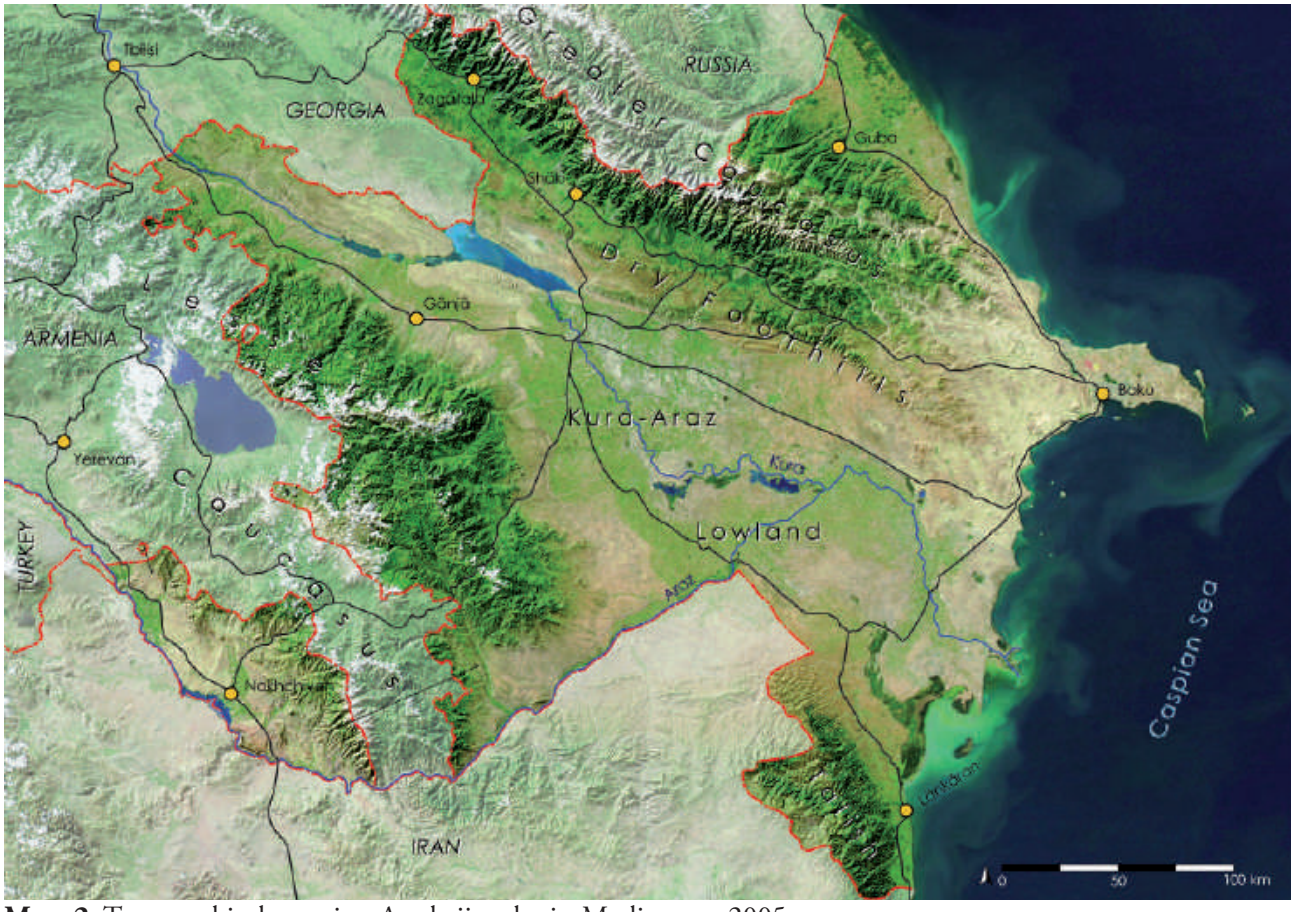
Introduction and Framework

1.1. Geo-ecological background of the project

1.1.1. Geography and Climate

Azerbaijan is the largest and most populous country in the Southern Caucasus. Geographically it is dominated by the Caspian Sea forming its eastern border, the Greater Caucasus mountain range to the north, the Lesser Caucasus in the southwest, the Talish Mountains to the south and the extensive flatlands in centre of the country, which are dominated by the river basins of the Kura and its biggest tributary, the Araz. About 60 percent of the country consist of mountains and their foothills; the elevation changes over a relatively short distance from lowlands to highlands. Except for its eastern Caspian shoreline with an elevation of 27 m below standard sea level and some areas bordering Georgia and Iran, Azerbaijan is surrounded by mountains. The highest elevations occur in the Greater Caucasus, where Mount Bazardüzü rises to 4,466 metres above sea level.

Azerbaijan has a total land area of approximately 86,600 km², which is slightly less than the size of Portugal and less than 1% of the land area of the former Soviet Union.

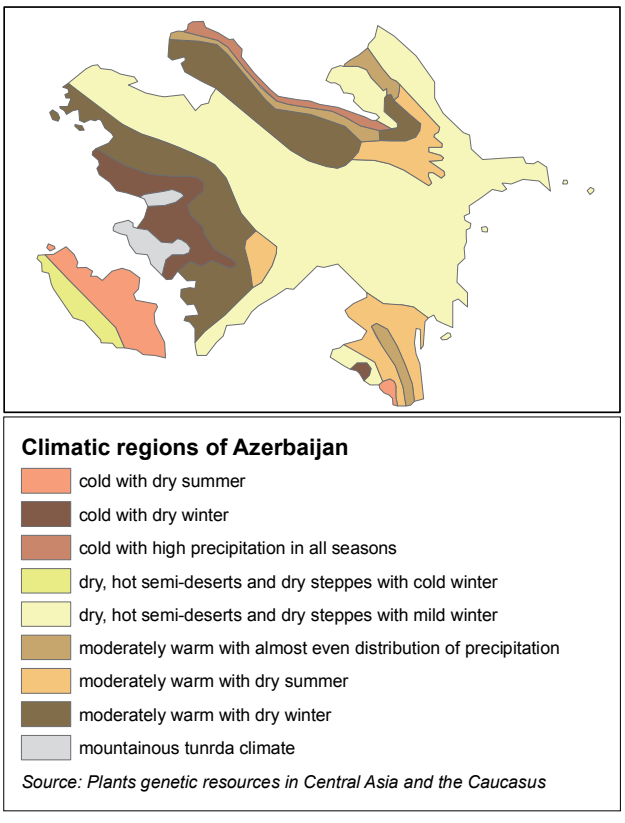


Map. 2: Topographical overview Azerbaijan, basis: Modis scene 2005

Of the three Transcaucasian states, Azerbaijan has the greatest land area. Special administrative subdivisions are the Nakhchivan Autonomous Republic, separated from the rest of Azerbaijan by a strip of Armenian territory, and the Nagorno-Garabakh Autonomous Region, entirely within Azerbaijan. Nagorno-Garabakh has been occupied by Armenia along with 7 other districts in Azerbaijan's southwest for more than 15 years. The occupied area constitutes 20 percent of the total territory of Azerbaijan.

Azerbaijan is bordered by Georgia to the east, Russia to the north, Iran to the south, and Armenia to the southwest and west. A small part of Nakhchivan also borders Turkey to the northwest. The capital of Azerbaijan is the ancient city of Baku on the Absheron peninsula, which has the largest and best harbour on the Caspian Sea and has long been the centre of the republic's oil industry.

Eight large rivers flow from the Greater and Lesser Caucasus Ranges into the central Kura-Araz lowlands, named after Azerbaijan's longest river, the Kura, and its main tributary, the Araz. The Kura drains into the Caspian, forming a delta a short distance downstream from the junction with the Araz. The largest body of water in Azerbaijan, Mingächevir Reservoir with an area of 605 square kilometres, was formed by damming the Kura in western Azerbaijan. Currently the sea level of the Caspian lies 27 m below the world sea level.



Map 3: Climatic regions in Azerbaijan, source: Embassy of the Republic of Azerbaijan (2009)

Besides being regulated by the inflow of its feeders, the Caspian is subject to complex tectonical influences, which result in fluctuating sea levels and regularly changing shorelines.

The climate varies from subtropical and dry in central and eastern Azerbaijan to subtropical and humid in the southeast, temperate along the shores of the Caspian Sea, and cold at higher elevations. Baku, on the Caspian, enjoys mild weather, averaging 4°C in January and 26°C in July. Most of Azerbaijan receives scant rainfall - on average 152 to 254 mm annually. Consequently, large parts of the country are covered by semi-desert and dry steppe. High precipitation with more than 1,000 mm annually occurs at high elevations of the Caucasus and in the Lenkoran lowlands in the southeast.

1.1.2. Major Habitats

Azerbaijan can be divided into the following seven ecosystem complexes, all of which contribute to the large diversity of this small country:

- Forest ecosystems,
- High mountain ecosystems,
- Dry mountain scrubland ecosystems,
- Steppe ecosystems,
- Semi-desert ecosystems,
- Wetland and
- Coastal ecosystems.

1.1.2.1. Forest Ecosystems

Older data indicate that forests covered about 12% of the country's territory. Unfortunately, this number has been cited for almost two decades, since no recent numbers on national scale are available. The distribution of forested areas is very uneven. The Greater Caucasus contains 48.8% of the total forest cover, the Lesser Caucasus 34.2%, the Talish Mountains 14.5%, the Kura-Araz lowlands 2.5%, and the Nakhchivan Autonomous Republic 0.5%. Everywhere in the country, forests have been under serious pressure as a source of fuel for heating,

Map 4: Landscapes and climate zones of the Southern Caucasus. Source: http://maps.grida.no/go/graphic/climate-zones-of-the-caucasus-ecoregion

timber products and as forest pastures for the numerous privately owned herds of cattle and other livestock. Lowland forests formerly occurred along all major rivers and in the floodplains, especially along the Kura River or in coastal regions such as Samur Yalama. Large White Poplar (*Populus alba*), Wingnut (*Pterocarya pterocarpa*) and Common Oak (*Quercus longipes*), all overgrown by dense thickets of lianas, make up the characteristic appearance of these forests. Today, only Garayazi State Reserve and the proposed Samur Yalama National Park hold significant remnants of the floodplain forest in Azerbaijan. The mountain forest occurs at elevations between 500 and 2,500 m and generally consists of Oriental Beech (*Fagus orientalis*), hornbeam (*Carpinus orientalis* and *Carpinus betulus*) as well as several species of oak. Although beech forest contains the highest wood reserves at present, oak forest formerly used to

Photo 1: Forest of the Greater Caucasus (J.Etzold)

be widespread. Georgian Oak (*Quercus iberica*) is the species of lower and mid-elevations, whereas Broad-leaved Oak (*Quercus macranthera*) dominates up to the treeline in the Lesser and Greater Caucasus. Other species contributing to the forest diversity at various elevations are Caucasian Lime (*Tilia caucasica*), Sweet Chestnut (*Castanea sativa*), European Ash (*Fraxinus excelsior*) and Red-bud Maple (*Acer trautvetteri*). A special forest region with numerous Tertiary relict species is the Hirkanian Forest in the Talish Mountains.

1.1.2.2. High mountain ecosystems

The high mountains of the Greater and Lesser Caucasus can be divided into subalpine and alpine as well as subnival and nival regions. The greatest diversity of plant species is found in the subalpine areas between 1,900 and 2,500 m. The herbaceous vegetation of the high subalpine meadows shows a unique species composition and diversity. Interspersed with woody scrubland, as many as 70 species can be found on 10 square metres (e.g., species of *Aconitum*, *Cicerbita*, *Delphinium*, *Heracleum* and *Senecio*). The upper treeline of the subalpine zone is dominated by shrub birches – the preferred habitat of e.g. the Caucasian Black Grouse. The alpine zone around 3,000 m is dominated by short-grass meadows with perennial plants and typical talus slope vegetation. Due to its sheltered climatic location and rather lower altitudes, the Lesser Caucasus does not feature an alpine zone nor a lush subalpine zone comparable to that of the Greater Caucasus. The same applies to the high altitudes of the Talish Mountains, where - high above towering rock walls - a unique semi-arid landscape developed.

Photo 2: Sub-alpine meadow (J.Etzold)

1.1.2.3. Dry mountain scrubland ecosystems

Photo 3: Juniper sparse forest (J.Peper)

This ecosystem is found at elevations around 600 to 1,000 m, predominantly in the eastern parts of the Greater Caucasus or in lower altitudes along the Dry Foothills, in between loam escarpments. Affected by summer droughts and a continental climate, dry scrublands are commonly found scattered among other habitats like steppe or semi-desert. Whether the dry, shrub-like forests with pistachio (*Pistachia mutica*), juniper (several species), jasmine (*Jasminium fruticans*) or almond (*Amygdalus fenzlianum*) are of natural origin or the result of a long history of utilisation is difficult to assess. A special type of dry mountain scrubland with tragacantic vegetation is found in the semi-arid region of Zuvand, part of the Talish.

1.1.2.4. Steppe ecosystems

Formerly widespread throughout the entire Southern Caucasus region, only fragments of steppe communities remain in Azerbaijan today. With a share of almost 60% of the country's cultivated territory, most of the former lowland and foothill steppes were turned over to the production of cotton, vines, grain, vegetables and fruit trees under Soviet leadership. What remains

Photo 4: Jeyranchöl steppe with *Artemisia fragrans* close to the Georgian border (H.Müller)

today are only small remnants with secondary steppe character – the result of human influence on woodland and shrub habitats. The increased intensity of grazing – steppe regions are traditional winter pastures – has contributed to the reduction or alteration of the natural steppe habitats. Former patches of steppe have taken on the character of semi-deserts, as their soil quality and species composition have been extensively modified. Originally, steppes predominantly occurred between the wormwood and saltwort semi-deserts of the lowlands and as forest steppes in the mountains. Today, highly arable regions, especially the foothills along the Greater Caucasus, bear witness to the productivity and soil quality of these former steppe habitats. Interspersed with semi-desert, semi-arid open woodland and thicket communities, the remaining patches of steppe are characterised by species of feather grass (*Stipa* spp.), Plains Blue-stern (*Bothriochloa* spp.), Festuca (*Festuca* spp.), thorny shrubs such as Christ's Thorn (*Paliurus spina-christii*), and several important wild relatives of domestic fruit trees.

1.1.2.5. Semi-desert ecosystems

Similar to the steppe regions, the semi-deserts also underwent tremendous changes. Mainly distributed within the Kura-Araz lowland, most semi-deserts fell victim to agricultural development, irrigation and intensified grazing within the past decades. Less productive than steppe areas, the patches of semi-desert were mainly used for cotton production, which requires large amounts of fresh water and fertilizers. Whether of natural occurrence or the result of altered steppe habitats, semi-desert areas of manifold character can be found throughout the entire country today. The two dominating formations are wormwood semi-desert dominated by *Artemisia fragrans* and saltwort semi-desert with various chenopodiaceous species (e.g. *Salsola dendroides*, *Salsola ericoides*, *Suaeda dendroides* or *Salicornia europea*). Depending on the level of soil salinity, a gradient can be established for the semi-deserts. Tree-like saltwort (*Salsola dendroides*) is a common sight throughout the country, growing on slightly saline soils at roadsides and in disturbed areas. High-mineral (saline) soils (e.g. around mud volcanoes) support Small-leaved Seablite (*Sueada microphylla*) and *Salsola gemmascens*, often interspersed with various other chenopod species. Halophytic shrubs such as *Halocnemum strobilaceum*, *Kalidium caspicum* and *Halostachys caspica* often represent the initial stage of vegetation and occur on highly saline soils. Both wormwood and saltwort semi-deserts are often characterised by a high number of ephemeral species, i.e., species that often complete their life cycle within four weeks.

Photo 5: Semi desert of Gobustan (S.Schmidt)

1.1.2.6. Wetland and coastal ecosystems

Together with four other countries (Russia, Iran, Turkmenistan and Kazakhstan), Azerbaijan shares the largest inland body of water in the world, the Caspian Sea. Covering a total surface area of 400,000 square kilometres, the Caspian Sea is a remnant of the historical ocean Paratethys (the "European Part of Tethys"), dating back to the Jurassic period – to the formation of the

Photo 6: Psammophytic ecosystem at Absheron National Park. (M. Langhammer)

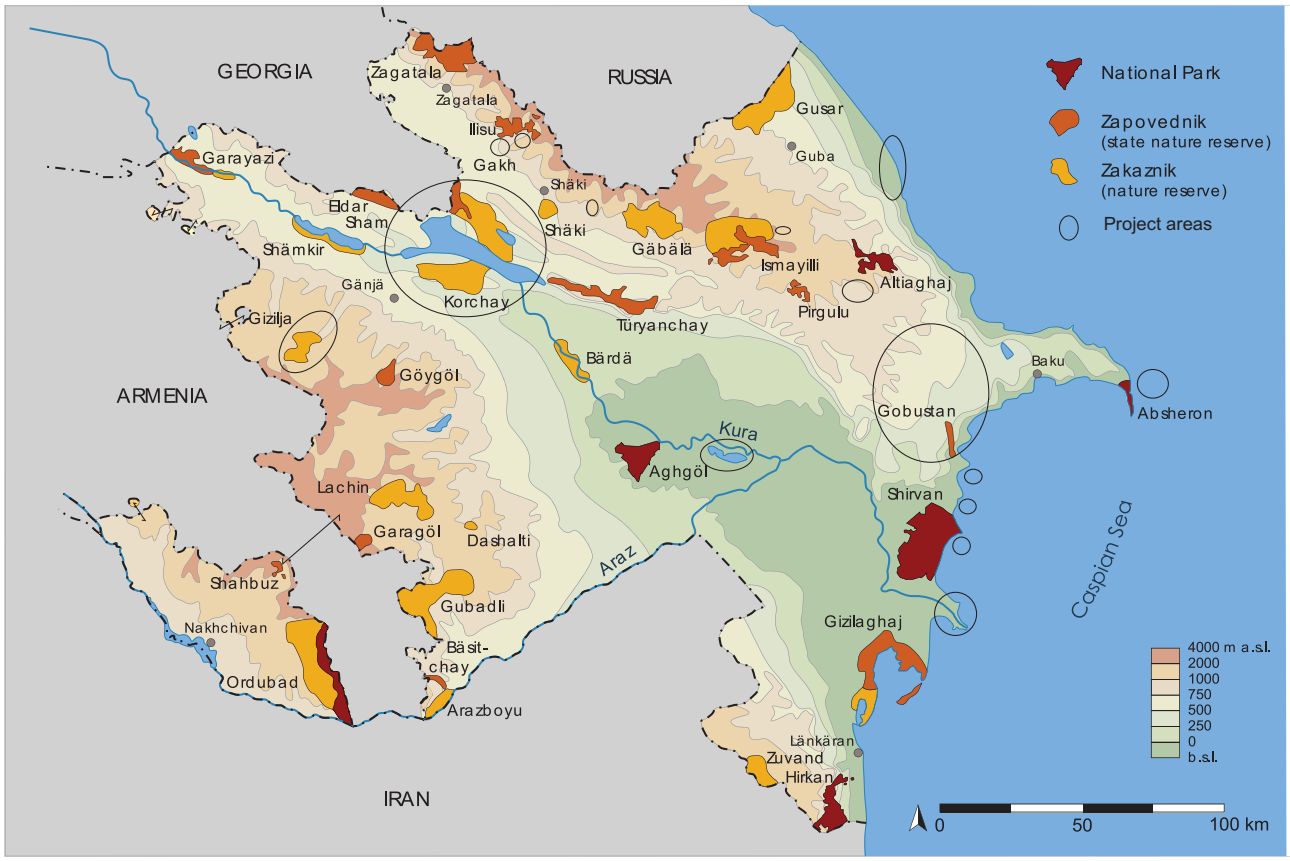
continents and the alpine rise of the mountains. Due to this fact, a unique fauna and flora has been preserved. This not only includes the Caspian Seal, an isolated species of brackish water seal, but also 90% of the world's population of sturgeon, a group "archaic" fish species, five of which are common in the Caspian. Affected by the fluctuating sea level, the coastal regions are very dynamic and contain important habitats for numerous nesting, wintering, and migratory bird species. Millions of them stop here to feed during migration in autumn and spring. Along the shoreline, coastal wetlands, the Kura River delta, numerous islands and lowland forests provide a broad range of habitats. The plant communities of the wetlands feature many circumpolar genera and species such as reed (*Phragmites australis*) and bulrush (*Juncus* spp.). Wetlands in the interior of the country are mainly influenced by the Kura or Araz Rivers, if not by the numerous artificial channels zigzagging in-between. Shifting water levels regularly lead to desiccation in the summer, which results in salinisation of the area. The most important wetlands of the country are two lakes, Aghgöl and Sari Su, in the centre of the lowlands. Extensive reed belts surround these lakes in the middle of a flat and barren steppe and semi-desert.

1.2. Biodiversity and nature conservation

Azerbaijan is situated at a biogeographic crossroads and contains species of European, Central Asian and Mediterranean origin. The Caucasus is ranked among the earth's 25 most important hotspots of biological diversity and endangered ecosystems by Conservation International (CI) and Critical Ecosystem Partnership Fund (CEPF). Many of the species that occur here are threatened elsewhere in their ranges. Furthermore, the varied terrain and climatic conditions contribute to the diversity of ecosystems and species. Approximately 4,200 species of vascular plants, 600 species of vertebrate animals, and 14,000 species of insects are found in Azerbaijan. An estimated 270 species of plants are endemic to Azerbaijan, and a much greater percentage of both plants and animals are unique to the Caucasus region. Yet biodiversity is constantly lost due to unsustainable logging, overgrazing, poaching, infrastructural development and pollution. Immediate action and long-term conservation strategies are required to protect this hotspot of biological diversity.

The diverse and threatened large mammal fauna includes wild goat, chamois, red and roe deer and their predators, such as wolf, lynx, wildcat and leopard. Some of these species (e.g. wild goat and wolf) undertake large-scale annual migrations, increasing their susceptibility to habitat loss and fragmentation, hunting and competition with domestic livestock for forage. Among birds, Azerbaijan encompasses important populations of southern European species with restricted distributions, such as White-headed Duck, Ferruginous Duck and Marbled Teal. During migration and in the winter, the importance of Azerbaijan's shoreline and wetlands increases, supporting high numbers of waterfowl species, including endangered species such as the Lesser White-fronted Goose (*Anser erythropus*), a globally threatened species.

Photo 7: Sociable lapwing (*Vanellus gregarius*) (P. Meister)



Map 5: Protected areas and investigation sites of the present project in Azerbaijan

The Caspian Sea supports the entire world population of the Caspian Seal as well as many endemic fish species, including the economically important but almost extinct sturgeon species Beluga.

Data on the status, abundance and distribution of fauna and flora are very outdated. The Red Data Book of Azerbaijan, which describes plants and animals considered to be rare, threatened or endangered in the country, was published in 1989 but was based on data 20 to 5 years old. Knowledge about the abundance of species - even noticeable species like the leopard - often depends upon hearsay or sheer luck. Recent systematic inventories are lacking to a large extent.

1.2.1. Nature Protection and Protected Areas

National Protected Areas

The „Law on Specially Protected Nature Areas“ defines the following categories:

- Strict Nature reserve
- National Park
- Nature Park
- Ecological park
- State Natural Sanctuary
- Nature Monument
- Zoological park
- Botanical garden
- Medical resorts
- Hunting reserves

From a global perspective, and largely driven by its own capacities, Azerbaijan has come a long way towards protecting its natural wealth: over the past eight years it has already established a significant number of protected areas.

At present, decisive follow-up actions are taken towards the development of a protected area system in the republic. Although Azerbaijan had no national parks until 2003, protected areas in Azerbaijan now cover more than 600,000 ha, which is around 8% of the country's total area. Currently, there are more then 40 protected areas, eight of which are national parks, the last two established as recently as 2008. Besides, through corresponding decrees of the Cabinet of Ministers, the areas of Pirgulu, Türyanchay, Ismayilli, Ilisu and Garayazi Nature Reserves were increased approximately two- to threefold, and the Gakh, Hirkan and Arazboyu (Nakhchivan AR) State Nature Sanctuaries were created.

Photo 8: Gobustan rock engravings (N.Agayeva)

The current list of national parks in Azerbaijan reads as follows:

- Ordubad National Park (established in 2003)
- Shirvan National Park (established in 2003)
- Aghgöl National Park (established in 2004)
- Hirkan National Park (established in 2004)
- Absheron National Park (established in 2005)
- Altiaghaj National Park (established in 2006)
- Göy Göl National Park (established in 2008)
- Shahdag National Park (established in 2008)

Protected area categories are defined by the Law on Specially Protected Natural Areas and Objects (established in 2000) and include areas of international, national (state reserves and national parks) and local (natural reserves, natural monuments, zoological parks, botanical gardens and dendrological parks, health resorts) concern. An appropriate law on Biosphere Reserves is currently under discussion and development. Private landowners or long-term lessees can, in theory, also establish local protected areas.

About 5% of the republic's reserves and protected areas are located within the territories occupied by Armenia. The total area of occupied natural territories is 44,300 ha, among them Besitchay and Garagol State Nature Reserves.

These developments are very promising, although the designation as a national park must be seen as only the first step towards a proper establishment. The management efficiency of the individual parks has not reached its optimum yet. However, it certainly would not be appropriate to refer to Azerbaijan's national parks as simple "paper parks". Compared to international standards, all parks are still very young and the challenges they have to overcome are enormous. For a country in transition and under fast industrial development such as Azerbaijan, it is of the utmost importance to quickly set aside areas for the preservation of nature as a first step. It is hoped for, that with increasing experience and wealth of the country these challenges will be addressed in a second step.

The main challenges faced by the Ministry of Ecology and Natural Resources (MENR) and its park administrations are:

- lack of qualified staff,
- inexperienced management,
- unsolved conflicts with the surrounding areas,
- insufficient expert background,
- ongoing lack of financial resources.

For the long term safeguarding as well as strengthen the protected area recognition nationwide, Azerbaijan should strive for an international certification of its PA's. At present only one UNESCO World Heritage site exists – the Neolithic rock engravings of Gobustan.

Apart from National Parks, World Heritage Sites as well as Biosphere Reserves as official UNESCO categories do have the potential for a greater international recognition and support.

The Hirkanian Forest is regarded as bearing the potential for the recognition as World Natural Heritage Site. Yet, the relevant cluster can only be submitted for approval to UNESCO, together with Iran, where the majority of this forest type remains. Whereas the efforts have been intensive in 2004 and again in 2007, at present there is no commitment and solid investment into the fulfilment, finalisation and preparation of the nomination requirements and documents.

In any way, the potential of international recognition via UNESCO is yet underdeveloped and protected areas of one or the other international category is under-represented. This should be extended in due future. A national MAB committee does exist in Azerbaijan and the first feasibility assessment ((financed by KfW in the frame of the Caucasus Initiative) for the potential establishment of the Zakatala-Balakan Biosphere Reserve, the first South-Caucasian Biosphere Reserve has been presented in 2009.

1.2.2. Transboundary nature conservation

A detailed assessment of transboundary nature conservation was conducted by the MSF already in 2005. The results of this assessment have been taken into account within this survey; the full report is part of the annex.

Transboundary cooperation in principle is a challenging task. Especially for the Ex-Soviet Union countries, all in transition and most of them for the first time an independent nation, self definition, thus dissociation of the union, has a priority at the moment. Nevertheless, the ecological and species potential does makes it highly valuable to establish cross-border environmental protection and conservation programmes.

Only recently, the MENR in cooperation with the Ministry of Environment Protection and Natural Resources Georgia, initiated a joint project on Gazelle re-introduction to the Georgian Region of Vashlovami, the same habitat like the Mingächevir Region in Azerbaijan, opposite.

This initiative, as well as the possible establishment of a Zakatala-Balakan Biosphere Reserve at the border to Georgia, opposite Lagodechi State Reserve, is highly promising although at present the indications reveal a rather slow and not very active process.

Quite apart from the benefits for biodiversity conservation, transboundary protected areas can also play an important role in fostering better co-operation and understanding between countries. Indeed they may help catalyze the peaceful resolution of disputes. In many parts of the world, transboundary protected areas have been important in building bridges between nations and peoples. It has long been recognised that such areas have symbolic value for peaceful co-operation between nations as well as practical benefit for coordinated or joint conservation management. Since 1997, IUCN has promoted a Parks for Peace initiative as a tool to enhance regional co-operation for biodiversity conservation, conflict prevention, resolution and reconciliation, and sustainable regional development[1].

One of the promising regions for further protection, as well as transboundary co-operation, is the Araz floodplain at the border to Iran. Unfortunately, due to border restrictions the authors have not been able to assess the area but remote sensing analysis revealed a good potential. The Araz, passing along the Nakhchivan, Armenia, Iran and again Azerbaijan does form a green belt – a yet closed border area but bearing high natural potential.

Table 1: potential for transboundary cooperation of Azerbaijan and its respective neighbouring countries

no.	Name / Title	Country						Ecosystems
		Azerbaijan	Iran	Turkey	Georgia	Russia/ Dagestan	Armenia	
I.	Middle Araz Basin, eastern part	X	X					riparian forests, semi-desert
II.	Western Kura-lowlands	X			X			riparian forests, steppe, arid forests
III.	Iori-Eldar	X			X			riparian forests, steppe, arid open forests
IV.	Eastern Greater Caucasus	X			X	X		deciduous forest, subalpine and alpine grasslands, rocky crags
V.	Samur River Forests and Wetlands	X				X		riparian forests, steppe, inland and marine wetlands
VI.	Talish Mountains and Hirkan Forests	X	X					deciduous forest, subalpine grasslands, rocky crags

1 following Sandwirth et al. 2001

1.2.3. Major needs in biodiversity and nature conservation[2]

In order to bring the capacity for biodiversity conservation in Azerbaijan to the required level, the MENR points out the following requirements and activities (selection):

1) *Enhancement of the legislation on biodiversity;*

At present there are ongoing activities to approximate the national legislation on biodiversity to European standards. Several laws and regulatory acts still wait for adoption, such as the "law on biodiversity conservation" or "regulatory document on the establishment of a specially protected nature areas and monuments fund".

2) *Expansion of the area of specially protected nature sites;*

There are ongoing activities to expand the total area of specially protected nature sites with the goal of protecting 10% of the country's total area. On the other hand, overcoming such challenges as the lack of the required infrastructure in specially protected nature areas, poor public knowledge and awareness of specially protected nature areas, and reluctance of the private sector to take part in the development of PAs is among the foremost responsibilities.

3) *Enhancement of the mechanisms of conducting biodiversity inventories;*

The red data book of Azerbaijan is largely out of date. The last censuses were conducted in the 1980s, and very few current systematic data are available. The latest research has already revealed deficits and therefore an urgent need for updating and extending the existing inventory.

4) *Strengthening the capacity of scientific research for the assessment of biodiversity within the country;*

Following independence, a brain drain took place in Azerbaijan's natural sciences, similar to other countries in transformation. Biological and geographical sciences were no longer attractive to the young generation of the 1990s and beyond. At present, due to the significant lack of young and well-educated researchers and scientists, few experts on biodiversity can be found in the country. The average age of scientists with a firm knowledge of species identification is about 65 years.

Therefore, the development of capacities in the following fields is considered to be of primary importance:

- education and training of young researchers
- systematic organisation of the results of scientific research activities carried out in the field of biodiversity and their evaluation in terms of suitability for further application;
- application of suitable findings in pilot projects and subsequently on a larger scale;
- stimulating the implementation of scientific research activities encompassing all forms of biodiversity protection processes (physical, biological, social, economic, etc.);

5) *Enhancement of a system that raises public awareness of biodiversity conservation issues;*

To date, the knowledge about biodiversity conservation issues in different strata of the society is low, the involvement of NGOs in this field is unsatisfactory, and public awareness of biodiversity conservation issues is poorly developed. Hands-on activities and actions that can be implemented in this field may prove more useful than strictly administrative methods.

6) *Enhancement of forest management techniques*

Forests are indispensable for the conservation and regular development of fauna and flora and ensure their diversity. The main problem of forest development in the country is the anthropogenic impact on forests. However, elimination of these impacts is impossible without enhancement of the forest management techniques. Therefore, the application of new techniques in the management of multifunctional forests is an important precondition for biodiversity conservation.

2 Based on the National Action Plan on Strengthening Capacity to Respond to Challenges of Biodiversity Conservation, Climate Change and Desertification / Land Degradation (2006-2015), Baku 2005

1.2.4. Threats to environment and biodiversity

Azerbaijan faces serious environmental challenges. Based on the information contained in the National Action Plan[3], the following threats to biodiversity exist:

- loss or change of habitats;
- commercial und unsustainable use of biological resources (e.g. forest use, poaching);
- unsystematic or continuous cattle grazing in pastures, failure to meet grazing standards, low level of activities concerning the recovery of grasslands;
- contamination of the environment (soil and water resources) in industrial zones and adjacent areas by industrial waste;
- contamination of soil by oil and petroleum products, etc.;
- unregulated building and construction;

Hunting and poaching are, apart from threats following below a further significant impact to the nature and environment.

1.2.4.1. Forest depletion

The alteration and depletion of forest resources is among the most severe ecological impacts in Azerbaijan today. Although reforestation plans have been put in place on a considerable scale, the losses still outway the protected areas by several degrees of magnitude. Moreover, reforestation frequently occurs in regions that are eco-climatically less profitable for forestry.

Owing to the insufficient energy supply, local residents and refugees cut forests to provide their households with firewood. Furthermore, wood is often the single source of income and the construction market in the country requires wood for parquet, doors, windows, etc.

During the most recent forest inventory of 1984[4], the total woodland area of Azerbaijan was 1,213,700 ha, or 14% of the country's territory. By 2001, estimates suggested that this percentage had declined to approximately 11% of the territory, and there is concern that the actual figure could be even lower because of deforestation, military conflicts and increased demand for fuel wood in remote mountainous areas where there is a shortage of natural gas[5].

Deforestation is one of the central ecological problems in Azerbaijan at the moment. Illegal logging occurs but is officially neglected. If the entire forestry system seems out of date, a recent and accurate forestry inventory with data and information available to the public is unavailable. The decline of high valuable forest bearing various ecological services is dramatically continuing.

Reforestation and afforestation programmes exist and are constantly increasing in Azerbaijan. However, emphasise is put on road side plantations, often afforestation takes place in climatically sub-optimal regions for forestry. Seedling depends on active watering over several years. Large programmes for regions climatically preferable like the Hirkanian Forest, the slopes of the Greater Caucasus and the alluvial gravel fans are yet not in place (one BMU funded project, implemented by WWF was recently set up aiming on re-forestation gravel fans with floodplain forest in the Greater Caucasus).

At present the forest use pattern often reminds on historical description of forest use in Central Europe at the end of the Middle Ages. Wood pasture, firewood collection and unsustainable collection of high grade wood occurs in high numbers.

Photo 9: Degraded Hirkanian Forest (M.Rietschel)

3 According to the National Action Plan on Strengthening Capacity to Respond to Challenges of Biodiversity Conservation, Climate Change and Desertification / Land Degradation (2006-2015), Baku 2005

4 Reported in UNECE :Environmental Performance Review Azerbaijan, 2004

5 Azerbaijan Capacity Development and Sustainable Land Management Program Summary of Project Proposal, MENR/UNDP/GEF, 2006

Map 6: Pasture land in the Caucausus ecoregion. Source: http://maps.grida.no/go/graphic/pasture-land-in-the-caucausus-ecoregion

The Forestry Code (established in 1997) defines the State ownership of forests. The right to use the forest depends on a lease agreement, a forest cutting licence (for the cutting and transport of firewood), an order (for collecting dead wood), and a forest licence (for other forest users). However, according to a presidential decree commercial logging is forbidden entirely.

Per definition, the Forestry Development Department of the MENR is the central authority for forest management. It coordinates 34 regional (rayon) enterprises for forest protection and regeneration (in addition to four regional nurseries and three enterprises for afforestation). In general these enterprises carry out sanitary cuts, protection work against pests and diseases, inspection, reforestation, seed collecting and nursery production.

The establishment of a regulatory forestry system is urgently needed in Azerbaijan.

1.2.4.2. Land Degradation and Grazing

Extensive areas of Azerbaijan are affected by desertification. Soil erosion and salinisation are the main processes of desertification. 42.5% of the territory of Azerbaijan is subject to erosion (3.7 mill ha). 7.1% of the country's territory is affected by salinisation (0.6 million ha), mostly due to insufficient irrigation systems. Land degradation in grazed areas is similarly increasing at a rapid rate, largely as a result of overgrazing. Livestock husbandry is very profitable, so there is a move by herders to increase. Additional herds have been brought in by refugees and IDPs from the occupied districts around the Nagorno-Garabakh region. The precise number and location of livestock is not known. The government estimates the national carrying

Photo 10: heavy grazing pressure on the Greater Caucasus summer pastures (H. Müller)

capacity to be about 16 million sheep equivalents, but some estimates put the current total number at 23 million, with many of the animals concentrated in areas that are unsuitable for a variety of reasons, including competition for water and food near settlements and exclusion from summer grazing areas due to conflicts in some mountainous areas.

Principally, the types of land degradation can be divided as follows, with overgrazing considered one of the major impacts:
a) land degradation in irrigated agricultural lands, mainly due to insufficient water management and supply, resulting in salinification and a general deterioration of soil quality,
b) land and pasture degradation in semi-deserts, mountainous areas and on sloping terrain, mainly due to overstocking,
c) deforestation and erosion in steep mountain areas, which in turn leads to increased flooding and mud flow impact on other areas,
d) technogenic damage through industry and the exploration and exploitation of oil and natural gas,
e) and unregulated building and construction.

Map 7: Sheep and goats in the Caucasus ecoregion. source: http://maps.grida.no/go/graphic/sheep-and-goats-in-the-caucasus-ecoregion

1.2.4.3. Pollution

Although several actions have been taken to clean up the country, particularly the Absheron peninsula, following a presidential decree in 2007, severe pollution can still be found in many areas, especially around oil production units.

Soils throughout the region were contaminated by DDT and toxic defoliants used in the cotton production during the Soviet era. Caspian petroleum and petrochemical industries also have contributed to the present air and water pollution problems. According to the Mercer Human Resource Consulting 2007 Health and Sanitation Report[6], Baku is the world's most polluted city.

The Caspian not only suffers from heavy oil pollution,

Photo 11: Severe pollution around Baku's oil production (S. Schmidt)

6 http://www.forbes.com/2008/02/26/pollution-baku-oil-biz-logistics-cx_tl_0226dirtycities.html

but also from a massive inflow of other pollutants originating from the industries in the river basins of its tributaries, mainly the Volga and Kura-Araz basin. The Kura, which flows through Turkey, Georgia and Azerbaijan, is heavily polluted. The basic sources of pollution are municipal waste and industrial and agricultural waste waters. The cities near the river bed do not have appropriate canalization systems. In addition, on Georgian territory, three power stations are located near the Kür and discharge their waste water into the river. On Azerbaijani territory, about two million people receive their drinking water from the Kura River. In the Kura Delta, the allowable concentrations for the following pollutants are exceeded: phenol 10 times, phosphate 14 times, oil 20 times and nitrates 1.3 times (Ruzgar 2008).

Besides water pollution, over-fishing by poachers is threatening the survival of Caspian sturgeon stocks, the source of most of the world's supply of caviar. The Convention on International Trade in Endangered Species (CITES) has listed all sturgeon species as threatened, including all commercial Caspian varieties.

1.3. Institutional, economical and political framework conditions

1.3.1. Public administration governance and public participation

Municipalities form the basis for local self-government and participation of the population in the decision-making process. Azerbaijan has been able to gather experience with local governments since 1999, when representatives for the municipalities were elected. Local government was introduced according to the constitution accepted by referendum in 1995. The delay until 1999 was explained with the need for preparatory measures. Local government is covered by its own section in the constitution of Azerbaijan, indicating the importance given to the issue. However, the preparation and execution of local government has been and still is undergoing a learning process. A special „parliamentary commission on local self-government" has prepared basic documents about election procedures and the status of municipalities. International experts evaluated these efforts as positive and multi- and bilateral donors rendered assistance implementing the new system of local government. Among the organisations involved are the Council of Europe, the United States Institute of National Democracy, and the German Friedrich Naumann Foundation.

Local councils play a central role in decision-making processes. The chairpersons and commissions of municipal agencies are empowered to decide upon issues within the framework of their authority, contingent upon the approval by local councils. Local council sessions must be convened by the chairperson or at the request of one-third of all council members, or at least ten percent of the local population. Decisions can be passed by a simple majority vote if a majority of council members are present. Exceptions are decisions on local taxes, which must be passed by a majority of two-thirds of all council members.

The chairperson of a council is elected from the membership in the opening session by a simple majority; the council can decide on open or secret vote. Councils may also create standing and temporary commissions to which outside experts may be invited as well (e. g. local ecology, social protection, development). The executive branch is implementing local council decisions and consists of the municipality chairman and agencies established by legislation or by the municipal charter. For implementing policies and programmes, by law the state guarantees local elected officials the right to exercise their authority and the protection of their rights.

In principle, municipalities and local bodies of state administration should carry out their activities on equal terms. As there are no explicit standards for the division of authority in the current legislation, the Azerbaijan Centre for Civil Society recommends a clarification of the resulting ambiguity.

1.3.2. Economy

At present Azerbaijan is undergoing tremendous changes. Displaying the world's largest growth of GDP over the last few years, the economy of Azerbaijan is booming with a GDP growth of 30.5 % in 2006, 23.4 % in 2007 and still 11.6% in 2008 (CIA World Factbook). The main reason for this is the fact that oil and natural gas from Azerbaijan are now reaching the world market since the completion of the Baku-Tbilisi-Ceyhan (BTC) pipeline.

Photo 12: Building boom in Baku (S.Schmidt)

As a consequence Azerbaijan has achieved substantial economic progress. Sound macro-economic policies have secured economic stability, and oil-related foreign direct investment has generated a rapid economic growth. The government has adopted a State Programme for Poverty Reduction and Economic Development, setting the country on a path towards poverty reduction and achievement of the Millennium Development Goals. In addition, the Government has established a State Oil Fund (SOFAR) under the responsibility of the president as a tool for protecting the country from the difficulties typically faced by oil-dependent economies. These positive developments, however, are not yet reflected in the lives of the Azerbaijani people. About half the population lives in poverty, while the boom is – to a large extent - still concentrated in and around Baku. Besides the spatial restrictions, the incoming wealth is still only very slowly distributed to all citizens of the country. A middle class is developing very slowly, and the clash between a few very rich and many very poor is a sight that is hard to miss in the country.

Even in Soviet times, Azerbaijan's industry had already been more developed than that of two neighbouring Caucasian countries, Georgia and Armenia. Yet investments were mostly focused on the oil sector.

Oil and gas today account for about 90% of Azerbaijan's economy, with machinery, cotton and agricultural products contributing to its economic growth over the last five years. Since 1997, large foreign investments have been made in the oil and gas sector. The BTC pipeline that transports Caspian oil to the Mediterranean from Baku through Tbilisi (Georgia), to Ceyhan (Turkey) became operational in 2006. The oil pipeline is expected to generate as much as $ 160 billion in revenues for the country over the next 30 years. The diversification of Azerbaijan's economy remains a long-term issue.

Several other obstacles impede Azerbaijan's economic progress: the need for stepped-up foreign investment in the non-energy sector, the continuing conflict with Armenia over the Nagorno-Garabakh region, pervasive corruption and elevated inflation. Trade with Russia and the other former Soviet republics is decreasing in importance, while trade is developing with the EU, and particularly with Turkey. Long-term prospects will depend on world oil prices, the location of new oil and gas pipelines in the region, and Azerbaijan's ability to manage its energy wealth.

The country possesses a number of other mineral resources, such as gold, silver, iron, copper, titanium, chromium, manganese, cobalt, molybdenum, complex ore and antimony. Most of those minerals are found in the Lesser Caucasus. A wide range of metals is produced in Azerbaijan, such as aluminium, lead, steel, and zinc. Apart from the metal and oil industry, the country possesses cement, chemical and textile industries.

It is difficult to predict how soon the recent boom will show an effect on the agricultural sector. Machinery and technology are bought internationally and imported to increase national agricultural production. Factories processing national dairy and fruit products have been (re)built already or are in the planning stage. Only very recently in 2008, highly productive milk cows from Germany were imported as part of a state programme to boost the national dairy industry.

Besides the above mentioned, there are still few alternative sources of income, and until recently there had been limited access to credit. The lack of agricultural services

GDP composition by sector (2007 est.)
- agriculture: 6.2%
- industry: 63.3%
- services: 30.5%

Labor force by occupation (2001)
- agriculture: 41%
- industry: 7%
- services: 52%

source: *CIA The world factbook (2009)*

Fig. 1: GDP by sector and labor force by occupation, source: CIA The World Factbook (2008)

and the collapse of the input supply system have resulted in a significant decline in productivity, which has only started to recover again within the last one to two years. The inefficiency of deteriorated irrigation and drainage systems is responsible to a large extent for the decline in productivity. This in turn has caused a shift toward subsistence production and a subsequent decrease in cash crops such as cotton, fruit and grapes.

The lack of markets for agricultural products has been a major challenge for farmers and has contributed to the impoverishment of the rural sector. When the Soviet-era processing industry and marketing system collapsed, alternatives were slow to emerge. Yet, medium scale industries processing fruits and vegetables have been built and the production of foodstuff is increasing in Azerbaijan.

Many farmers have been unable to sell their produce. There has been a massive influx of imports of competitive products as a result of the availability of foreign exchange from oil revenue and liberalisation policies. Local production has been unable to compete with this in domestic markets, and farmers have been driven further into poverty and subsistency production. However, this tendency is increasingly reverting and domestic markets offering domestic products are re-emerging.

The development of financial services and banking businesses is rapidly increasing in Azerbaijan. Several banks opened offices and businesses in various regions in Azerbaijan, stimulating the regional micro-credit scheme in recent years. Among them are CredAgro (NGO-Credit Agency, USAID background), Accessbank (20% shares with KfW, strongest provider of micro-credits concentrating on small-scale agricultural credit users), or the German Sparkassenstiftung in the context of KfW's downscaling programme in cooperation with 9 banks, e.g. Azerdemiryolbank, Bank of Baku, Azerigazbank and Unibank. Micro-credit services are an important branch within their activities. More than 30,000 micro-credits have already been issued under the KfW programme in Azerbaijan. As an example, Azerdemiryolbank allows 20-30 credits a month, with low amounts from 50.00 AZN upwards and an average sum of about 300.00 AZN. Recently the banks providing micro-credits have spent a lot of effort on advertising their micro-credit options. The opportunity to use credit is generally new to the rural population. Criteria for dealing with credits are wide-ranging, flexible and open to new aspects, but exclude start-up businesses, environmentally damaging activities, debt repayment, bribery or investments in the tobacco business. Principally, a credit user should have an already running business. Relatively new are seasonal agro-business credits, e.g. for fuel, plantations, fertilisers, or transportation. For investments in small-scale businesses and workshops credits between 1,000 to 5,000 AZN are the norm. A business plan and securities are required for such credits. Also, the German Federal Ministry for Economic Cooperation and Development (BMZ) agreed to assist Azerbaijan with the implementation of small credit systems and aid for small and medium enterprises (total assets 2006/07: 10 million US$), in particular providing improved credits for rural development. Examples of business ideas beneficial to rural development credits are e.g. the implementation and improvements in domestic "on farm" milk processing and cheese production, improvements in tillage, construction of stables and storage facilities for fodder.

Yet, one of the main questions apart from the recent boom is – what happens as soon as the oil and gas export peak is reached and declines again? What is the perspective past the recent boom?
At present there is little diversification of the national economy. Albeit input and investment exists, it is still little and slow in comparison to the direct investment in the oil sector.
At present a huge road and infrastructure re-construction programme takes place in Azerbaijan, upgrading all major roads and highways. This might be the basis and the backbone for a diversification of economy and the creation of a solid economic system which is able to sustain once the oil boom disappeared.

1.3.3. Social and health system

The right to social protection is formulated in the Constitution of Azerbaijan (Chapter III, Article 37). Because of the favourable economic development in recent years, the Azerbaijani government has increased the budgets for social security, social protection, health and education.
Less than 5% of the population is working in the booming oil sector, which therefore provides few jobs compared to the profits it generates. The greatest concentration of poverty in Azerbaijan is found among one third of

the population working in agriculture and among the country's one million refugees and internally displaced persons, including those who returned after the collapse of the Soviet Union and those who fled the Nagorno-Garabakh region as a result of the conflict with Armenia. Those people have been temporarily resettled, mainly in urban areas. They have few employment opportunities and depend on humanitarian aid for survival.

The incidence of poverty is highest in the northeast of the country and in some areas within central Azerbaijan. Remote areas and upland or mountainous areas show high rates of poverty. These areas often lack basic infrastructure and services, including irrigation, adequate road access, a reliable drinking water supply and health services. They often harbour a high proportion of refugees, too.

Women are less educated than men and far fewer women receive a university education. In rural areas, almost 39 percent of households are managed by single women. These, together with larger households with more than three dependents, are generally most disadvantaged socially.

One of the major causes of pervasive rural poverty is neglect of the agricultural sector over recent decades. Although more people are working the land now, after the privatization of collective farms, working conditions for farmers are generally unfavourable. Rural infrastructure and power supplies are limited or lacking altogether; individual plots are small. The large numbers of former labourers who have turned to farming have little experience or knowledge of management techniques. Machinery and equipment are outdated and in short supply. This trend is slowly revising with increasing financial and infrastructural development of the country.

The strength of the health system is that it is still designed for the wide coverage of the population, especially with programmes of immunisation, the availability of health facilities even in remote areas and governmental support (subsidies) for medication. The weaknesses are, however, that outside extensive basic care, the system only slowly develops towards a higher efficiency in structures and services. The pharmaceutical sector is largely depending on drugs imported from Eastern European countries, as in Azerbaijan medicinal production enterprises are not yet developed. By and large the health system has become less accessible for a large part of the population than it was before.

The constitution of Azerbaijan guarantees access to health care as a citizen's right (Article 41). Therefore, at least officially a large proportion of services is free for all citizens, for example maternal health services, child health care, family planning, care for people working in certain hazardous situations, and vaccination, treatment of tuberculosis, malaria and diabetes. The health laws are also concerned with environmental protection, comfortable conditions for work and recreation as well as medical-social aid. Since 1998 fees have been introduced for specific services. This was partly a pragmatic reaction to informal payments that were charged to supplement salaries and to keep the system functioning. According to a decree of the Ministry of Health, government revenues should pay for salaries and most health care. However, according to a report of the World Health Organisation, these funds are insufficient[7].

There are a series of efforts to reform the health sector, such as more efficient management and economic mechanisms, the organisation of a medical insurance, privatisation as an additional component for flexibility, better education and training of the staff, improvement of sanitary/epidemiological services and better information and statistics. A Health Sector Working Group was part of the poverty assessment and identified a better allocation of limited government resources as one of the most urgent needs.

1.3.4. Education and science

The education system in Azerbaijan reaches nearly all children on the primary level. Literacy rates are high even though enrolment figures are at present below the rate of nearly 100 percent reached during the Soviet era, when learning was strictly organised with centrally defined curricula. The achievement of this rather repressive system was that literacy levels rose from a low starting point at the beginning of the 20th century to nearly complete coverage of the population. Despite two changes in the standard alphabet, from Arabic to Roman in the 1920s and from Roman to Cyrillic in the 1930s, basic learning remained on a high level. In 1991 the Roman alphabet was reintroduced. In 1992 Azerbaijan started educational reforms in cooperation

7 WHO Country Cooperation Strategy (2006) accessed at: http://www.who.int/country-focus/cooperation_strategy/ccsbrief_aze_en.pdf.

Photo 13 : Entrance to Shirvan National Park (S.Schmidt)

with UNESCO and was supported by several donor agencies such as the Asian Development Bank in the introduction of modern teaching and learning methods. At present, Azerbaijan is cooperating with more than 30 countries in various education programmes.

Primary schools are located in every village, offering up to eight years of education. Schooling is free of charge, but in winter, many schools in remote villages are closed for several months due to weather hazards and/or lack of heating.

Private universities with a particular focus, e.g. oil industry or language, exists in ever growing numbers in Baku as well as in larger provincial towns like Gänjä or Lenkoran. Beside this, Baku State University is by far the biggest university in the country. While the State University is free of charge, private institutions are liable to charge tuition.

1.3.5. Media and public opinion

In Azerbaijan the mass media – radio, television, printed and electronic media – are in a phase of dynamic development. The fastest changes are encountered in the number of Internet users. While estimates in 2000 named 12,000 users, this number has increased to more than 1.5 million. Meanwhile about one fifth of the total population uses this information source[8]. In rural areas there are still constraints because of limited access to fast telecommunication lines. Due to the relatively small number of land lines, mobile telephones flourish, but their use for Internet access would be prohibitively expensive.

The most popular media in Azerbaijan are various television channels. The state television stations dominated in recent years, even though private stations had already been established shortly after independence.

The Azerbaijani constitution guarantees „Freedom of Thought and Speech“ and „Freedom of Information“. In addition many ordinances and decrees (particularly, the anti-censorship decree of 1998) were passed to promote free and open information flow. Journalists and media companies, however, must pass the screening tests of the Information Ministry, the Ministry of Culture, and other governmental authorities. This includes paying fees and supporting the government against terrorism and the Armenian occupation of the Garabakh enclave. Other regulations are: avoiding obscenity and rebellious incitements against the government, protecting the constitutional rights of the Azerbaijani people, reporting fraud and crimes, and supporting the constitutional institutions.

Several times restrictions and government controls were placed on primarily private news media, which had to face restrictions up to temporary closure. Also, several journalists have been arrested under vague accusations within the last year, a practice heavily criticised by international observers as all these actions by the national government contradict to the above mentioned constitutional freedom of thought and speech and as well as the international statement of the government in this regards.

With the creation of municipalities, local television and radio stations have gained importance. They also report on the council meetings and on decision-making processes at the local level. Some contribute to the fostering of local culture.

There are about one dozen newspapers for a national readership; however, their distribution is mainly limited to the larger cities. Overall the number of newspapers sold in Azerbaijan is comparatively low and therefore their influence is rather limited.

1.3.6. Land tenure and land use

Since Azerbaijan gained its independence, the legislation regarding land tenure, land markets and land registers has thoroughly changed. Accordingly, structures in land

8 http://www.internetworld-stats.com/asia/az.htm).

ownership and land use have diversified. Now, three forms of land ownership exist in Azerbaijan:

- State ownership
- Public (municipal) ownership
- Private ownership

In Azerbaijan a municipality is a local self-governing institution. The municipalities have their own property, budget and election bodies. The municipal land includes land for different purposes and reserve stock land.

State ownership covers land on which governmental authorities, property of state importance or military estates are located. Also, mineral or water resources and areas of nature protection belong to the state and cannot be privatised. All forms of ownership possess equal rights and are protected by the state. Land can only be purchased by Azerbaijani citizens; foreign persons or organizations can merely lease land.

The reforms since 1991 led to profound changes in the agrarian sector. Not only did the economy change from centralised to market-oriented, but the structure of land ownership changed due to extensive reforms.

The land and assets of state farms and collective farms have been distributed among the farm workers and villagers free of charge. Subsequently, agricultural production is now organised in 2,651 municipal cooperatives, 1,191 collective farms, 156 farmers' cooperatives and 841,100 family farms. The share of the private sector in agricultural production is nearly 100%. Since 1999, farmers are released from all taxes, except land tax. Additionally, a leasing system of land machines

Land use

Total land resources		8,641,500 ha
• forest	14 %	1,213,000 ha
• agricultural land consisting of:	52.4 %	4,528,300 ha,
• arable land	36.2 %	1,641,000 ha
(of which	11 % are occupied by Armenia)	
• irrigated	31.6%	1,432,800 ha
• cropland with homesteads	5 %	225,600 ha
• permanent crops	3.4 %	155,500 ha
• pasture	56.9 %	2,576,500 ha
• hayfields	2.4 %	109,600 ha
• fallow land	1 %	45,700 ha

Fig. 2: Land use, source: Khanalibayli (2008)

Photo 14: Agricultural land use pattern in Talish Mountain (S.Schmidt)

was supported.

Special attention is currently being paid to the development of soil fertility and to securing the supply with provisions. In 2001, 'The Provisions Safety Programme of Azerbaijan' was adopted; in 2008, the 'State Programme for Solid Supply of the Population with Foodstuff 2008 – 2015' was adopted. The agricultural sector has been growing at a rate of 28.6% over the past four years. As part of these programmes, especially melioration and irrigation measures are promoted to increase soil fertility. For example, the main part of the Mil-Mugan collector was constructed, the Khanarkh canal completed and the Samur-Absheron canal reconstructed.

The main aricultural products are cotton, grain, rice, grapes, fruit, vegetables, tea, tobacco, cattle, pigs, sheep and goats. Cotton and foodstuffs also contribute to the country's export.

1.3.6.1. Spatial planning, land cadastre and urbanisation

After regaining independence Azerbaijan adopted a state land cadastre[9] for the compilation of information on state registration of land users, quantitative and qualitative characteristics, and grading and economic valuation of lands; it may be called land structuring.

The national cadastre is the base for a new land management regime considering different land use

9 "Law of the Azerbaijan republic on state land cadastre, monitoring of lands and land structuring" (signed by President of the Azerbaijan Republic, Heydar ALIYEV. Baku, December 22, 1998. 593-I).

types, including the registration of protected areas. The State Land Cadastre Fund comprises information and materials on boundaries, dimensions, geographical location, legal status and other quantitative and qualitative characteristics of lands.

Azerbaijan has gradually increased its capacities for spatial and regional planning, following its land reform and cadastre registration. The basis for enabling more efficient land management are the Azerbaijani law on cadastre from 1999 and other land related laws such as the law on real estate markets.

According to a more detailed breakdown of the cadastre, zoning of territories in the Republic of Azerbaijan[10] were to be carried out regarding principles of efficient use of nature, protection of the environment and historical-cultural heritage, allocation of population or efficient distribution of productive abilities.

In respect to the country's natural assets, several more general zoning provisions have been developed:

- Forest fund zones are all categories of mountainous slopes, sea shore forests and floodplain forest lands along the Kura river basin in Azerbaijan; these areas shall constitute the forest fund zone of the republic. These zones suitable for recreation may also be used as leisure zones for the population of residential settlements located in their vicinity.

- River, open water basins, channels and collector zones shall comprise rivers, channels, collectors, natural and artificial lakes, as well as ground water streams and water collector with permanent flow or non-drying water streams and water collectors. Use of such zones for irrigation and recreation purposes and the usage regime of protection zones shall be regulated by the legal-normative acts. Designation, common rules and principles applicable to natural reserves zones approved by the state shall facilitate protection of flora and fauna. Small-scale construction may be carried out and facilities may be built within such zones for the purpose of protection and maintenance of the flora and fauna within such zones. Activation of mountainous villages as residential settlements shall be reinstated for the purpose of performance of cattle farming and bee-keeping, as well as for tourism and mountain climbing sport-recreation zones in the Main Caucasus mountain range, the Shahdag, Garabagh, Murovdag, and Bozdagh ranges and in certain sections of the Samur range.

Albeit general, these zones lay a basis for further, more detailed spatial planning, which would be required for the implementation of the EU planning standard for PA's.

Ongoing cadastre capacity formation and technical training (incl. modern technical equipment, digital mapping) is supported by several donor agencies (e.g. World Bank, BfN, Swiss Aid).

Responsible ministries or other governmental bodies are:

- MENR (planning and control of land use and land conservation)
- State Committee for Land and Cartography (used for promoting land markets, transactions, mapping and cadastres)
- The Ministry of Agriculture
- State Committee for Amelioration and Water Management

Land development plans are in theory put up by the architecture department of the district administration and municipalities.

Environmental impact assessments are compulsory in Azerbaijan and are regulated by the legal act on 'Environmental Impact Assessment (EIA) in Azerbaijan' (1996). This act serves as one of the means of checking during the inception phase of the project the conformity of the project with the requirements of the nature protection legislation, including in particular the requirements for the protection of flora and fauna and their habitats, or other elements of biodiversity.

In 2004 USAID already proposed support for the development of the EIA scheme and methodology as well as the full implementation in Azerbaijan. As far as we can tell, EIA is frequently employed by now, in general in all large-scale construction projects involving international companies. However, no information on the benchmark for the project size that requires an EIA was available.

The success of EIA for large-scale construction work (e.g. road construction) following the procedure is hard

10 General Principles and Conditions of Zoning of Lands (Approved by the Resolution of the Cabinet of Ministers of the Azerbaijan Republic No. 79 of May 1, 2000)

to assess. In general, the consultants have the impression that the intensity and success are only limited. For road construction, e.g. the environmental impact is assessed and evaluated only for 100 m each to the left and right of the proposed route.
However, a handbook for EIA processes in Azerbaijan was developed in 1996 by UNDP and the system was further evaluated by Bektashi & Cherp 2002. Compensation payment has to be made if the environmental impact is significant (as done by British Petrol (BP) following the construction of the BTC pipeline). Republican criminal legislation and legislation on administrative faults include some measures directed toward the protection of the environment and efficient use of nature.

1.4. Environment and nature in state, policy and society

The colonial policy of the Soviet Union overcame nearly completely the former consensual behaviour in the Azerbaijani society. The centrally decided policies were aimed at the subordination of nature rather than its protection. An exception to this strict policy were the former protection institutions of Zapovedniks, and the less severe Zakazniks. Their efficiency, however, – beyond perhaps scientific benefits – varied greatly, depending on the location within the Soviet Union and their particular management.

The appreciation of nature, nature protection and applied ecology in Azerbaijan must have its roots - as in other societies - in basic cultural and religious ideas and philosophies[11]. Yet 71 years of Soviet ideology deteriorated the existing moral concepts. Additionally, being a country in transition, little effort is being paid by the individual to nature protection and consideration of environmental issues. However, this should not be condemned, as the new society and the new system require all the attention of the individual to get used to and to manifest himself within it. As a result, the present-day challenge is to develop a new consciousness of the environment among the people. Meanwhile, the state has to take the lead and protect sites and areas to exclude them from booming development with its negative impact. The latter has already taken place in Azerbaijan, the former is yet to come.

Many steps towards an ecologically sound administration have already been taken; within the first two years since its establishment the MENR prepared various national programmes.

Azerbaijan has been active in formulating policies for the environment, for sustainable development, and for poverty reduction and economic development. However, the relationship among these policies and their relative priority is not always clear. No strategy has yet emerged for their monitoring, review and revision. In addition, the MENR is the main body that initiates environment-related activities. This is, however, impossible without good coordination among all government institutions, integration of the environment into other sectoral policies, and plans for and provision of adequate funding. A sound environmental planning process would benefit from a more consolidated and rationalized framework, which also accounts for implementation. Yet it is still not available. By now, the participation among ministries is not extensive; the same applies for the cooperation with NGOs.

Environmental NGOs exist in Azerbaijan in great numbers. However, most of these entities are managed as "one-man" NGOs, not working in a substantial and coordinated manner. The purpose of many national NGOs is rather seen as an opportunity for flexibility for application for external funds. It is less a strategically working association with long-term goals. At any rate this is still a challenging task due to restricted freedom of evolvement.

Accepting the additional benefits gained from the involvement of NGOs and other social groups and their commitment towards a comprehensive policy of environmental protection will be a crucial challenge for a sound approach to improving the individual awareness of nature and its conservation.

The Azerbaijan National Academy of Sciences (ANAS) is the key national scientific research organization; it operates a series of research institutes, many of which conduct work relevant to biodiversity conservation (including, among others, the Institutes of Geography, Botany, Zoology, Genetic Resources, Microbiology, Oil-Chemistry Processes and Soil Research). However, depending on state funding, the scientific output of the ecology-related fields of the ANAS is very low, and the

11 For an overview on the political situation in the Caucasus see: Svante, E., Cornell, S. Starr, F. (2006): The Caucasus: A Challenge for Europe, Silk Road Paper, Central Asia-Caucasus Institute and Silk Road Studies Program, Washington, D.C.

Conventions	Year	Country, City	signed in:
Convention on Protection of Cultural and Natural Monuments	1972	France, Paris	1994
International Convention for the Prevention of Pollution from Ships - MarPol Convention	1973	England, London	1995
United Nations Framework Convention on Climate Change	1992	USA,New York	1995
Convention for the Protection of the Ozone Layer - Vienna Convention	1985	Austria, Vienna	1996
Convention on International Trade in endangered Species of Wild Fauna and Flora	1973	USA, Washington DC	1997
Convention on Environmental Impact Assessment in Transboundary Context	1991	Finland, Espoo	1998
United Nation Convention to Combat Desertification	1994	France, Paris	1998
Convention on Public Participation in Decision Making and Access to Justice in Environmental Matters	1998	Denmark, Aarhus	1999
Convention on Wetlands of International Importance especially as Waterfowl Habitat - Ramsar Convention	1971	Iran, Ramsar	2000
Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal - Basel Convention	1989	Switzerland, Basel	2000
Convention on the Protection and Use of Transboundary Watercourses and International lakes	1992	Finland,Helsinki	2000
Convention on Biological Diversity	1992	Brasil, Rio de Janeiro	2000
Convention on the conservation of European Wildlife and Natura Habitats	1979	Switzerland, Bern	2002

Fig. 3: Conventions on nature protection signed by Azerbaijan, source: Environmental movement in Azerbaijan (2008)

equipment is largely out of date. A young generation of scientists is missing at large.

In general, public awareness of nature and the environment is high due to a) the strong agricultural sector of the country, b) the strong identification with the nation and its cultural and natural heritage, c) the general appreciation of nature as space for relaxing and recreation, and d) the strong attraction of hunting and fishing throughout all levels of society.

Although awareness towards "green issues" does exist, a deeper understanding is entirely missing on a broader scale. In particular, nature conservation is not yet embedded into civilian society. Furthermore, expert knowledge is largely lacking, even among responsible authorities.

Awareness towards the environment and the technical environmental protection is moderate to high, presumably as a result of the intensive industrialisation of the country and the horrendous industrial contamination under Soviet aegis.

Awareness of the particularly rich biodiversity is still only very limited, generally to those persons who deal with the issues on a professional level. Nowadays, the fact that Azerbaijan is one of the countries with the highest biodiversity globally is frequently used to promote the country. Within the civilian society knowledge of species and their value is rather limited, while administrations like the MENR are well aware of the potential, although their information is based on out-dated literature. The same applies to the scientific body, e.g. ANAS and the universities.

Tendencies towards nature conservation can be found among the young and liberal generation, e.g., language students voluntarily organising national park visits, or "cleaning up the environment" campaigns. Even

today working saturdays for entire school classes (with obligatory attendance) for e.g. planting trees are organised by all levels of authorities in the former collective style of the Soviet Union.

With the rise of a nation and the resulting constraints and particular challenges, all efforts and capacities made by the individual as well as large parts of the society, industry and administration are aimed at safeguarding the individual (financial) future in general. Hence, nature conservation has not yet become a common issue in Azerbaijan, except for the MENR and some NGOs and individuals dedicated to it.

Over the past years, the only (widely) visible awareness-raising campaigns were posters and video spots presented by MENR (also available on their website) and posters by the National Aviation Company, as well as several means presented by international donor organisations (e.g. WWF road billboards). However, it is mainly the MENR that is promoting and addressing environmental issues (e.g., over the last few years it has steadily improved its online presence at: http://www.eco.gov.az/en/). The extent to which private initiatives face restrictions when addressing environmental issues or problems cannot be assessed. However, NGOs working on environmental education exist and urgently need to be strengthened in order to reach a much broader audience with this important and relevant matter. A short series of nature conservation aspects was part of a monthly childrens' magazine but was halted due to lack of funding.

While the MENR has primary responsibility for environmental management, other ministries and committees also have important functions that directly relate to those of the Ministry (see list below). The Cabinet of Ministers is officially responsible for coordinating government agencies. But, at the working level, there are no mechanisms for coordination and integration. This is especially a problem for the development of the implementation of key programmes. There is a danger, for example, that the MENR is expected to implement the National Programme on Environmentally Sustainable Socio-economic Development and the National Environmental Action Plan (NEAP) on its own. Therefore, environmental planning authorities should cooperate with those institutions and vice versa.

- the State Committee for the Land Cadastre
- the Ministry of Agriculture
- the Ministry of Economic development,
- the Ministry of Culture and Tourism
- the Water Amelioration Joint Stock Company
- the Academy of Sciences
- the regional executive powers

1.4.1. The Ministry of Ecology and Natural Resources (MENR)

The underlying legislative basis pertaining to conservation of biological resources is developed by the Parliament. Under this framework, a number of government institutions exist which contribute to the delivery of environmental policies.

The MENR was established on the basis of the former State Committee on Ecology by presidential decree in 2001.

Upon its creation, the MENR took over the functions of several other State bodies: the Departments of Hydrometeorology, Geology, Forestry and Fishery. Therefore, the Ministry's employment structure appears asymmetric — out of 9,500 employees, only about 900 (incl. 500 at the local level) work for environment divisions, compared to 2,000 working for the forestry sector.

The main responsibilities of the MENR include:

- Implementation of State policies on natural resources research, use, restoration, protection and safety assurance, and biodiversity conservation;
- Implementation of State policies on the use of bio-resources of both internal water bodies and the Caspian Sea (although not of the water resources themselves);
- Implementation of State policies on geological exploration, mineral resources protection and use;
- State administration concerning the environment;
- Organisation of hydrometeorological services;
- Implementation of State control over ecological safety compliance;
- Within its competence, implementation of

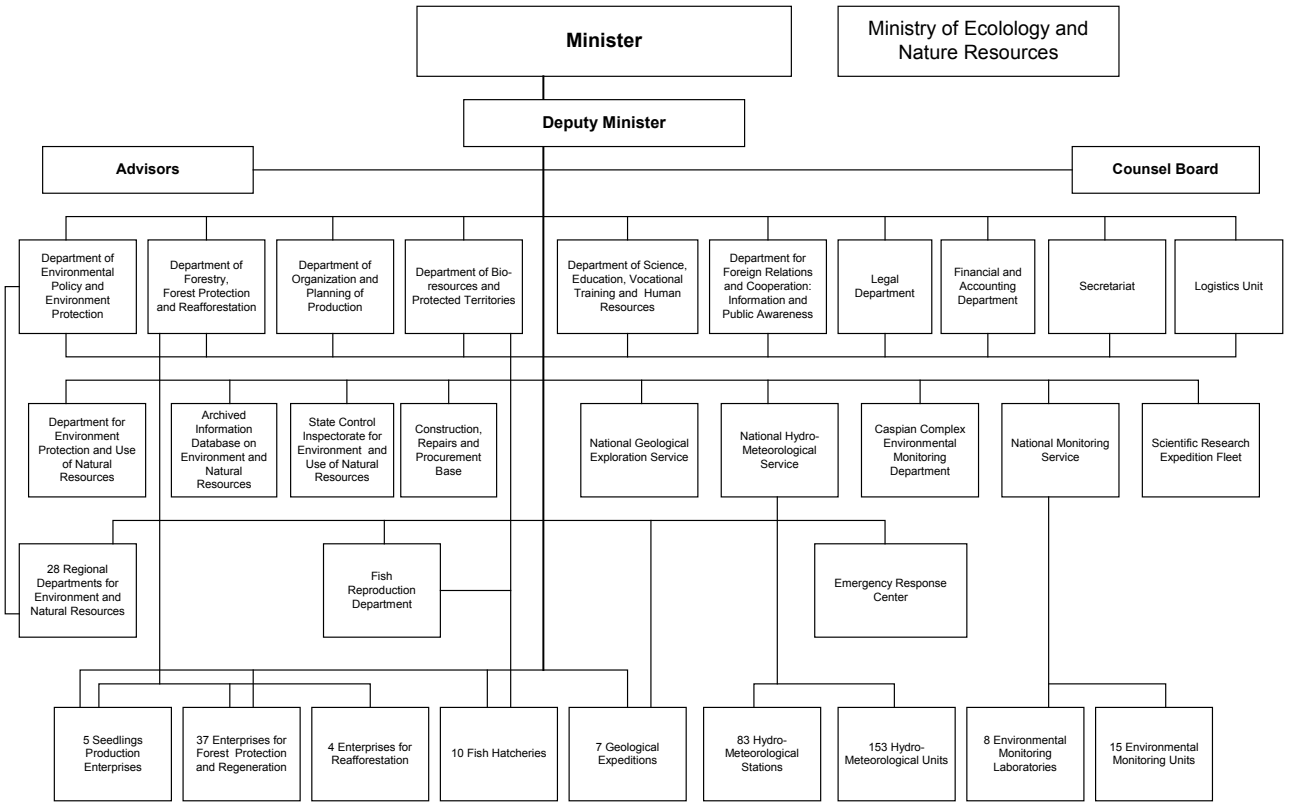


Fig. 4: Organigram of the Ministry of Ecology and Natural Resources

relevant international agreements and coordination of other bodies in this field.

The MENR manages forestry and hunting activities (including oversight of hunting quotas and permits), oversees protection and rehabilitation of fish stocks (and other aquatic bioresources) in marine and freshwater habitats, and is also responsible for biodiversity conservation. It develops strategies for long-term and short-term approaches to sustainable development and sustainable use of biological resources. The activity of the MENR is divided into six areas: (i) ecological policy development; (ii) ecological protection; (iii) water monitoring and management; (iv) protection of marine (Caspian) bio-resources; (v) forest management, and (vi) protected areas.

The first annual budget was about US$ 8 million; no data could be obtained concerning the current budget. However a steady increase over the last years is indicated already be increasing salaries of the MENR's employees.

The structure of the MENR continues to bear signs of the constituent parts that were brought together to create it. For example, the geology, hydrometeorology, forestry and fishery sub-sectors have separate departments, as does the environment in general. Consequently, some tasks are divided among several departments; for instance, there are three different departments with monitoring responsibilities. The MENR, therefore, appears still to be in a transitional stage from a complex combination of pre-existing organizations to an integrated and manageable institution. It is expected that further adjustments to the Ministry's structure will be unavoidable in the future.

The MENR also has a network of 28 regional departments for the environment and natural resources subordinated to its Department of Environmental Policy and Environment Protection.

The organigram shows that the MENR was once structured without taking advantage of western experience. It was, of course, very difficult to overcome the old "Committee Structure" of the Soviet past. In analysing the organigram one can immediately realise the mix of ministerial and non-ministerial functions. They reach from more local involvement to a kind of scientific task (in the Ministry) and to real ministerial work, including the important international part of it.

MENR has an expanded mandate that "includes geology, fisheries, and forests." Broadly speaking, MENR has a central apparatus, 21 specialized departments

(including, among others, Caspian Environmental Monitoring, Department of Fish Reproduction, Department of Forestry, Hydrometric Department, State Environmental Inspection, and others), 5 subordinated research-oriented agencies, 29 regional environment and natural resource departments, 41 enterprises for forest protection and regeneration, 10 fish hatcheries, and 7 geological expeditions (essentially, prospecting and inventory teams). In 2007, MENR employed a staff of about 9,500 persons at the central and local levels.

1.5. International cooperation with regard to nature conservation in Azerbaijan

A look at the international side of the environmental policy reveals a large picture of engagement of states (Switzerland, France, Germany, Austria, Norway), international organizations (EU, UNDP), internationally acting NGOs (WWF, MSF, NABU), and banks (World Bank, EBRD, Asian Development Bank). They all act within agreements with the Azerbaijani government; sometimes the authors of corresponding reports, plans, and position papers come from the intellectual, governmental and scientific sectors of the country. As part of these initiatives several actions and programmes have taken place aiming to support Azerbaijan in protecting its natural heritage.

However, the engagement of international Non-governmental entities declined sharply over the last two years. By beginning of 2009 only WWF remained active in the country.

Politically the most far-sighted framework initiative – although still very general – is the possibility of Azerbaijan becoming a member of the European Neighbourhood Policy and the resulting actions. The only concrete international initiative in this direction is the Caucasus Initiative of the German government.

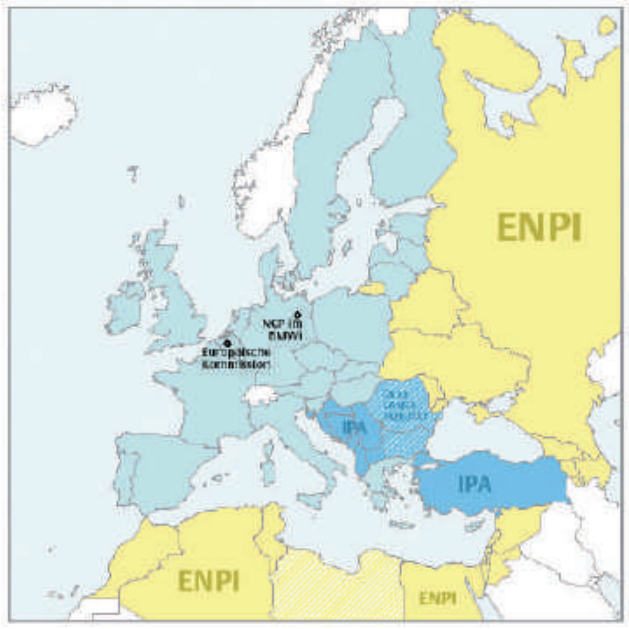
1.5.1. European Neighbourhood Policy (ENP)

The Republic of Azerbaijan keeps tight relationships with Europe. To strengthen the bond between the EU and Azerbaijan, both sides signed a formal Partnership and Cooperation Agreement (PCA). This approximation expresses - up to a certain degree - the tendency towards "more than a neighbourhood". It is up to the contracting parties, EU and Azerbaijan, to decide what kind of relationship they want to have in future, after the implementation of the PCA. For the time being, there is no formal invitation of the EU to start an accession process.

The PCA states: 'The Republic of Azerbaijan should endeavour to ensure that its legislation will be gradually made compatible with that of the EU (Art. 43 PCA). Among other policy sectors, the approximation also comprises the 'environment and the exploitation and utilization of natural resources' (Art. 43, par. 2). For the EU, it was obviously indispensable to name this priority segment in close context with economic or directly economy-oriented segments.

Following the EU's internal difficulties arising from its formal opening to Turkey and former members of the Soviet Union, the EU instituted a new policy towards the eastern European countries, the European Neighbourhood Policy (ENP). The European Commission recommended a significant intensification of relations with Azerbaijan through the development of an action plan under the ENP.

In June 2004, the European Council decided to include



Map 8: EU programme regions since 01.01.2007

© BMWi

Azerbaijan, Armenia and Georgia in the ENP, opening up the prospect of a significantly enhanced partnership and thus marking an important step forward in the EU's engagement with the Southern Caucasus region.

The ENP goes beyond the existing Partnership and Cooperation Agreement with Azerbaijan, offering a close relationship with the EU, which involves a significant degree of economic integration and a deepening of political cooperation. However, it is not seen as a preliminary step toward accession but as a tool for various forms of development in and stabilisation of the individual country.

Within the ENP, it also became possible for non-EU candidate countries, such as the independent states and Russia, to harmonize with EU legislation and administrative structures via the Twinning instrument. Twinning projects can concern administrative, economic, political or environmental matters. Besides the goals mentioned above, Twinning projects are also meant to provide an exchange of know-how and pave the way for further collaboration. They are financed by the EU. Until the end of 2006, the TACIS Programme (Technical Assistance to the Commonwealth of Independent States) was also the supporting programme for Twinning projects. Since 2007 responsibility has switched to the newly created European Neighbourhood Policy Instrument (ENPI). Currently Azerbaijan is running two Twinning projects on economic matters with the BMWi.

Within the EU, Germany plays a significant role in Azerbaijan both as a trade partner and a capital investor. Most important were investments by the German Development Bank (Kreditbank für Wiederaufbau - KfW) in a system of micro-credits for small enterprises, in a credit guarantee fund for local banks and in the Azerbaijani energy and water supply systems.

1.5.2. Caucasus Initiative

The Caucasus Initiative was first presented in April 2001 by the German BMZ. The Initiative aims to make a specific contribution to the economic, social and political development of the Southern Caucasus. It focuses on promoting democracy, transparency and legal security in Georgia, Armenia and Azerbaijan. All southern Caucasian states are invited to collaborate within the framework of technical and financial cooperation programmes or, where this proves impossible, to foster cooperation between two neighbouring countries. In particular in areas where cooperation at interstate level is not yet feasible, it encourages exchange and cooperation at technical and NGO level. Meetings with members of the civilian society and technical contacts can make a valuable contribution to overcome the view of the other side as 'the enemy', and can foster mutual trust.

The main objectives of the Caucasus Initiative are:

- Consolidating a democratic legal system
- Strengthening local-level democracy and civilian society
- Promoting the private sector
- Promoting the energy sector
- Combating tuberculosis
- Establishing transboundary national parks

While there is cooperation on various levels between Georgia and Azerbaijan as well as Georgia and Armenia, there exists no cooperation at all between Azerbaijan and Armenia.

1.5.2.1. Actions under the Caucasus Initiative

Main target under the Caucasus Initiative is to extend and strengthen the protected area network. E.g. the establishment of at least one national park in each of the three Southern Caucasus countries was envisaged. This is supported by a set of programmes described below. For the proposed national park in Azerbaijan, Samur Yalama, the first feasibility assessment was prepared in 2003. Still, already years past this first action, the national park is still not established although the implementation project was tendered two times already.

Ecoregional Conservation Plan (ECP)

Along with the World Wide Fund for Nature (WWF) and experts from the universities, governments and NGOs of all Caucasian states (including Russia, Turkey and Iran) the ECP was drawn up. It identifies bio-corridors for the entire Southern Caucasus region - from the coast of the Black Sea across the peaks of the Lesser and Greater Caucasus to the Caspian Sea - which are crucial to protect in order to retain biodiversity in the region. The plan is layed out for 20 years. It represents the first overall step towards protecting areas in the

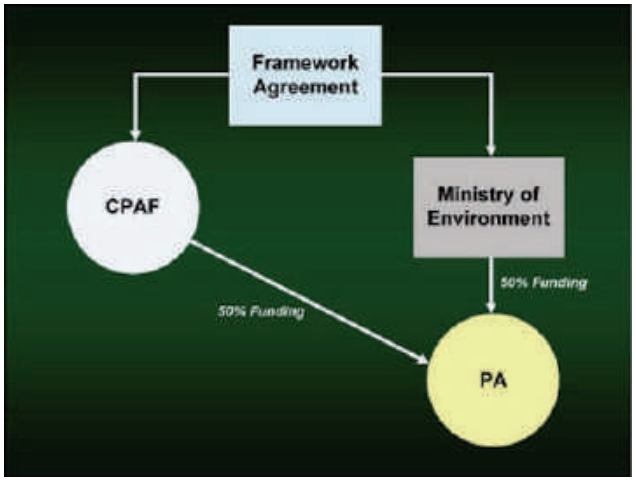


Fig 5: Flow chart of funding flow Caucasus Protected Area Fund. Source: http://www.caucasus-naturefund.org

Caucasus Region.

On Azerbaijani territory, establishment of protected areas like the Samur-Yalama National Park (or the Zakatala Biosphere Reserves, if feasible) will be established on the basis of the Ecoregional Conservation Plan. The ecological balance of this 12,500-hectare area, which embraces the coastal strip and forested areas, is threatened and special protection is urgently needed. As a result of lively tourism in the coastal strip along the Caspian Sea and the heavy traffic along the transit route to Russia, the pressure on the area is immense. Thus, ecologically sound tourism concepts are one of the project's objectives, as is an increased environmental awareness on the part of both the local people and the tourists, mostly coming from Baku. In addition, the establishment of visitor centres, controlled access and modern waste disposal systems is being considered.

Caucasus Protected Area Fund (CPAF)

In 2007, the CPAF was legally established to finance the establishment and long-term funding of protected areas, including half of the annual operating costs (CPAF 2008). The other half is to be raised by the national governments. The fund was created through collaboration of the WWF, the BMZ and the German KfW. In order to provide this basic but critical funding of 1.7 million Euros/year over a period of at least the next 15 years, it is estimated that the Caucasus Protected Areas Fund will need to raise a core endowment of around 44 million Euros from international donors. In 2009, about 8 million Euros formed the capital basis of the CPAF. The CPAF is a charitable foundation, registered in Germany. Its Board of Directors is composed of representatives of KfW, WWF, CI and BMZ. Each of the three Caucasian countries' Ministries for Environment and Nature Conservation will submit a series of annual proposals to the fund to finance specific costs of those protected areas that the Ecoregional Conservation Plan identifies as priority areas. No particular financial support in line with the dispersal criteria has been given to projects in Azerbaijan so far.

Transboundary Joint Secretariat (TJS)

The TJS coordinates national park and protected area projects within and among the three Caucasian states and provides substantial and technical support as well as organising joint training courses for park staff. It further conducts targeted PR work (Joint Secretariat 2008). The TJS has a regional office in Tblisi and country offices in Baku, Tblisi and Yerewan. The permanent staff consists of a regional team leader and regional advisor and in each country a country coordinator and a national expert, seconded to the TJS by the country's environmental ministry. In each of the ministries, the TJS is supported by a programme director. Beside national initiatives and support, which is highly commendable for a regional centre such as the TJS, transboundary cooperation between Azerbaijan and its neighbours has not yet taken place.

1.6. Environmental International Donor Agencies and Non-Governmental Organisations in Azerbaijan

A wide range of international donor agencies support nature conservation in Azerbaijan. With the present economic boom, the increasing wealth and the resulting change in preconditions for any future funding policy of international agencies, it is difficult to predict a certain development. Theoretically, Azerbaijan should already be in a financially comfortable position, not having to rely on external funding anymore. However, as long as benefits for nature conservation can still be obtained from international organizations, the authors recommend a continuation of the support, if requested and supported by the Azerbaijani government.

German Agency for Technical Development (GTZ)

GTZ has been working in Azerbaijan since 1995 and has implemented projects for the diversification of the economy and the support of privatisation in agriculture. The most recent GTZ programme (from 2009 on) is named "Sustainable use of biodiversity in the South Caucasus, Azerbaijan" (services for the overall project are also scheduled for Georgia and Armenia). It aims at sustainable development in the vicinity of protected areas by supporting regional production, processing and marketing chains or small-scale tourism projects.

KfW Development Bank

The German KfW started its work in Azerbaijan in 1995. KfW provides funds, investments and consulting services in the financial sector and in the economic infrastructure. It encourages regional cooperation among Azerbaijan, Armenia and Georgia under the German government's Caucasus Initiative. The majority of the funds are long-term low-interest loans; a small part is non-repayable grants. Since 1998, KfW has an office in Baku. Projects in Azerbaijan are within the fields of eco-regional nature conservation, investments in municipal infrastructure, the fight against tuberculosis and the rehabilitation of electric power transmission lines. KfW also engages in the improvement of the national cadastre, currently focusing on real estate cadastre in view of facilitating mortgage loans.

NABU

NABU was present in Azerbaijan with a) supporting the long term establishment of the Birdlife Partner AOS (Azerbaijan Ornithological Society) and various kind of support for Hirkan National Park. On its way to a membership based NGO and a strong partner within the international BirdLife network AOS is supported and guided institutional and financial. The "Bird of the Year" campaign as well as support for the establishment of a national IBA network is some examples of AOS- NABUs engagement in Azerbaijan. Further emphasise is put on supporting the nomination of the Hirkanian forest as UNESCO World Heritage site. The Hirkan National Park has been supported from the very beginning with ranger training, equipment support and the development and establishment of an educational nature trail. Nature tourism was fostered by specific workshops enabling local stakeholder to participate at the increasing tourism in the region.

United Nations Educational, Scientific and Cultural Organization (UNESCO)

Azerbaijan joined UNESCO in 1992. In 1996, the government and the UNESCO signed a memorandum of understanding to cooperate more closely in the fields of education, science, cultural heritage, cultural activities and free and independent media. In the domain of sciences UNESCO supports Baku State University and the Academy of Sciences by facilitating the involvement in international networks. Important programmes are the Hydrological Programme, the Oceanographic Commission, Geological Correlation Programme and Management of Social Transformations.

United Nations Development Programme (UNDP)

An important current environmental project is the sectoral and territorial "Strategic Environmental Assessment" (SEA) funded by UNDP. It is scheduled for a period from 2008 to 2010 and aims at increasing the understanding of sound environmental planning and decision-making as a base for minimising and preventing degradation. It is the goal of the present UNDP SEA project to improve decision-making processes and to promote institutional development in Azerbaijan. Plans include capacity needs assessment, training programmes on SEA, implementation of pilot projects, and towards the end of 2010 the formulation of a national capacity development strategy. UNDP is also active in the development of renewable energy concepts such as small hydro-power plants or wind energy. Furthermore, the organisation coordinates environmental issues across borders and links up with other United Nations programmes in the country.

World Bank

The World Bank has been active in Azerbaijan since 1992. In the Environmental and Biodiversity Sector the World Bank prepared the "Shah-Dag Rural Environment Project" as early as 2003. The project, with a budget of 17.72 million US $ (grant 7,7 million, credit 8 million, rest co-funding) was approved in 2005. The project is directed at improving biodiversity conservation and introducing more sustainable natural resource management and economic activities in two mountainous areas of Azerbaijan. The Shahdag National Park will be created within the project, and the Ordubad

National Park (located in Nakhchivan) will be extended. Shahdag National Park will encompass about 100,000 ha of forest on the northern and southern flank of the Greater Caucasus chain. It will further protect the high peaks of the mountains, such as Shahdag and Gizilaghaj. Unfortunately, at the time of writing, a detailed map of the spatial extension and location was not available.

United States Agency for International Development (USAID)

USAID started its activities in Azerbaijan in 1992. The objectives concentrated on promoting economic growth and reform in order to contribute to strengthening and expanding democratic institutions and rule of law.

USAID was also involved in the Environmental Analysis for Biodiversity Conservation. After a report in the year 2000, updates were organised for the periods from 2001 to 2004 and 2005 to 2009.

United Nations Environmental Programme (UNEP)

UNEP works in Azerbaijan in cooperation with other United Nations offices and bilateral donor agencies, including GTZ. UNEP deals with environmental issues concerning the whole southern Caucasus region. One example is the support for the management of trans-boundary watercourses shared by Georgia and Azerbaijan and the drafting of bilateral agreements on this behalf.

Further activities are environment security programmes. They consist also of in-depth assessments of environmental degradation in politically blocked areas and problems in conflict zones of Georgia, Armenia and Azerbaijan. These efforts are jointly planned and funded by UNEP and the Organisation for Security and Cooperation in Europe (OSCE).

Food and Agricultural Organization of the United Nations (FAO)

In 2008, FAO informed national and international stakeholders active in the agriculture and rural sector – including forestry and fisheries – that it is preparing a framework for a National Medium Term Priority Cooperation. For the Caucasus region, FAO also has dealt with non-wood forest products. Studies include indigenous knowledge on medicinal plants and local knowledge on biodiversity.

Non-governmental organisations (NGO's)

NGOs, both national and international, faced increasing restrictions over the past two years. Access to protected areas, implementation of projects or acceptance of national experts at the relevant national institutions were subject to new restrictions. In spring 2009, a legal amendment that would have severely restricted national NGOs eventually did not pass legislation, but was seen internationally as an attempt to limit and restrict the capacities of the NGOs (Eurasianet NGO Amendments put civil society at risk)[12]. Only recently, a former project member and critic of the national politics was arrested under questionable circumstances and accused of hooliganism (EU Statement on the arrest of two Azerbaijani youth organisation members)[13]. These tendencies should not be accepted. Currently, it is very difficult to predict whether this is of temporary character or a general state policy, but the situation will presumably become clearer within the months to come

At present there are over 60 ecological NGOs and associations, about 20 of which focus on biodiversity. Among these are scientific groups undertaking basic biodiversity research (such as the Society of Botanists, the Society of Zoologists, the Society of Geographers, the Society of Mammologists and the Azerbaijan Ornithological Society). A number of other NGOs are active in environmental education relating to biodiversity and play an important role in raising public awareness. Generally, the capacity of these NGOs is low; often they are formed by a network of friends or represent a one-man entity. The only NGO with a considerable number of members is AOS, described in detail below.

The Critical Ecosystems Partnership Fund (CEPF) has been an important funding source for a broad range of environmental NGOs in the Caucasus region. The Caucasus region has arrived at nearly one tenth of total grants reaching more than 150 million US$ a year; there is a trend toward further expansion. It cooperated with partners such as the WWF, and also with the German KfW Development Bank.

World Wide Fund for Nature (WWF)

WWF Caucasus has merits in the documentation of biodiversity hotspots in the Caucasus region, including Azerbaijan. The Caucasus Eco Region Hotspot comprises the three countries of the Caucasus Initiative, Georgia,

12 http://www.eurasianet.org/departments/insightb/articles/eav061709.shtml accessed 21/07/2009

13 http://ol.azerbaijan.googlepages.com/EUStatement23July2009.pdf accessed 22/07/2009

Armenia and Azerbaijan, in which WWF has country programme offices. Parts of Turkey, Russia and Iran also belong to the region; however, WWF is not officially represented there yet. In Iran links were formed with an environmental NGO. With financial support by KfW, the MacArthur Foundation and the Critical Ecosystems Partnership Fund, WWF was involved in outlining an Eco-regional Conservation Plan for the Caucasus. WWF cooperates with organisations such as Birdlife International, Conservation International, Ecological Union of Azerbaijan and other national or regional organisations.

Azerbaijan Ornithological Society (AOS)

Under a project funded by Birdlife International, the Azerbaijan Ornithological Society (AOS) not only supplies information about rare bird life but also offers comprehensive information on the access to scenic landscapes for bird watching (high quality information signs, maps and flyers with potential hiking routes and excursions). One goal was the promotion of ecotourism, mainly for international tourists. Additionally, local hosts were trained in professional behaviour towards international tourists. Nowaday, AOS seems to be the larges member based environmental NGO in Azerbaijan.

Private sector

In addition to local private entrepreneurs, a number of international corporations operate in the Republic of Azerbaijan. Representatives of local private businesses have not yet taken an active role in solving environmental problems, mainly due to the relatively early stage of business development in Azerbaijan. In general, foreign investors have been more involved in ecological protection than the local business sector. In particular, the oil sector (including companies such as BP, Exxon Mobile) has been involved in biodiversity protection activities as a result of their recognition of both potential corporate impacts and social responsibility.

Through the construction of national and international pipelines they are confronted with demands to avoid environmental damages and protect nature and biodiversity.

British Petrol Oil (BP) Azerbaijan was active in developing a Biodiversity Strategy in consultation with local stakeholders for the Caspian Sea coast as well as for the route of the pipeline. Considerable funds are made available for the support of both short- and long-term local projects. However, the results and success of these measures are controversial topics in Azerbaijan.

PART TWO

Fact sheets of regions surveyed

2.1. Methodological Approach

Over the period of two field years, the regions described below were thoroughly assessed.

Based on remote sensing pre-classification and an initial expert survey throughout the entire country, research regions were identified.

The criteria for these research regions were:

- they are part of the priority conservation area given by WWF in 2005 and harbour species with conservation priority,
- they represent areas of considerable size with little alteration and or with valuable future conservation targets,
- they represent typical ecosystems of the country, preferably ones currently underrepresented in the protection network of the country,
- they are as of yet unprotected or show potential for the extension of an existing protected area.

This chapter presents the conclusions of several surveys conducted during autumn of 2005, spring and autumn of 2006 and 2007, as well as the summer of 2008.

During the implementation of the project, a broad range of data collection and ecological surveys was conducted. The project team consisted of about 14 national and 13 international experts who contributed to various aspects over a varying period of time. In addition to the expert team, about 15 German and Azeri graduate students from Baku State University as well as Greifswald University, volunteers and interns supported the project over the three-year project phase. The local NGO "Biodiversity and Nature" with its zoological experts became a long-term partner. Other cooperation included members of the Academy of Science and the Azerbaijan Ornithological Society. The results of the project were further enhanced through data gathered during the long-term activity of the MSF in Azerbaijan. Especially concerning the ornithological data, we were able to refer to several years of our own observations made by MSF staff and by the Azerbaijan project partner.

Particular methods that were applied included:

- Landscape ecological cross sections,
- Bird counts,
- Herpetofaunistic/ zoological surveys,
- Remote Sensing interpretation and classification,
- Semi-structured interviews with key stakeholders in the region,
- Literature analysis and institutional analysis.

The numbers of all birds were counted or estimated and the observed species were classified as breeding, migrating or wintering. All species and their habitats were compared to international/European categories such as IUCN, Bern convention, Bonn convention, etc.

The cross-section headed along the main ecological gradients in the investigated area; spatial distribution of plant communities was documented. Plant diversity was documented by identifying and listing all plant species that occurred. The nomenclature of plant species follows Cherepanov (1995). All species tables can be found in annex two.

A Spot scene (resolution 10x10 m) was available for the Kura Delta; satellite interpretation of all other areas is bases on ETM 7+ imagery. Partly supervised classifica-

tion was conducted using these scenes. However, satellite imagery available for the islands was restricted to high-resolutions images taken from Google Earth Pro.

To keep the entire report of this comprehensive project readable, only the main conclusions of the partly very detailed analyses are given within the text following. The date base for these conclusions, i.e., species lists, high resolution maps as well as intensive text on the individual chapters and paragraphs, is attached to this report and provided on CD-ROM only.

For local names, the transliteration given by Allworth (1971) was used (Nationalities of the Soviet East: Publications and Writing Systems - A Bibliographical directory and transliteration tables for Iranian and Turkic language publications. Publications and Writing Systems. New York)

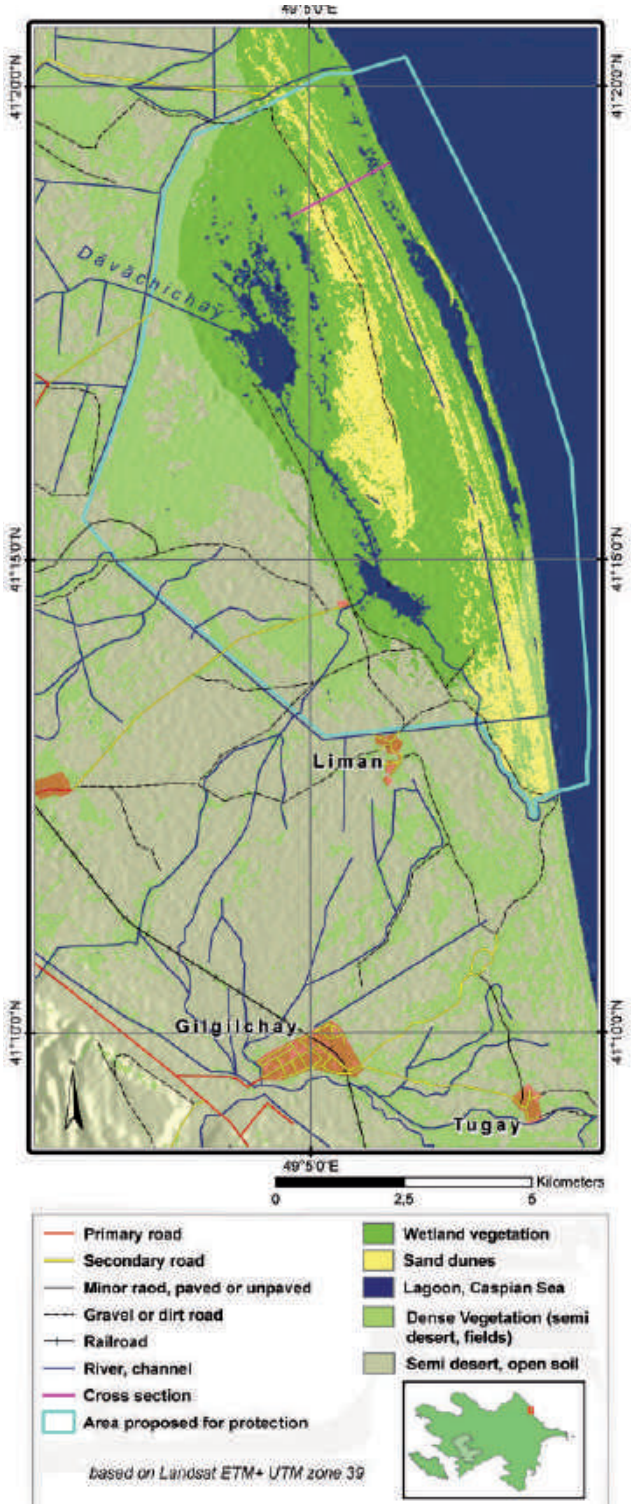
2.2. Coastal Region

2.2.1 Shifting dunes in the Samur-Dävächi lowlands

Location: Located in northern Azerbaijan, the investigated dunes and lagoons of the Samur-Dävächi lowlands (49°05' E; 41°19' N; -27 m a.s.l.) are embedded in a flat plain between the coast and the foothills of the Greater Caucasus. The Caspian Sea to the east and swamps and arable land to the west border this landscape. Irrigation channels delimit the researched area to the northwest and southeast (Map. 9). The dune complex covers about 10,000 ha (Prilipko 1970).

Landscape characteristics: The dune complex, which is approximately 12 km long, consists of single segments arranged parallel to the beach (Map. 9). A flat wall divides the sandy beach from the beach lagoon with its shallow waters above clayey ground. The beach lagoon is 300-400 m wide and its depth decreases towards the dunes, where the natural sequence is interrupted by a gravel dike of 3 m in height. The dike itself is partly buried by the dunes.

Two dune ridges with a height of up to ten metres compose the core of the complex. Due to active sand transport, steep slopes developed at the lee sides. The relief of the dune valleys is undulating, with sandy



Map 9: Samur- Dävächi project area

hummocks of up to one metre in height. The area of the inner lagoon, or "Liman", varies between 1,600 and 7,000 ha (Patrikeev 2004) depending on water supply.

The beach lagoons are presumably irregularly flooded by seawater. The larger, inner lagoon is fed by drainage ditches from the surrounding salinised fallows and meadows and by the river Dävächichay. An outlet south of the dunes drains the inner lagoon to the sea. The water

regime is directly influenced by the sea level fluctuations of the Caspian Sea.

Climate: The Samur-Dävächi region, like Baku, has a semi-arid climate (cf. Goskomgeodesiya 1993). It is characterised by cool and wet winters with less than 300 mm precipitation annually and a hot drought period between March and September. The climate station of Khachmaz, about 30 km from the dune complex, measures the highest mean temperatures in August (45.1°C) and the lowest in January (-1.5°C).

Soil: Sandy soils and dune ridges are limited to a two–kilometre-wide strip along the coast. The coastal plain surrounding the area is made up of fine sediments; salt-influenced Gleysols and Solontschaks predominate (Mamedaliev 1963). In the dune complex, these soils are mostly buried by active dunes.

Vegetation: In the study area, 50 species of vascular plants were detected. Among the four woody species encountered, *Tamarix ramosissima*, *Populus alba* (agg.) and *Elaeagnus caspica* are indigenous species, while *Pinus brutia* is planted. Typical lianas that occur in salt-influenced woodlands are *Cynanchum acutum*, *Asparagus verticillatus* and *Clematis orientalis*. The herbaceous plants can be subdivided into three groups: (1) Psammophytic species, e.g. *Artemisia arenaria*, *Agriophyllum arenarium*, *Convolvulus persicus* and *Tournefortia sibirica*, are restricted to the coastal zone. (2) Halophytic species on salt-rich sites, e.g. *Salicornia europaea*, *Suaeda salsa* and *Petrosimonia brachiata* - the latter even grows on salt-crusted soils. (3) Salt-resistant halophytic species (*Juncus acutus*, *Samolus valerandi, Scirpoides holoschoenus*) predominate in wetlands.

In the dune complex, different types of habitats occur as shown in the cross section.

a) Beach lagoon with *Phragmites* reed: Only few parts of this swamp show open water, most of the area is covered by dense reeds with *Phragmites australis* predominating. Also, *Typha angustifolia, Alisma lanceolata* and typical species of salt-influenced reeds such as *Samolus valerandi* and *Schoenoplectus littoralis* grow in the brackish water of max. 40 cm depth.

b) Beach lagoon with *Juncus* reed: *Phragmites australis* stands are displaced by *Juncus* reeds at sites with water levels near the soil surface. Hummocks of *Juncus maritimus* and *J. acutus* alternate with lawns composed of annual salt-tolerant herbs such as *Salicornia europaea, Suaeda salsa* and *Centaureum pulchellum* or perennials such as *Calamagrostis epigejos, Lactuca tatarica* and *Inula britannica*.

c) Dune valleys: Huge perennial grasses, shrubs and

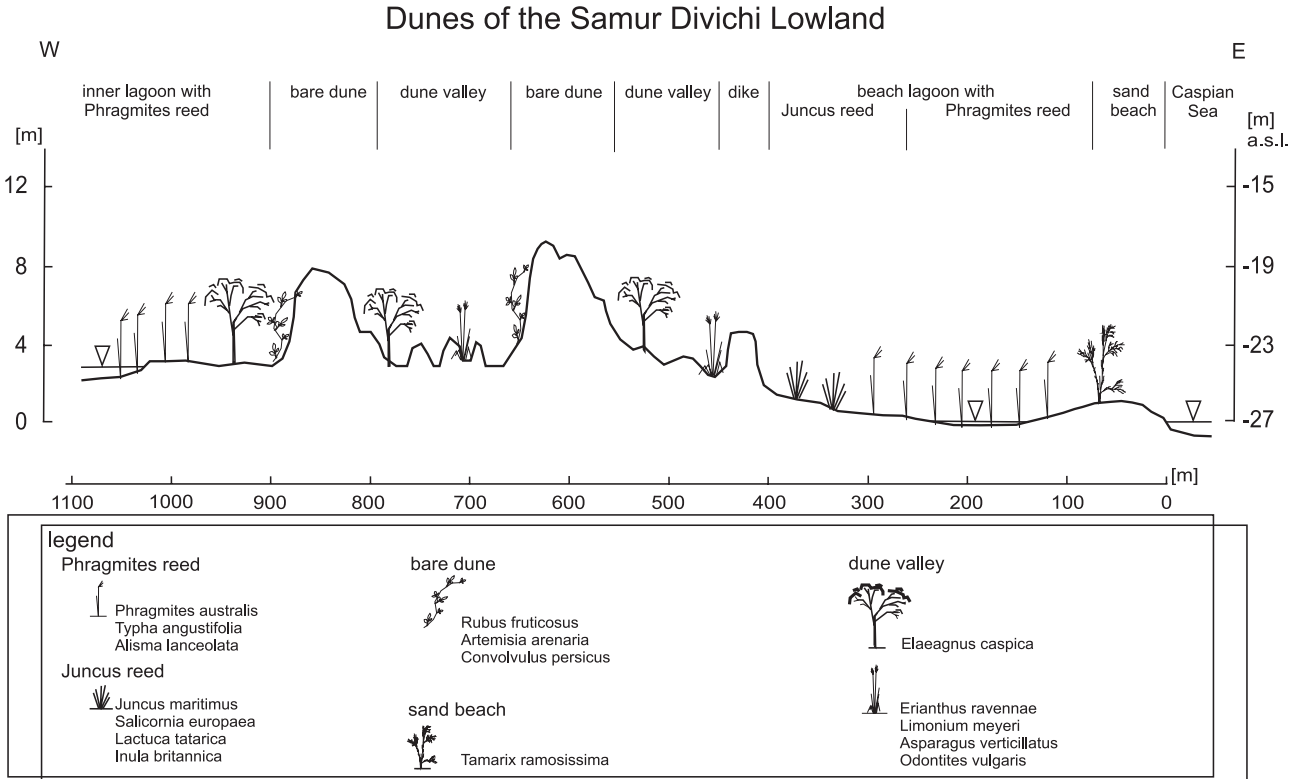


Fig. 6: Cross section Dävächi: Cross section of the dune complex with physiognomic landscape units and predominating plant species

semi-shrubs are typical plant species between the dunes. *Erianthus ravennae* is the dominant grass with stems up to three metres high. Other abundant species are *Limonium meyeri*, *Asparagus verticillatus* and *Glycyrrhiza glabra*. Important species occur here, e.g. *Senecio erucifolius*, *Cephalaria transsylvanica* and *Odontites vulgaris*. The formative tree of this complex is *Eleagnus caspica*, and some stands of *Pinus brutia* were planted in the dune valleys.

d) Bare dunes and slopes (photo 16): Only single individuals of specially adapted plant species survive on the actively shifting dunes, like some typical Caspian psammophyts, e.g. *Artemisia arenaria, Agriophyllum arenarium, Melilotus caspica* and the endangered *Convolvulus persicus* (Ogar 2001). The steep slopes are covered by a thicket of *Rubus* sp., *Salsola tragus* and *Clematis orientalis,* benefiting from infiltrated water.

e) Inner lagoon: Around the so-called Dävächi Liman, large *Phragmites* reeds extend and only small parts of this lagoon consist of open water. The dense, up to four metres high reeds reflect the same species composition as the beach lagoon with *Typha latifolia*, *Schoenoplectus littoralis* and *Samolus valerandi*.

Birds: At Lake Dävächi Liman and in its surroundings, more than 230 species of wild birds have been recorded, of which 73 are listed in the annex I of the directive 79/409/EEC. 15 species are listed by the IUCN (6 NT, 5 VU, 3 EN, 1 CR) and 19 are included in the Azerbaijan Red Data Book. 99 species are of special European conservation concern (13x SPEC 1, 20 x SPEC 2, and 66 x SPEC 3).

The vast reed areas of the wetland are an important breeding site for several species of herons, egrets and Pygmy Cormorant (NT). Also, nesting Ferruginous Ducks (NT) and Marbled Teal (VU) occur here. Typical passerine species of this habitat are Reed and Great Reed Warbler, Moustached Warbler and Bearded Tit. In the wet surroundings Lapwings, White-tailed Lapwings, Black-winged Stilts and Collared Pratincoles breed.

Photo 15: Black Headed Gull (*Larus ichthyaetus*) (P. Meister)

The semi-desert areas are inhabited by Lesser Short-toed Lark, Isabelline Wheatear and Stone Curlew, while the small woods of *Eleagnus angustifolia* harbour breeding Scops Owl, Nightjar and Menetries's and Olivaceous Warblers.

In migration, many more species have been seen here. The most valuable of them is the critically endangered Sociable Lapwing (CR); a flock of 11 individuals of this species was recorded in September 2006. Other species of high international conservation concern that regularly rest here are Dalmatian Pelican (VU), Lesser White-fronted Goose (VU), White-headed Duck (EN), Greater Spotted Eagle (VU) and Saker Falcon (EN).

In wintertime large flocks of up to 10,000 ducks and coots rest on the Liman.

A species in the category 'Near Threatened' is the Little Bustard (*Tetrax tetrax*) (1 record). The recorded Greater Spotted Eagle (*Aquila clanga*) and Lesser Kestrel (*Falco naumanni*) belong to the category 'Vulnerable". Three additional species that were observed are listed in the Azerbaijan Red Book: White-tailed Eagle (*Haliaeetus albicilla*) (2 records), Steppe Eagle (*Aquila nipalensis*) (1 record) and Purple Gallinule (*Porphyrio porphyrio*)(several resident pairs). Along the beach, Whimbrels (*Numenius phaeopus*), Green Sandpipers (*Tringa ochropus*) and Great Black-headed Gulls (*Larus ichthyaetus*) were detected among others. Kingfisher (*Alcedo atthis*), Moustached Warbler (*Acrocephalus melanopogon*), Northern Lapwings (*Vanellus vanellus*), pipits (e.g. *Anthus pratensis*) and larks (e.g. *Alauda arvensis*) were recorded on the salt meadows at the beach lagoon. On the lagoon, ca. 4,500 coots, about 200 Red-crested Pochards (*Netta rufina*) among other ducks and 13 Great White Egrets (*Egretta alba*) could be observed. In the surrounding grasslands with their small ponds, 53 Greylag Geese (*Anser anser*), 52 Ruddy Shelducks (*Tadorna ferruginea*) and 30 Common Shelducks (*Tadorna tadorna*) were found. Grey Herons (*Ardea cinerea*) and Cormorants (*Phalacrocorax carbo*) breed in stands of White Poplar (*Populus alba* agg.).

Summarising our own data and the reviewed literature, among the large number of waterfowl and other

migrating species seven Red List species could be recorded for the surveyed area up to now. In addition to our observations, Patrikeev (2004) mentions Dalmatian Pelicans (*Pelecanus crispus*, IUCN status 'Vulnerable') and many duck species on migration (e.g. Marbled Duck (*Marmaronetta angustirostris*), White-headed Duck (*Oxyura leucocephala*), status 'Vulnerable' and 'Endangered', respectively), and Ferruginous Duck (*Aythya nyroca*, status 'Near Threatened'). Ferruginous Duck was found breeding in several pairs on the Liman. Mentioned by Shelton (2000), the wetland is highly valuable as a bottleneck stopover site for numerous bird species due to narrowing lowland areas, encompassed by the Caspian Sea and the Greater Caucasus massif. Therefore, the Dävächi Liman has to be regarded as an important part of the network of wetlands along the migration corridor of the west Caspian coast. However, the listing as IBA does not automatically imply any protection status yet (Patrikeev & Wilson 2000).

Main threats for the birds are hunting activities and disturbance by fishermen. As in other wetlands, poaching of ducks and coots on migration and in wintertime is prevalent.

Amphibians and Reptiles: Two species of amphibians and 17 reptiles were recorded around Lake Dävächi Liman. 3 of them are listed in annex II and 8 in annex IV of the directive 92/43/EEC.

Of special interest is the occurrence of the very numerous *Testudo graeca,* which is included in the Azerbaijan Red Book and the IUCN Red List (VU). Other typical reptiles of the dry and sandy areas are *Eremias arguta, E. velox* and *Ophisops elegans* among the lizards and the snakes *Eryx jaculus*, *Eirenis collaris*, *Ophisaurus apodus* and *Telescopus fallax*. In the woods, *Lacerta strigata* is also very common.

The wetlands hold the amphibians *Rana ridibunda* and *Bufo viridis*, the turtles *Emys orbicularis* and *Mauremys caspica* and the snakes *Natrix natrix* and *N. tesselata*.

Human influence: The main threat for wildlife arises from very intensive hunting. The official period of hunting, stated by the Azerbaijani Hunting Society, lasts from September 15th to March 15th. Amateur hunting of waterfowl and shorebirds is widespread in all Caspian neighbouring states; mainly for the harvesting of meat and feathers. The Dävächi wetlands have a certain tradition as a popular hunting destination, as they were already managed as a private hunting reserve of the

Photo 16: Bare shifting sand dunes (J. Peper)

Russian Royal Family in the late 19th to the early 20th century. Besides the disturbance of migratory birds at their resting sites and the collateral killing of endangered species, lead accumulating in the food chain (up to 100 kg lead pellets per hunter and month!) might be the biggest long-term threat. (Caspian Environmental Programme 2007; Patrikeev 2004, Patrikeev et al. 2000, Shelton 2000). The excessive number of more than 100 shots per hour was witnessed in November 2006.

Grazing is only in parts a threat to the landscape complex. Intensive grazing occurs next to small settlements at the Liman. In contrast, only small numbers of cattle were found grazing within the shifting dunes, not affecting the vegetation in a serious way. Prilipko (1970) mentioned extensive pasturing as the traditional land use of sandy areas along the coast. Approximately 30 years ago, a dike was constructed parallel to the coast and several pine plantations were founded. The dike is partially buried by the dunes, while the pine stands are in good condition, but not able to stop the dune shift. In Soviet times, adjacent fish nurseries and nutria farms affected the lagoon through artificial changes of the water regime. Today, economically meaningful forms of land use are inshore fishing and hunting. Especially on the seaside and next to the Liman, several fishing and hunting huts are spread out across the landscape, but they do not affect the dune system complex.

Significance & protection: Settlements for recreation are constructed along the coast on non-protected sites today. The dune complex might also be influenced by construction projects in the near future. The Samur-Dävächi lowlands encompass the largest continuous complex of actively shifting sand dunes and lagoons in the country. The Dävächi Liman is an important wetland for many species of birds, among

them several of global conservation concern. Huge numbers of waterfowl are resting and wintering here. On the one hand, the dunes are an important habitat for rare psammophytic plant species in Azerbaijan, on the other hand they hold a particular species composition of reptiles, small mammals and birds that can only be found in this region. The dune-wetland complex is of international importance, providing resting sites for migratory birds at a bottleneck of the migration corridor between Caspian Sea and the Greater Caucasus range. Although listed as an Important Bird Area (IBA), the area does not underlie any further protection. The site is especially important for the autumn migration of waterbirds. More than 70,000 to 80,000 birds pass through each year, and about 5,000 ducks (*Anas platyrhynchos*, *A. clypeata, A. crecca, A. querquedula, A. strepera, Aythya fuligula, Netta rufina*) and up to 5,000 Eurasian Coots (*Fulica atra*) spend the winter here (Bird Life International 2007).

Yet, it would only take a small effort to protect the dune-wetland complex in its current state. Dune regulation activities and disturbances through any kind of building or road construction should be prohibited. A challenge for the nature conservation in Azerbaijan is the essential prohibition of hunting to warrant safe migration for thousands of birds (in particular waterfowl, and some of them globally threatened), at present a major threat to the area. The initial establishment of a nature reserve (IUCN cat. IV) containing the dunes and surrounding wetlands is strongly recommended. Additionally, the development and enforcement of management and protection measures in regard to the IBA status should be envisaged.

2.2.2.Kura River Delta

Introduction: After the Volga, the Kura River is the second biggest river draining into the Caspian (CEP 2002) and the most important water source in the Southern Caucasus (Hoogendoorn 2005). It discharges 16.8 km²/a of water into the Caspian (Volga: 237 km²/a) (Dumont 1998). The Kura rises from springs located 2,720 m a. s. l. on the Kizil-Giadik (Turkey), runs through the territory of Georgia and finally reaches the Central Lowland of Azerbaijan, where the river merges with its main tributary, the Araz River (Map 10).

Map 10: The catchment area of the Kura River, source: UNEP, accessed 23.11.2009 www.grid.unep.ch

The total catchment area of the 1,515 km long Kura River amounts to 188,000 square kilometres, including the Araz. The catchment area occupies the greatest part of the Lesser Caucasus and the south-eastern Greater Caucasus (Hoogendoorn 2005).

Seventy-five percent of the drinking water resources of Azerbaijan are taken from the Kura. Via a sophisticated system of channels in the Kura-Araz lowland the water is also used for irrigation. It is polluted with salts, pesticides, heavy metals and other toxic substances. With the ratification of the Helsinki Convention, a first step of awareness-raising was done, but adjacent countries have yet to follow to solve the problem.

Location: The recent Kura delta is located on the border to the South Caspian basin, part of an active tectonic zone in which the Greater and Lesser Caucasus are being uplifted (Mitchell & Westaway 1999). The Kura River delta comprises 19,000 ha, of which 6,340 ha are occupied by the delta and 12,600 ha are adjacent to shallow seawater areas.

Landscape characteristics - Development: The delta's recent shape is the result of the latest phase

Fig 7: Water level fluctuation of the Caspian Sea from 1900 till 2000

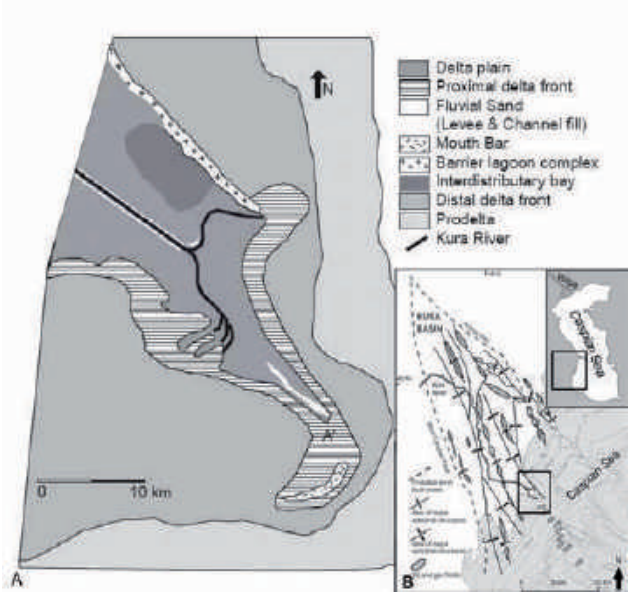


Fig. 8: (A) Depositional environments of the modern Kura delta; (B) Location map including bathymetry of the south-western Caspian Sea, major faults, syncline and anticline structures and oil and gas fields; rectangle: location of Kura delta (Hoogendoorn et al., 2005; Inan et al. 1997)

of delta development, which started at the beginning of the 19th century (Mikhailov et al. 2003). According to Galloway's (1975) classification, the delta is dominated by fluvial dynamics with redistribution of delta sediments through wave action on the northern shore.

From Miocene times onwards, shallow marine and estuarine sedimentation has been dominant (see Fig. 8A). A folding of the basin sediments into NW-SE-oriented anticline structures (Fig. 8B) took place mainly at the end of the Pliocene, leading to the development of the numerous volcanoes that are still active today (Hoogendoorn 2005). One mud volcano is located several kilometres offshore northeast of the Kura delta (Hoogendoorn 2005).

Soil: The sediments in the delta are predominantly clay, silt and fine sand. The annual sediment volume reaching the delta averages $8{,}8*10^6$ m^3/a (Mikhailov 2003). The deposition of sediments is asymmetrical and the delta accretes to the southeast (120°) as a result of the southward currents (Hoogendoorn 2005).

Dynamics: The active delta switched its location and size several times as a result of sea-level fluctuations (Fig. 7) and fluvial dynamics of the Kura River. About 2,500 years BP, the Kura discharged into the Gizilaghaj bay, several tens of kilometres south of the present delta (Mikhailov et al. 2003).

The actual shape of the delta is triangular, oriented to the southeast and characterised by three outlets: one artificial channel oriented northeast, one river arm to the southeast, which is discharging to the east by an artificial shortcut, and one river arm to the south. The northern artificial channel lost its primary depth due to fast sedimentation. The eastern channel was dug as an alternative route for the fishing fleet.

The present Kura River delta started to form in the early nineteenth century, when the river broke through the coastal barrier that existed along the outer margin of its shallow estuary and began building a new delta east of it. At the outset and until 1957, the delta advanced seawards, growing at a rate of 50-60 m/a, resulting in an annual increase of nearly 1.5 square kilometres. The construction of the Mingächevir reservoir in the river valley in 1953 led to a decrease in sediment load carried by the Kura River to half of the former amount. This

Photo 17: The Kura River delta in 1980, source: Ignatov & Solovieva 2000

Photo 18: The Kura River delta in 1990, source: Ignatov & Solovieva 2000

caused intensive delta erosion from the early 1960s on (Ignatov & Solovieva 2000). 15-20 m/a of the land eroded in the eastern part during that time (Mekhtiev 1966). However, the continuous drop of the sea level until 1977 (Fig. 7) resulted in progradation of the delta as the coastline receded (Photo 17). Since 1977, the water level rose and flooding of low-lying coastal lands played an important role in the modification and erosion of sedimentary structures (Ignatov & Solovieva 2000).

According to the satellite photograph taken in 1980 (Photo 17), the maximum west-east extension of the delta reached 24 km in the late 1970s and early 1980s, measured from the medium shoreline (Ignatov & Solovieva 2000). By the 1990s, the whole length of the delta had decreased to 12 or 13 km.

As visible in the picture from 1980, the northern artificial channel already existed, whereas the southern outlet seemed to be active in former times. By observing the sediment drift at the mouth of the outlets over a

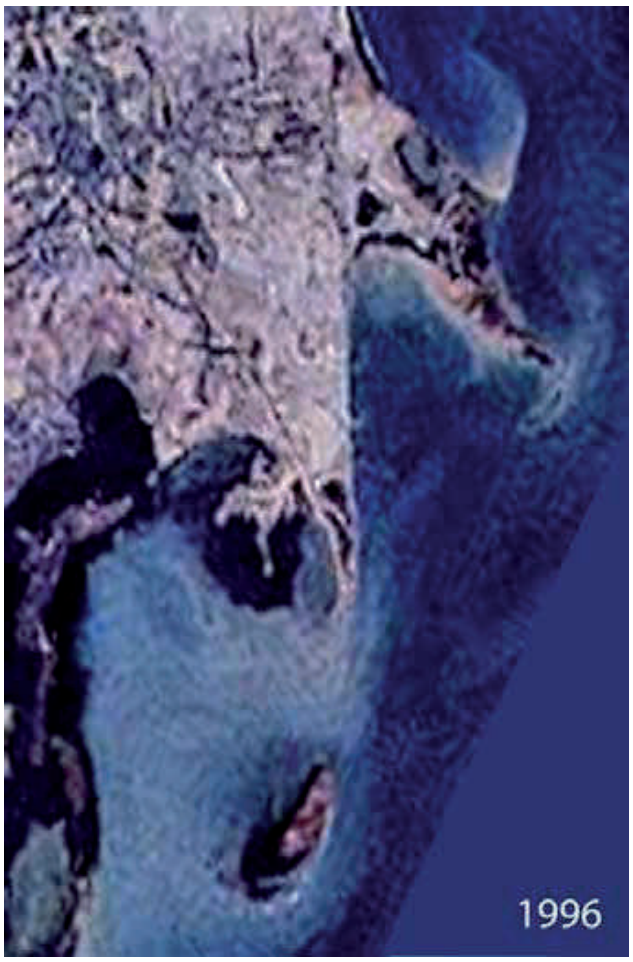


Photo 19: The Kura River Delta in 1996, source: Ignatov & Solovieva 2000

certain period of time, a change in activity can be noted. While only the eastern outlet was active in the 1980s, in 1990 both the northern and the eastern outlets were active. A constant sea level rise of about 15 cm/a from 1977 to 1995 caused large parts of the delta to submerge (Hoogendoorn et al. 2005). The delta expanded again in 1996 due to falling sea level and rapid accretion of sediments (Photo. 19). The aggregation of sediments in front of the northern channel shows that the river mainly discharged here.

The most recent satellite picture, taken in 2007 (Photo 20), shows a predominant discharge to the south. The shape of the delta has bent toward the sheltered southern side. Currently, the southern outlet splits into numerous smaller river arms, which are 10 to 100 m wide. Situated in the southern part of the delta, they are sheltered from along-shore currents and waves. The northern flank of the delta is composed of a barrier lagoon complex. The eastern flank is currently susceptible to erosion as the southeast channel is inactive and does not transport any sediments to the front of the delta.

Photo 20: The Kura River Delta in 2007

Vegetation: The vegetation of the Kura delta could only by assessed via remote sensing, using a Spot image and only spotty access by the national survey team. Border restrictions hindered the international team in conducting full vegetation surveys. The delta is characterised mainly by *Juncus* and *Phragmites* reed in swamp areas, whereas the central parts of the island encapsulated by the outflows bears poor semi-desert vegetation (see Map 11). The entire delta is grazed, albeit extensively. Dense *Phragmites* stands are characteristic for the southern part of the delta, the area of highest dynamics, whereas the northern part is dominated by ruderal species in a surrounding of abandoned industrial buildings. *Haloxylon* sp., *Salsola crassa*, *Tamarix* sp. and several weeds indicate the saline/ruderal conditions.

In general, the delta has been altered to a severe extent. A modified and regulated water regime, grazing, former utilisation and intensive disturbances have led to a less diverse situation than expected.

Fauna: The delta of the Kura River is an important breeding, resting and wintering area for many birds. The avifauna is highly diverse and consists of semi-desert species, waterbirds and many more, stopping over on migration here. More than 220 bird species have been recorded in the delta region, 70 of them are listed in the Annex I of the directive 79/409/EEC and 12 species in the IUCN Red List (6 NT, 4 VU, 2 EN). 17 species are included in the Azerbaijan Red Data Book and 94 are of special European conservation concern (11 Species 1, 19 Species 2 and 64 Species 3).

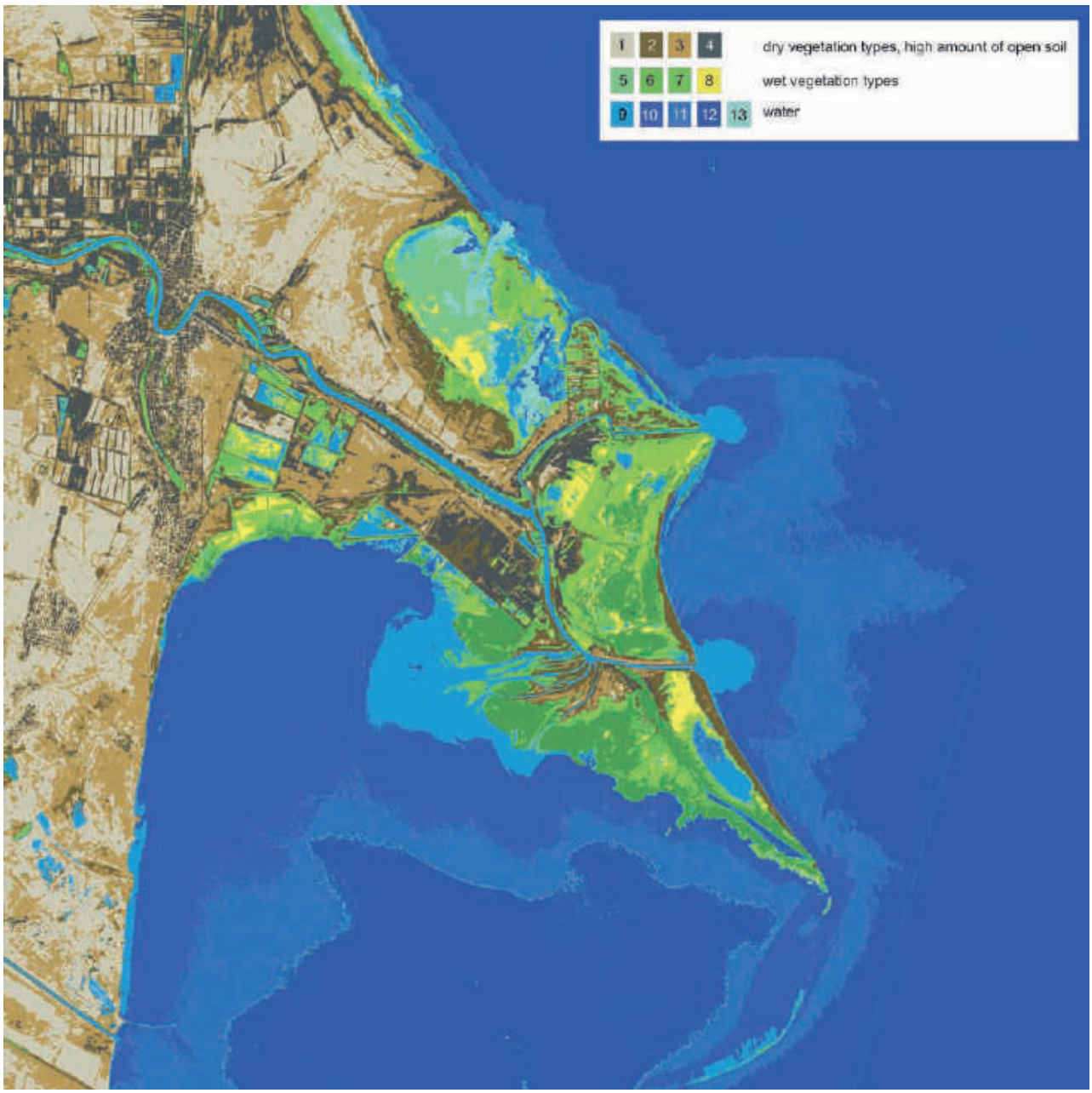
In summer, the reed areas of the delta hold breeding colonies of herons, egrets, ibises and Pygmy Cormorants (NT). The latter accumulate in huge flocks for roosting in the non-breeding season. In late November 2006, more than 3,000 individuals were counted. Other breeding species include Purple Heron, Cattle Egret and Glossy Ibis. In the wide reed areas, Purple Swamphen and Water Rail are common, and Marbled Teal (VU) and Ferruginous Ducks (NT) nest here as well. The reed vegetation is further inhabited by passerines such as Reed Warbler, Great Reed Warbler, Moustached Warbler and Bearded Tit.

In the former fish ponds and on sandbanks along the shore, several waders, gulls and terns nest. In spring 2007, a survey showed that Sandwich Tern (~340 bp) and Yellow-legged Gull (~130 bp) are most common on islands without access for predatory mammals. Among them, Common Tern (~20 bp) and Little Tern (~25 bp) have also been noted. In the former fish ponds and other areas with shallow water and rich underwater vegetation, Whiskered Tern (~65 bp) and White-winged Black Terns (~140bp) were found nesting. Collared Pratincole, Black-winged Stilt and White-tailed Lapwing have been found breeding in small groups.

The semi-desert areas harbour typical breeding bird communities, including Lesser Short-toed Lark and Isabelline Wheatear. In brushy areas, Rufous Bush Robin, Menetries's Warbler, Olivaceous Warbler and Black Francolin are common. In the ruins of the former fish factory, colonies of Lesser Kestrel (VU) can be found and Blue-cheeked Bee-eaters burrow their nesting tubes into soft, dry ground.

Birds: More than 220 wild bird species have been recorded in the Kura delta region, 70 of them are listed in the annex I of the directive 79/409/EEC and 12 species by the IUCN (6 NT, 4 VU, 2 EN). 17 species are included in the Azerbaijan Red Data Book and 94 are of special European conservation concern (11x SPEC 1, 19 x SPEC 2, and 65 x SPEC 3).

In summer the reed areas of the delta hold breeding



Map 11: Partly supervised classification of Spot Satellite Image. Image taken in July 2007.

colonies of herons, egrets, ibises and Pygmy Cormorants (NT). The latter accumulates in huge flocks for roosting in the non breeding season, e.g. in late November 2006 more than 3,000 individuals have been counted. Other breeding species are e.g. Purple Heron, Cattle Egret and Glossy Ibis. In the wide reed areas Purple Swamphen and Water Rail are common and also Marbled Teals (VU) and Ferruginous Ducks (NT) are nesting here. The reed vegetation is further inhabited by passerines like Reed Warbler, Great Reed Warbler, Moustached Warbler and Bearded Tit.

In the former fishponds and on sandbanks along the shore several waders, gulls and terns are nesting. A survey in spring 2007 showed that Sandwich Tern (~340 bp) and Yellow-legged Gull (~130 bp) are most common on islands with no access for predatory mammals. Among them also Common Tern (~20 bp) and Little Tern (~25 bp) have been noted. In the former fishponds and other areas with shallow water and rich underwater vegetation Whiskered Tern (~65 bp) and White-winged Black Terns (~ 140 bp) are nesting. Collared Pratincole, Black-winged Stilt and White-tailed Lapwing have been found breeding in small groups.

The semi-desert areas hold the typical breeding bird communities with Lesser Short-toed Lark and Isabelline Wheatear. In bushes Rufous Bush Robin, Menetries's Warbler, Olivaceous Warbler and Black Francolin are common. In ruins of the former fish factory colonies of

Table 2: Vegetation Formations of Kura Delta according to partly supervised remote sensing classification

	VEGETATION TYPES OF DRY SITES *signatures of dry temporary flooded or overgrazed vegetation types*
1	grazed low growing vegetation on very dry sites, exemplary species: *Salsola crassa, Hordeum murinum* and *Artemisia spec.* typical semi-desert vegetation combination
2	the sandy shore line; dry fish ponds; recently accumulated material in the active delta sparsely vegetated by low growing plants, high amount of open soil exemplary species for the shore line: *Parpaholis incurva, Convovulus persicus* exemplary species for the fish ponds: Salsola crassa, Halocnemum strobilaceum, Kallidium capsicum
3	include inhomogeneous vegetation high amount of open soil, semi-desert vegetation type but temporal floods exemplary species: Juncus acutus, Salsola crassa, Parapholis incurva
4	ruderal vegetation like surrounding of houses shallow flooded fish ponds or shallow flooded surroundings of wetlands highly productive plants like Aeluropus repens and other ephemeral plants
	overgrazed parts of the western island, high amount of Hordeum murinum
	VEGETATION TYPES OF WET SITES *signatures of reeds, with species like Phragmites australis, Schoenoplectus triqueter and Typha spec. and Tamarix spec. Shrubs*
5	some shallow water regions of the northern lagoon, with a sparse reed
6	a dense reed of Phragmites australis, which dominates the wet sites of the delta
7	less dense reeds of Phragmites australis and reeds of Schoenoplectus triquter or Scirpus lacustris
8	sparse cover with reed vegetation of the above mentioned species
	SIGNATURES OF WATER *signatures for sites covered with water*
9	river water big amount of clastic material
10, 11, 12	sea water of different depths
13	main shallow water area of the northern lagoon lake

Lesser Kestrels (VU) can be found and Blue-cheeked Bea-eaters burrow their nesting tubes in soft dry ground.

Up to 70.000 individuals have been counted. Among them are globally threatened species like Dalmatian Pelican (VU) (e.g. 573 individuals in January 2006) and White-headed Duck (EN) in smaller numbers. Flamingos are numerous on migration, with e.g. 1,200 in April 2007 and 620 in November 2007. The highest recent counts of waterbirds occurred in January 2006, with 32,000 Red-crested Pochards and 30,000 Coots. In late November 2006 more than 25,000 ducks, 2,000 Avocets and 7,000 *Calidris* sp. were recorded. Also in early November 2007 high numbers were found, with 17,000 Coots and 5,500 *Calidris* sp.

All over the region, empty cartridges were found, so there is probably regular hunting for waterbirds. Another threat is the disturbance by fisherman and the danger posed by fishing nets.

Amphibians and Reptiles: 4 species of amphibians and 17 reptiles have been recorded in Kura Delta. 3 of them are listed in annex II and 9 in annex IV of the directive 92/43/EEC.

Of special interest is the population of *Testudo graeca*

Photo 21: Old fishing fleet at the mouth of the Kura (S.Schmidt)

(VU), which inhabit all dry areas. Typical species of the semi-desert parts are *Eremias arguta* and *E. velox,* and in ruins and buildings *Cyrtopodion caspius* is common. The wet parts of the fish ponds are inhabited by *Emys orbicularis* and *Mauremys caspica*, as well as *Natrix natrix* and *N. tesselata*. While *Rana ridibunda* is very widespread, *Bufo viridis* is restricted to shallow ponds. *Hyla savignyi* and *Pelobates syriacus* are rather rare in the area.

Human influence: As mentioned above, two of the three outlets into the delta, namely the north-eastern and the eastern, are artificial. During Soviet times, a large number of fish ponds were dug in the northern and the southern part of the delta. However, they were abandoned completely and now form a dense system of rectangular depressions connected by dams. At the moment, depending on their distance from the sea and the depth of dredging, some of the ponds are always filled with water, some of them are periodically dry and others are totally dry, featuring typical semi-desert vegetation.

Close to the bifurcation of the river, a small settlement is situated. The whole semi-desert mainland of the delta is intensely grazed by sheep and cattle. The inhabitants of the settlement also transport their livestock to the island between the northern and the eastern channel. The island is protected by three dikes running north-south to protect the western part from seaward flooding. These dikes and the drainage system have led to desiccation and the development of a semi-desert landscape. Without the dikes, the island would regularly be influenced by spring tides.

Photo 22: Sturgeon sold at the roadside (H.Müller)

Two smaller settlements are located on the island, north and south of the bifurcation. The area of the southern settlement is surrounded by former fish ponds; the surrounding of the northern has hardly any vegetation cover due to the intense grazing. The whole western part of the island is covered with numerous animal tracks. It is drained by a system of channels. Some of them have already fallen dry, others are overgrown with *Phragmites australis* reeds and *Tamarix* sp. shrubs.

The field team had difficulties reaching the north-eastern channel mouth by boat, as the coastal water was densely pervaded by gill nets and/or anchored fishing lines with huge hooks every 50 cm. The gill nets were installed every 25 m.

Significance & protection: Besides Gizilaghaj Bay the Kura Delta is the largest coastal wetland system in Azerbaijan. The delta is essential for the existence of the anadromous sturgeon. Spawning in freshwater and feeding in nutrient-rich, brackish waters of estuaries, the fish needs unlimited access to these areas. Unfortunately, the delta is currently densely blocked with gill nets; especially in the northern channel it is nearly impossible for the fish to slip through.

Recognizing that sturgeon stocks have declined strongly in recent years, the states bordering the Caspian Sea agreed to reduce the combined catch quotas for the six sturgeon species native to the Caspian. The quotas now allow for a 20 % lower catch than in 2005, with reductions of one third for some of the species. The Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) banned the sturgeon export in 2005 and published decreased export quotas in 2007 (UNEP 2008).

According to the MENR, the sturgeon catch quota for Azerbaijan has been reduced from 100 to 92 tons in 2006. This decision was made at the session of the Caspian Sea Commission on Natural Resources in

Astana. The export quota on caviar was reduced from 6.7 to 6.5 tons (Caspian Environment Programme 2008).

The figures show that Azerbaijan is not the main player in catching sturgeon. Nevertheless, the country has a great responsibility as it contains the most important spawning areas in the entire Caspian. To secure the reproduction of these valuable fish, it is essential to reduce the nets on the main migration routes so that the sturgeons will be able to reach their spawning grounds. Strict prohibition of poaching and an effective control system should also become mandatory in all neighbouring states.

Especially for birds, the area is of high value and qualifies for becoming a strictly protected area. The region has an immense importance for resting and wintering waterbirds, mainly ducks and waders, and in addition large numbers of birds breed here. Among them are many species of international conservation concern in high numbers. Up to 70,000 individuals have been counted. Among them are globally threatened species such as Dalmatian Pelican and White-headed Duck in smaller numbers.

Hunting is very common, especially in winter and migration time, and is the main threat to birds. It should at least be severely restricted. Also, the intensive fishing activities are threatening the birds through disturbance and also through the danger posed by the fishing nets that cover all water bodies of the delta.

Furthermore, a constant monitoring of the avifauna should be established as only little information about actual numbers of birds is currently available.

A river delta is an ecosystem of high dynamics. The Kura River delta dynamics are restricted to the southern part of the delta, where the river has found a breakthrough apart from the artificial channels. The remaining areas of the delta are drained, grazed and partly settled. Contrary to the Volga River delta, the Kura delta represents a unique combination of semi-desert and wetland ecosystems in the battle zone between land and sea.

In general, due to the present state of the Kura Delta any establishment of a protected area will be very challenging. Although the vegetation is of minor importance, the importance for bird migration and breeding is high, as is the importance for the survival of sturgeon. At least in parts, an active delta dynamic should be accepted and continuous deepening or construction of channels will further deteriorate the condition of the delta. The establishment of a conservation area, such as a biosphere reserve, could assign clear limits to human use – although the efforts for conservation will be enormous.

Minimum requirements for any improvement of the ecological situation should be:

- The density of gill nets around the whole delta should be reduced in order to guarantee free passage for the sturgeons to their spawning grounds.
- In consideration of the development of sturgeon stocks, a total ban on fishing in the entire delta should be considered.
- In order to allow better dynamics, some of the dikes on the delta island should be deconstructed.
- Pasturing on the delta island should be limited.
- The hunting of birds should be prohibited and regular counts established

2.2.3. Islands of the Caspian Sea

Until now, the coastal areas of Azerbaijan are under-represented within the country's PA system. Although Absheron National Park and Gizilaghaj Zapovednik are located along the coastline, the former does not include any coastal waters and the latter only includes a bay and not the open sea. This, however, is strongly recommended and it is advised to choose the coastal part north of the Kura due to:

- Occurrence of various islands of different geological geneses
- Occurrence of sturgeon along its migration route into the Kura river
- Less densely settled areas at the coast
- Occurrence of Caspian Seal south of the Kura mouth is limited and numbers are low compared to the northern Caspian

In the following, a range of islands are presented in detail. As part of the project, all accessible islands have been investigated by the national team (Table 3). Out of these, the authors recommend to strengthen protection measures for the following:

Table 3: Overview about all islands investigated

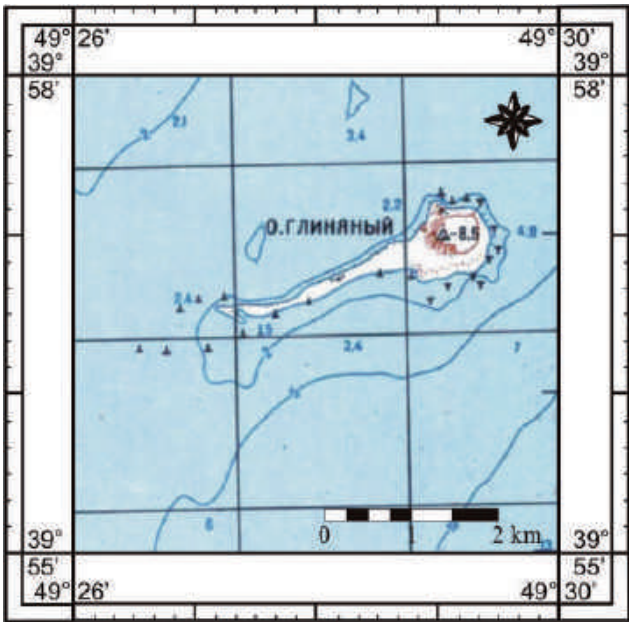
	Name	bird species/ counts 2007	nr. of plant species	herpetologic species	mammals	geology	Alteration
Absheron Archipelago	Pirallahy	99/-	20	-	-	sand-limestone	↑
	Boyuk Tava east	7/827	26	1	1 † of Phoca caspica	shell limestone	↓
	Boyuk Tava west	8/171	24	1	1 † of Rattus spec.	sand-limestone shell limestone	↓
	Podplitochniy	2/78	-	-	-	sand-limestone shell limestone	↓
	Kichik Tava	6/894	12	3	-	sand-limestone shell limestone	↓
	Koltish	3/76	-	-	-	sand limestone	±
	Dardanelly	2/40	8	-	-	shell limestone	↓
	Yal	2/38	1	-	Phoca caspica swimming	sand limestone	↓
	Jilov	6/15	34	4		sand limestone	↑
	Garabattag	3/92	-	1	-	shell limestone	↓
	Suiti- Absheron NP	15/277	24	3	Phoca caspica, Canis latrans	shell sand	↓
Baku Archipelago	Böyuk Zire	-	-	-	-	shell limestone, sand	↑
	Dash Zire	-	-	2	-	shell limestone, sand	↑
	Tava	-	-	-	-	shell limestone, sand	↑
	Islands on deep water jacket factory	7/103	34	1	-	sand, clay	↑
	Chigill	5/~3400	25	5	1 † of Phoca caspica, Oryctolagus, Cuniculus	silty clay, clay, shell limestone, gravel	↓
	Zenbil	9/885 (lot of †)	-	-	-	silty clay, shell limestone	↑
	Dashlar	6/107 (lot of †)	24	-	2 † of Phoca caspica	sand-limestone shell limestone	↑
	Xara Zira	13/63	20	3	Gazella subgutturosa, Oryctolagus, Cuniculus	clayey silt, shell sand	±
	Gil	2/	58	2	-	clays, loam, gravel, sand	↓
	Baburi	8/306	24	1	1 Felis sylvestris cattus, 1 † of Phoca caspica	shell limestone, shell sand	↓
	Gutan	2/116	11	1	Oryctolagus cuniculus	shell limestone, shell sand	↓
	Sangi Mugan	5/21	-	-	Oryctolagus cuniculus	silt, sand	±
	Garasu	2/1504	-	-	Oryctolagus cuniculus	silt, sand	↓
	Kur Dili	28/962	-	7	Oryctolagus cuniculus	sand, gravel	±

2.2.3.1. Gil (Glinyaniy)

Location: The island Gil (N 39°56'56", E 49°29'00") belongs to the archipelago of Baku and is situated about two kilometres before Älät.

Landscape characteristics: The island covers about 70 ha and consists of a recently active, 25 m high mud volcano and a flat, narrow tail of maritime sediments. In all, it is about four kilometres long. On the spit of land, a little lagoon with changing water levels is embedded between two walls of sediments. The mud volcano is about 700 m wide, the spit only 10 to 50 m.

Climate: Climatic conditions are semi-arid with hot, dry summers and mild winters. The highest mean temperatures at the climate station of Baku are measured in July (30.6°C) and the lowest in January (2.1°C). The annual precipitation is about 210 mm.



Map 12: Gil Island

Soil: The mud volcano extrudes mineral-rich clay and loam that promotes the accumulation of salt. Two walls, ca. one metre high, run parallel to the beach on the spit of the island. They consist of sand and gravel, which prevents the upper soil horizons from high salt accumulation.

Vegetation: Because of salt accumulation, conditions on the slopes are very hard for plant life. The upper slopes and the caldera are sparsely covered by *Salsola dendroides* and single shrubs of *Halostachys caspica* near the mouth of the volcano. At the beginning of May, thick covers of salt-resistant annuals like *Lepidium perfoliatum*, *Tetradiclis tenella*, and *Anthemis candidissima* flower on the mildly inclined middle slopes. On the wetter lower slopes, plant communities are dominated by *Urtica urens* and *Malva neglecta*.

On the spit, a species-rich community of predominately annuals such as *Anisantha rubens*, *Sencecio jacobea* and *Erodium cicutarium* is typical. Even some *Tamarix* shrubs grow here. At the edges of the flat lagoon, a few halophytes like *Salicornia europea* and *Petrosimonia brachiata* can be found. The gravel beach is covered by *Convolvulus persicus* and *Tournefortia sibirica*, plants restricted to the Caspian shore in Azerbaijan.

Fauna: More than 250 pairs of Yellow-legged Gull (*Larus cachinnans*) and a few Kentish Plovers (*Charadrius alexandrinus*) breed here. During the investigations, Chiffchaffs (*Phylloscopus collybita*) and three European Curlews (*Numenius arquata*) were detected in the tamarisks. The lagoon offers habitat for numerous Dice Snakes (*Natrix tessalata*) that hunt in the shallow waters around the island. In the mid-1970s, European Rabbits (*Oryctolagus cuniculus*) were brought to Gil (oral comm. local citizen) and survived the annual summer droughts until today. Rabbit holes are marked by nitrophilous plants such as *Beta vulgaris* and *Malva neglecta*.

Human influence: Some bullet casings were found and it is assumed that rabbits and birds are hunted on the island. Fishermen from Älät pick up the eggs of the Yellow-legged Gull for eating. Since Gil is not used for agriculture, it contains a near-natural vegetation only grazed by rabbits.

Significance & protection: Gil is a more or less undisturbed and unused island and therefore has suitable conditions for nesting birds. It has a protection

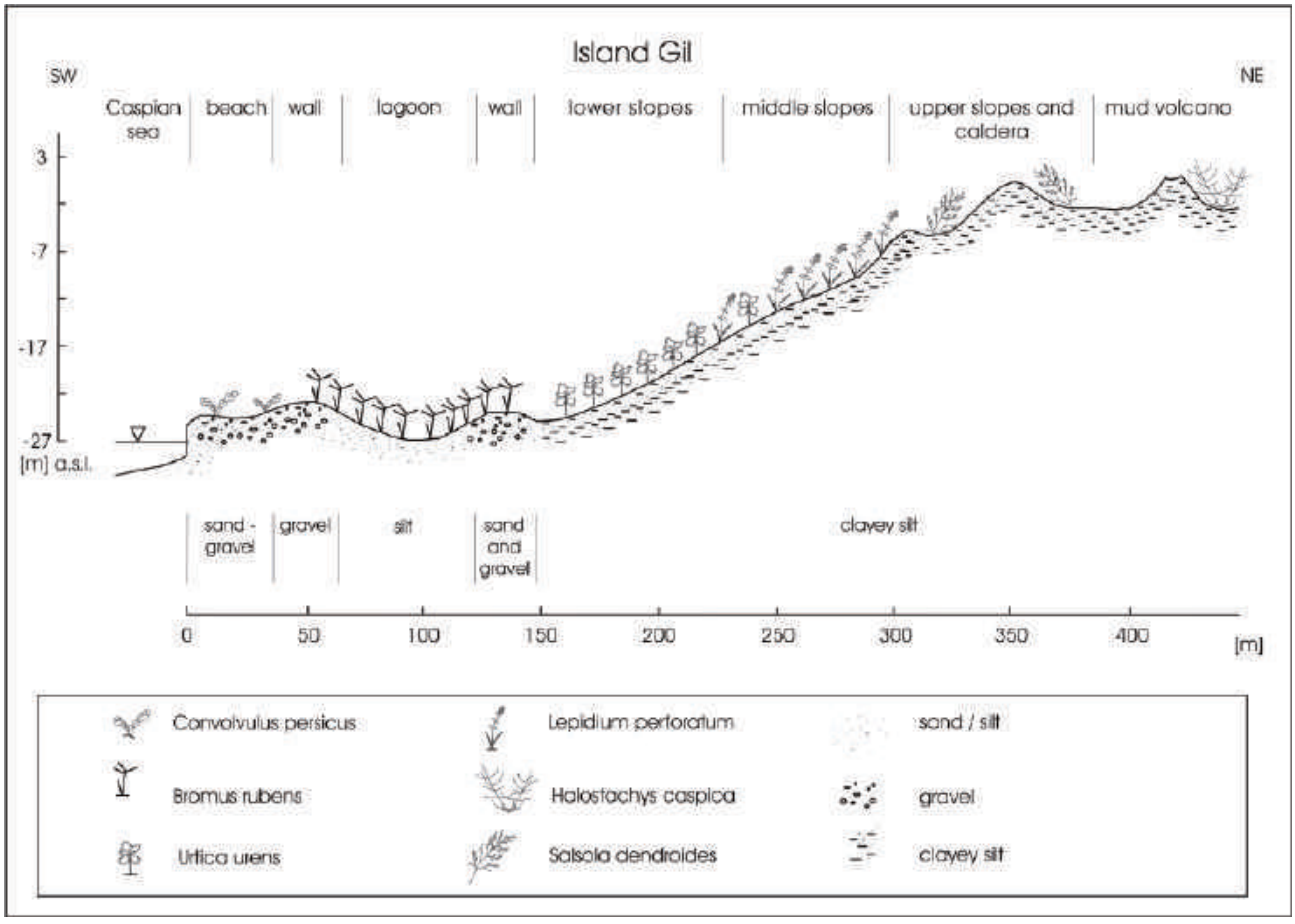


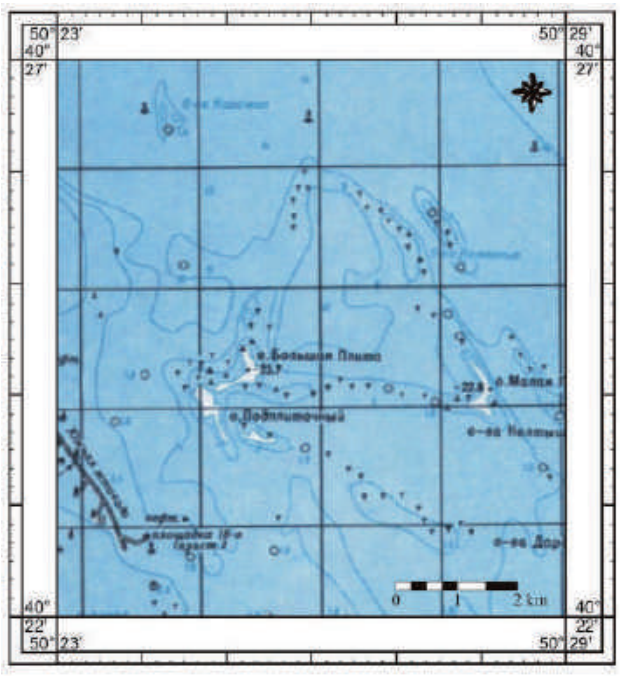
Fig. 9: Cross Section of the Island Gil

status as a bird sanctuary, which was established especially for the protection of the breeding colony of Yellow-legged Gulls.

The goals of conservation should be the preservation of the undisturbed vegetation of Gil and the breeding sites of birds. In order to reach these goals, the building of holiday houses and hunting of birds and rabbits need to be prohibited. The population of rabbits is regulated by summer droughts, so an artificial regulation by hunting is not necessary.

2.2.3.2. Boyuk Tava (Bolshaya Plita)

Location: Boyuk Tava is located at N 40°24'05", E 50°24'16", approximately six kilometres before the head of the Absheron Peninsula. Due to a rising sea level over the past decades, the island is divided into two parts. Together they cover an area of 60 ha.



Map 13: Boyuk Tava Island

Landscape characteristics: Both parts presently lie about two metres above the Caspian Sea level. The former connection between the islands is now a shallow water zone with rocky or sandy ground. Both islands are composed of uplifted shell limestone agglomerated with gravel. The limestone shelf is not oriented in a specific direction and shows sharp cuts and distortions. A cliff of approximately four metres in height is situated at the north-western edge of the western island. The bare stones are polished by seawater and wind. The southern part of this island is flat.

The eastern and southern shore of the eastern island are made up of shell sand. On the southern edge, shell sand

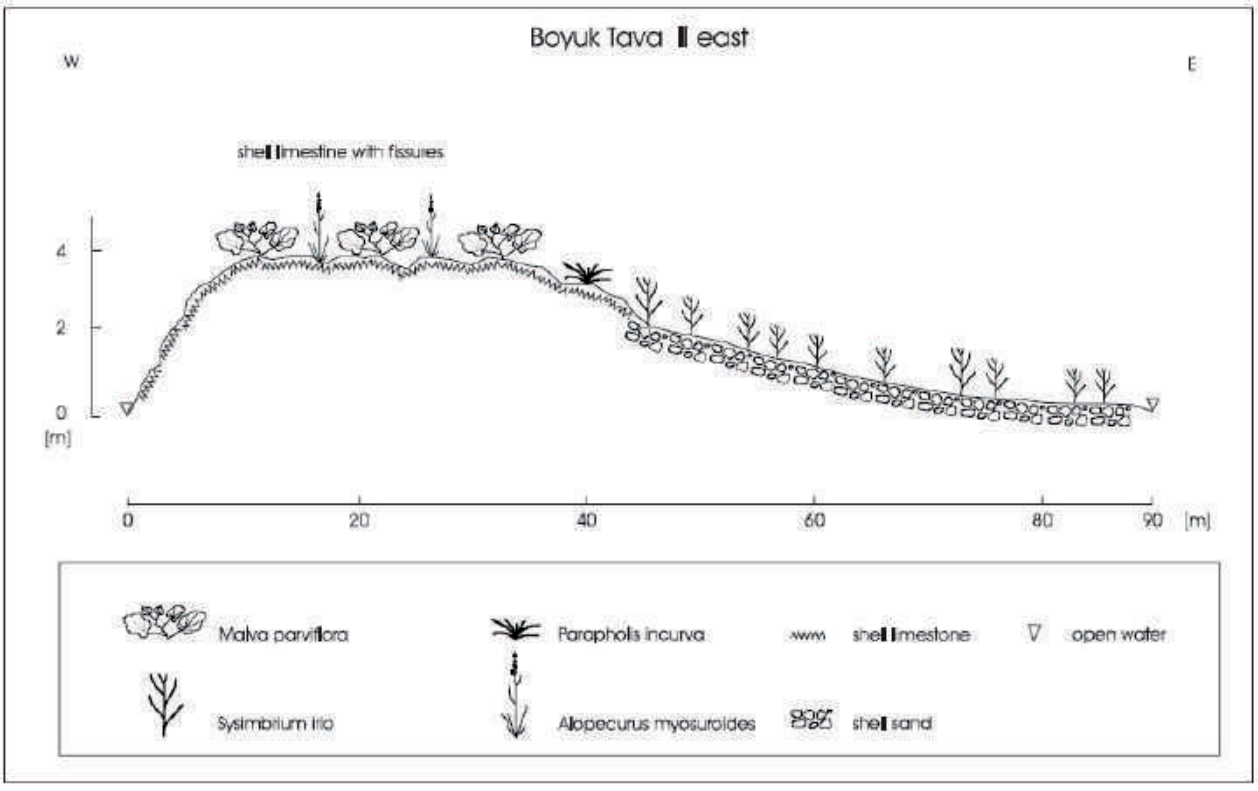


Fig. 10: Cross section through eastern part of island.

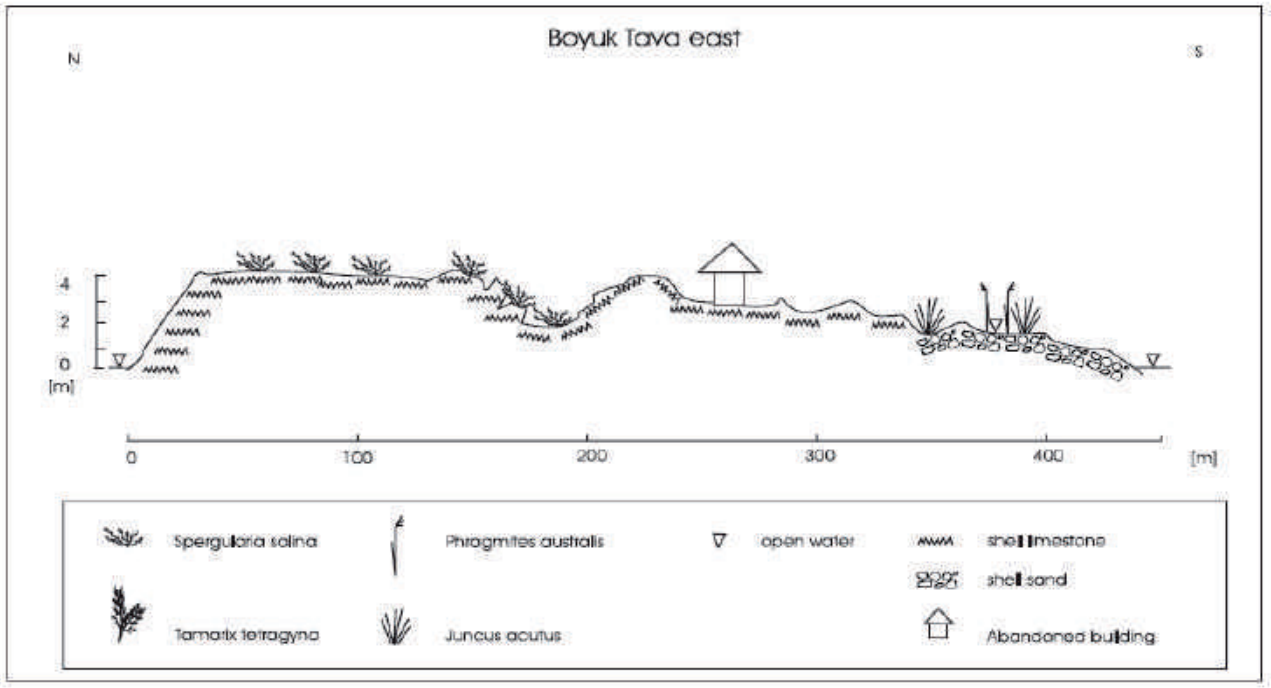


Fig. 11: Cross section through eastern part of island.

builds dune-like formations. Between these "dunes", small lagoons are embedded. Shell sand also covers the limestone in the central part of the island. Bare limestone shows spotty Tafoni weathering of approximately 30 cm in diameter.

Soil: The two islands are covered by shell limestone and shell sand. Soil development is still in an initial stage.

Vegetation: The vegetation cover depends on substrate. The shoreline is sandy on both islands and covered with a combination of *Argusia sibirica* and *Spergularia salina*. Bare limestone dominates the eastern island and the ruderal areas. The cracks in the otherwise bare limestone are colonised by *Parapolis incurva* and *Malva parviflora*.

A small, unused hut stands in the southern part of the eastern island; its surroundings are covered by ruderal flora, e.g. *Rubus fruticosus*.

Fauna: High numbers of breeding Yellow-legged Gulls (750 bp east island) were recorded on both islands, together with smaller numbers of breeding Common Terns (4 bp each island), Rock Pigeons (*Columba livia*) (4 bp east, 2 bp west) and Ruddy Shelduck (*Tadorna ferruginea*) (2 bp east). Also, high numbers of Dice Snake were observed hunting.

Human influence: Both islands were utilised, and even periodically inhabited, by fishermen several years ago. While on the eastern island only decaying fragments of a house remained, a proper wooden hut still exists on the western part of Boyuk Tava. This hut is frequently visited by fishermen; camping equipment is located inside. Human debris can be found around the hut. Towards Pirallahi island, power lines and old, defunct drilling platforms are in medium distance to the island.

According to the crew of the expedition vessel, spear hunting regularly takes place around the island. Fishing nets were installed in the shallow waters between both parts of Boyuk Tava.

Significance & protection: The islands are

Photo 23: Coast line of Boyuk Tava. (N.Agayeva)

small and subject to only very little anthropogenic influence. At present, fishing takes place around the islands, but away from the fishing hut, disturbance is considered low.

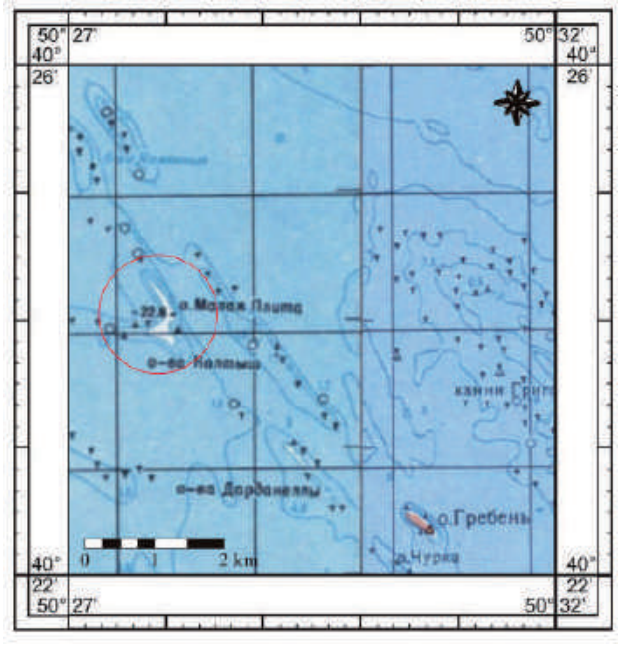
Boyuk Tava is one of the best examples for the various landscape formations that can be found on the coast of the Caspian. The relatively flat island - maximum elevation is four metres above the present sea level - is threatened by the rising sea level. Several geological features and their corresponding vegetation, the direct impact of the sea level dynamics and only limited human influence are valuable assets of Boyuk Tava in contrast to other islands.

The inclusion of these islands into the protection regime of Absheron National Park is advised. Little alteration, high biodiversity value and geological dynamics should be safeguarded.

2.2.3.3. Kichik Tava (Malaya Plita)

Location: Kichik Tava (N 40°23'55.7", E 50°27'56.3") lies about 10.5 km before the head of Absheron Peninsula. It covers about four hectares.

Landscape characteristics: The basis of the island is formed of shell limestone, enclosing other, more compact rocks. Most of the bedrock is covered by shell sand, although bare stone with deep cracks of about 1.5 m dominates the northern part of Kichik Tava. This west-east oriented stone ridge is surrounded by large shell accumulations. The south-south-eastern part of the island is dominated by flat shell ridges, which form undulating walls. The central part of the island holds a little water-filled basin, surrounded by shell sand.



Map 14: Kichik Tava Island

Photo 24: Coastline Kichik Tava. (N.Agayeva)

Soil: The island consists exclusively of shell limestone and shell sand.

Vegetation: There is a sparse vegetation cover of typical species such as *Argusia sibirica* and *Spergularia salina* on the shell sand walls. The small lagoon in the centre of the island is populated by *Phragmites australis*; the shell limestone is covered among others by *Malva parviflora*, *Sonchus oleraceus* and *Paraphotis incurva*.

Fauna: The island is used as breeding habitat by Yellow-legged Gull (820 bp), Ruddy Shelduck (3 bp), Great Black-Headed Gull (*Larus ichthyaetus*) (1 pb) and others. Yellow-legged Gull dominates in numbers.

Human influence: No direct human impact could be recognised.

Significance & protection: Kichik Tava is a small island without any direct disturbance by humans. An increasing human impact is not to be expected in the near future. The large shell accumulations on Kichik Tava are singular among all islands visited. It is important to conserve this area as it functions as breeding ground for the Yellow-legged Gull.

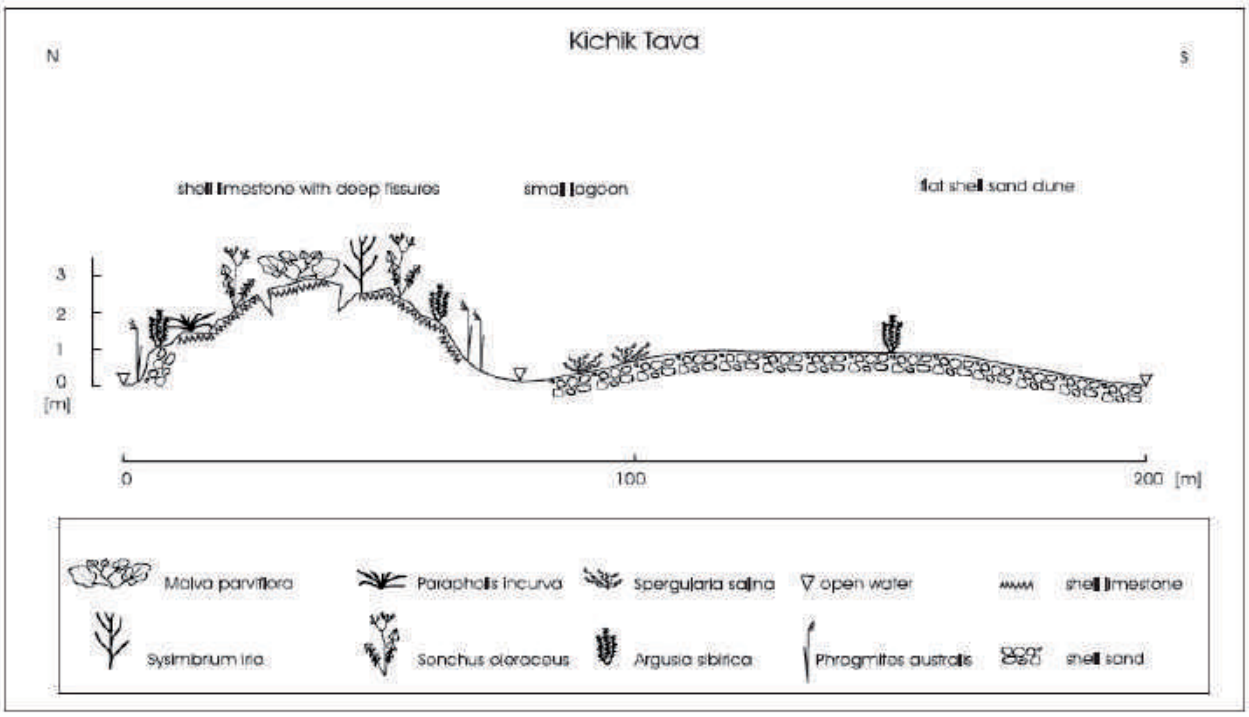
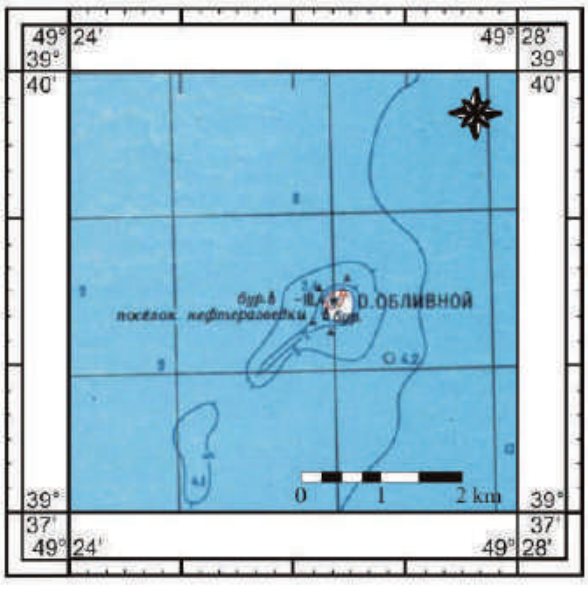


Fig. 12: Cross section through central part of Kichik Tava

2.2.3.4. Chigill (Obliwnoi)

Location: Chigill island (N 39°38'27", E 49°26'21") is situated about nine kilometres before the coast of Shirvan National Park. It covers an area of ca. 15 ha.



Map 15: Chigill Island

Landscape characteristics: The island is dominated by two different geomorphologic processes. The north-eastern part is dominated by volcanic activity and the western and south-eastern parts were tectonically uplifted from the sea surface. Therefore, the substrate in the north-eastern part is younger than in the western and south-eastern parts.

A cliff of 60 to 70 m height is situated on the western edge of the island. Its face is marked by deep and broad cracks that are the result of solution processes. A temporarily active mud volcano lies in the northeast; its caldera has a diameter of about 120 m. Concentric walls and sinks of silty clay form the caldera. Three active phases can be distinguished from the sedimentation pattern around the volcano mouth. The caldera is elevated about 30 m above the Caspian Sea level. The lava drops in an easterly

Photo 25: Chigill Island from the Sea. (N. Agayeva)

direction.

Between the western and the eastern part lies a depression with three small, active mud volcanoes. They measures less than one metre in diameter. The depression is filled with a mixture of mud and material that eroded from the clay wall in the west. In the east, it opens to a beach-like terrace. This open area is about 120 m wide at its maximum. The remaining shore of the island is rocky.

Soil: The tectonically uplifted part is composed of clay in the west and shell limestone in the southeast. The substrate extruded by the volcano is silty clay. Gravel can be found on the beaches.

Vegetation: The plant cover varies distinctly in the different parts of the island. The vegetation on the high plateau is poor in species, dominated by *Malva parviflora* and *Salsola dendroides*. Its soil is well fertilised by the excrements from a Yellow-legged Gull colony.

Around the mud volcano, the predominant vegetation consists of halophytic plants such as *Halocnemum strobilaceum* and *Salsola dendroides*, but they apparently suffer from the extremely acid excrements of the gulls. The poor vital status of these halophytic plants, especially *Halocnemum strobilaceum*, leads to the assumption that the population of gulls has rapidly increased over the past years.

The slopes of the plateau are covered by patches of *Spergularia salina* and *Salsola dendroides*. The narrow and block-rich shoreline is sparsely vegetated by pioneers such as *Atriplex* sp. and *Lolium rigidum*. The beach in the eastern part of the island with its gravel sediments is lightly covered by *Calendula persica* and *Alopecurus myosuroides*.

Fauna: The whole island is densely populated by Yellow-legged Gulls (*Larus cachinnans*). Their nests are scattered all over the island; they concentrate especially on the sea terrace, the lee area of the mountain in the east, and the plateau meadow.

During the visit of the field team (May 2007), nests with eggs and chicks of maximally three weeks of age were found in high numbers. About 3,500 adults were taking care of clutches and chicks. Dice Snakes colonise the entire shoreline in high numbers. Furthermore, a huge amount of rabbit droppings was found.

The discovery of two carcasses of the Caspian Seal (*Phoca caspica*) indicates that these animals probably use the island as a resting place.

Human influence: On the island is a non-working, derelict navigation light. The energy for the light used to be provided by batteries installed on the south-eastern slope of the mountain. The shore is littered with jetsam, such as plastic and glass bottles. Only few people lived on the island for a limited period of time, probably in order to build and operate the lighthouse or for fishing.

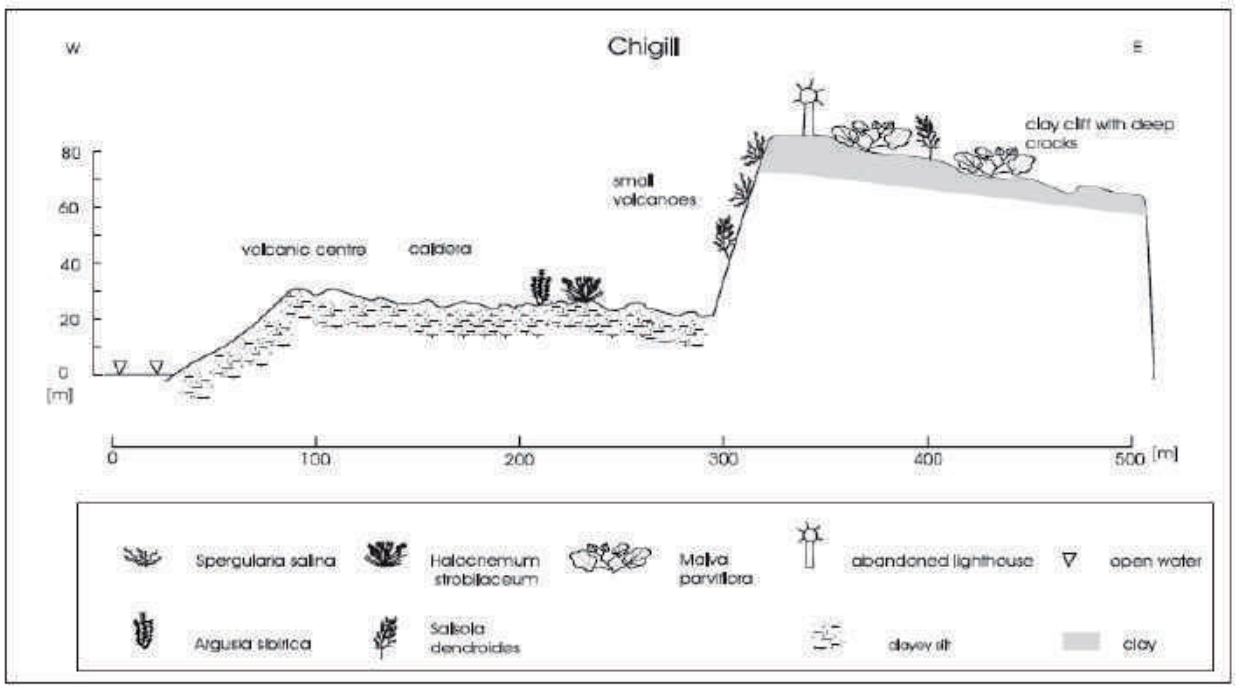


Fig. 13: Cross section through Chigill Island.

Approximately 100 m southwest of the lighthouse, an old platform on iron stilts is densely populated by 120 to 150 breeding pairs of the Great Cormorant (*Phalacrocorax carbo*).

Significance & protection: Apart from the area around the abandoned lighthouse, human interference is low on Chigill. Compared to 1996, the number of gulls has increased in 2007.

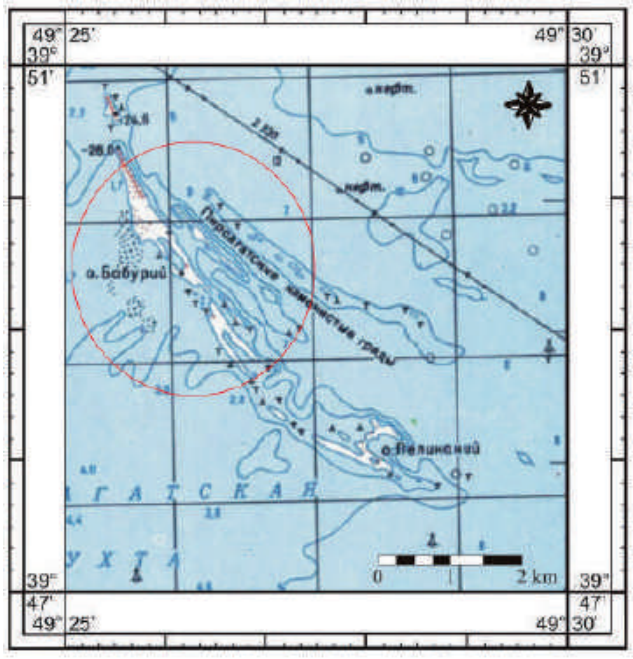
Due to its geological variety, Chigill is very impressive. Active mud volcanism, various landscape elements and only little alteration present rare and valuable characteristics. The island is or has been visited by the Caspian Seal; sturgeon pass by on their way to the nearby Kura River, and a breeding colony of Yellow-legged Gulls exists on the island.

The natural values of the island and its proximity to Shirvan National Park make it highly advisable to include the island into the protected area. Apart from the protection of mud volcanoes and breeding colonies, this option would also allow to include a strip of coastal waters into the protection network of Azerbaijan.

2.2.3.5. Babur (Baburii)

Location: Babur (N 39°59'52", E 49°25'54") is located 2.2 km before the coast south of the settlement of Älät. It consists of several smaller islands and has a total area of 3.4 ha.

Landscape characteristics: The island consists



Map 16: Babur Island

Photo 26: Babur Island (N.Agayeva)

of two parallel, slanted shell limestone plates partly covered with shell sand. Together with Gutan and Sangi Mugan, Babur forms a chain of islands.

On a length of approximately two kilometres, different types of landscape, including lagoons, bare stone ridges and shell beach, lie close together. The ridges rise about 2.5 m above sea level, and the lagoons have a size of several hundreds of square metres. The shell limestone plate in the southern part of the island shows Tafoni weathering.

Soil: Babur consists entirely of shell limestone and shell sand.

Vegetation: The shore of the island is populated by *Argusia sibirica* and *Spergularia salina,* as is typical on Azerbaijani shores. On the limestone sites, grasses such as *Antsantha rubens* and *Alopecurus myosuroides* dominate, accompanied by *Argusia sibirica*. In the lagoons, typical wetland reeds occur, such as *Phragmites australis* and *Scirpus lacustris*. Due to the small-scale mosaic of lagoons, bare rock and beaches, the respective vegetation types also alternate over short distances.

Fauna: The island accommodates seven breeding bird species, e.g. the Yellow-legged Gull (110 bp), which is dominant, the Common Tern (57 bps), and the Collared Pratincole (27 bp). It is a resting place for the Great Cormorant. Huge numbers of Dice Snakes could also be recorded.

Human influence: The southern part of the island displays huge oil spots on the rocks. They come from the numerous drilling platforms on the shore of the Caspian Sea.

In former times, the island was important for its population of the Mediterranean Gull (250 bp in 1996).

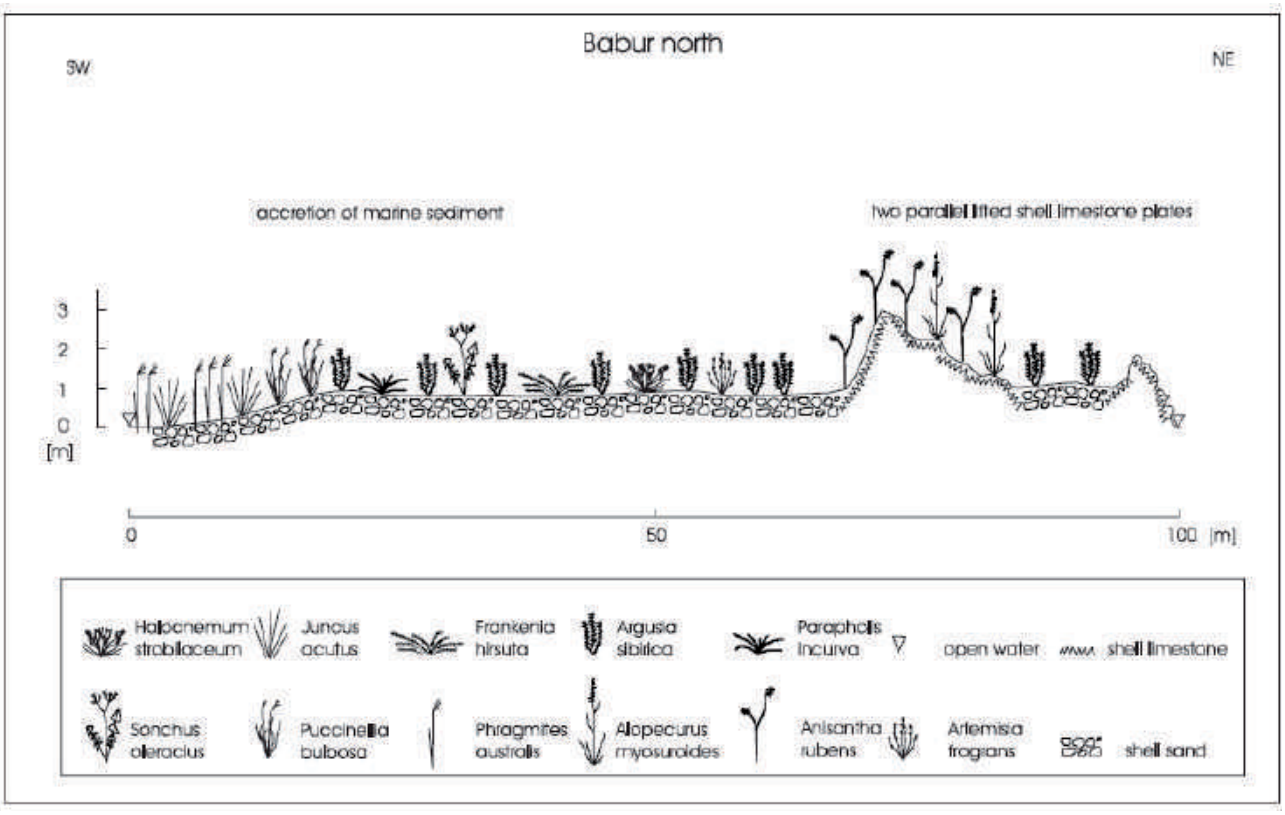


Fig. 14: Cross section through Babur Island

It was also an important breeding area of the Slender-billed Gull (about 550 bp, Patrikeyev 1991) and many other species. The situation severely deteriorated after the introduction of cats to the island. Currently, the longest part closest to the coast is almost completely vacated by the gulls. Some breeding species still occur on the completely separated parts of the island which are made up of rocks with sandy spits. Mediterranean and Slender-billed Gulls do not breed here anymore.

Significance & protection: Unless there were other, hitherto unknown interferences, the feral cats were likely responsible for damaging the breeding communities of birds on the island. Except for the introduction of cats, the island seems hardly disturbed by humans. Due to this fact, a great variety of landscapes has been preserved and should be kept preserved and carefully managed in the future.

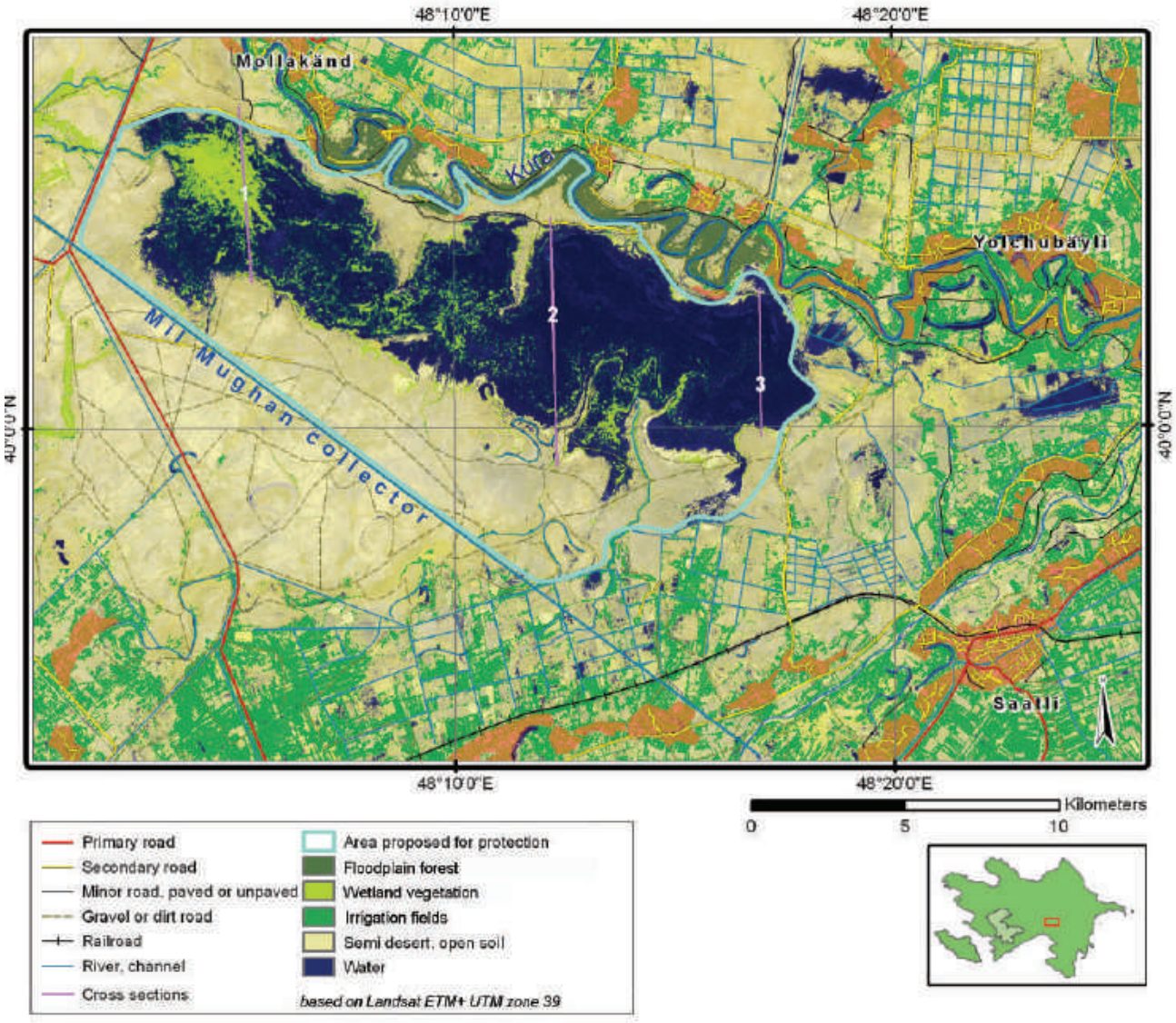
2.3. Lowlands

The lowland of Azerbaijan is densely populated and intensively used. Formerly covered by the Mil, Mugan and Shirvan steppes, the rather high soil productivity led to intensive agricultural programmes during collectivising. However, characterised by arid and hot climatic conditions, high output rates of agrarian products depend on irrigation in the lowland. As a consequence, only small portions of the lowland remain in a natural state and harbour biodiversity worthy of protection.

2.3.1. Sari Su wetland

Location: Lake Sari Su (40°00' E, 48°10' N) is one of three big steppe lakes in the Central Lowlands; the three lakes are connected by natural streams and artificial channels. The lake's area of open water measures around 67 square kilometres. Sari Su is bordered in the south by the Mil Steppe and in the north by an artificial dam and the narrow floodplains of the Kura River.

Landscape characteristics: Numerous old river branches indicate the former existence of a big floodplain with reeds, *Tamarix* sp. scrubs and Poplar forests near the confluence of Araz and Kura (map Sari Su). The steppe lakes in the Central Lowlands were once connected to the Kura.



Map 17: Supervised satellite image classification of Sari Su region. Based on Landsat 7 image

Today, Sari Su is mostly artificially supplied with water and has no outlet. According to the inflow, the water level fluctuates approximately 0.5 m as it does in Aghgöl (Strauss 2005). The fluctuation results in a broad belt of temporarily flooded areas.

Climate: Lake Sari Su is situated almost directly in the middle between the climate stations of Yevlakh (15 m a.s.l.) and Salyan (-21 m a.s.l.) and has a semi-arid climate. It can be assumed that temperatures and precipitation in the investigated area are similar to the values measured by those two stations. The highest mean temperatures occur in July (33-34°C) and the lowest in January (about -1°C). The annual precipitation amounts to 300 till 340 mm, with a dry period in summer. The drought in summer causes water to ascend within the soil, which leads to salt accumulation.

Soil: The annual fluctuations of river discharge are likely to hinder the formation of peat (Thiele et al. 2008). Both the quoted study and the present investigation failed to detect the presence of peat. The Sari Su region is characterised by organic-rich swamp soils (Volobuev 1953, Geodisija Komitet: Soil Map of Azerbaijan 1992). Silty clay with gypsum and salt crusts predominates. The main soil types are Gleyic Solontschaks and Mollic Gleysols on sites with no supply of groundwater. Salt accumulation occurs especially in compacted soils.

Vegetation: South of the lake, the land lowers almost imperceptively towards the water, which causes a sequence of habitats with different groundwater conditions (fig Sari Su). The groundwater level is the determining factor for the vegetation characteristics. South of the collector, halophytes dominate, e.g. *Petrosimonia brachiata, Salsola crassa* and *Salsola soda*.

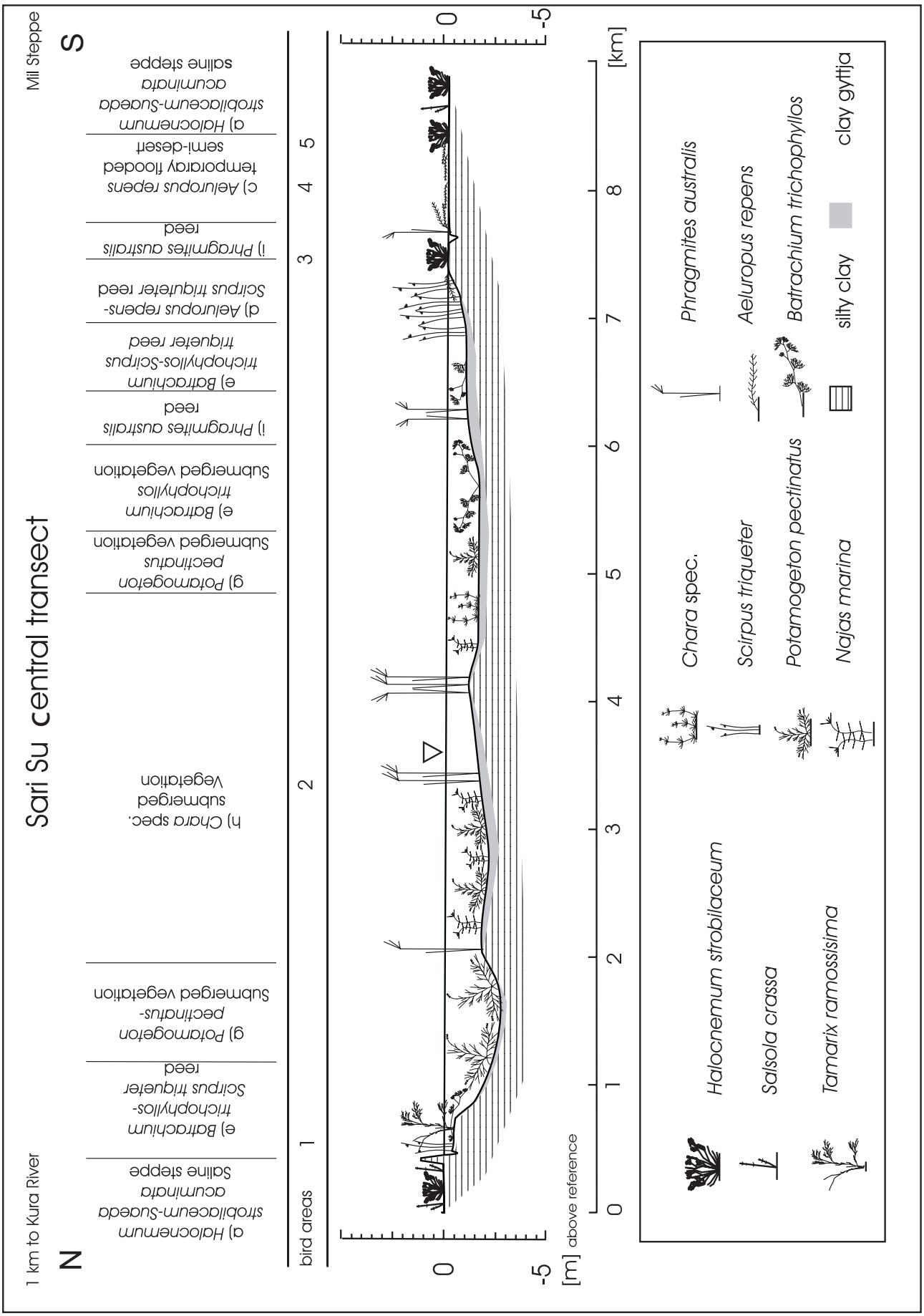


Fig. 15: Cross section through central part of Sari Su

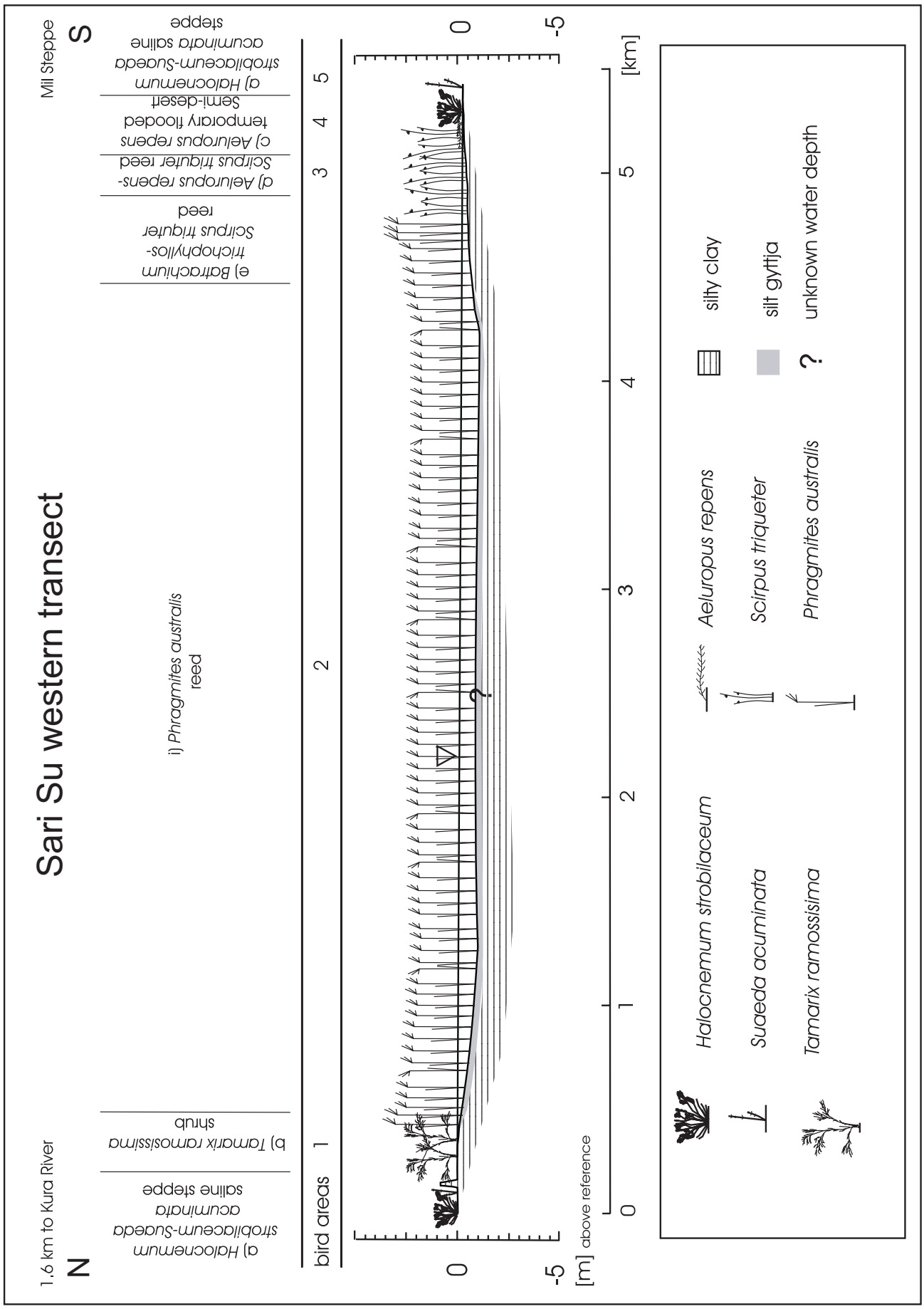


Fig. 16 Cross section through western part of Sari Su

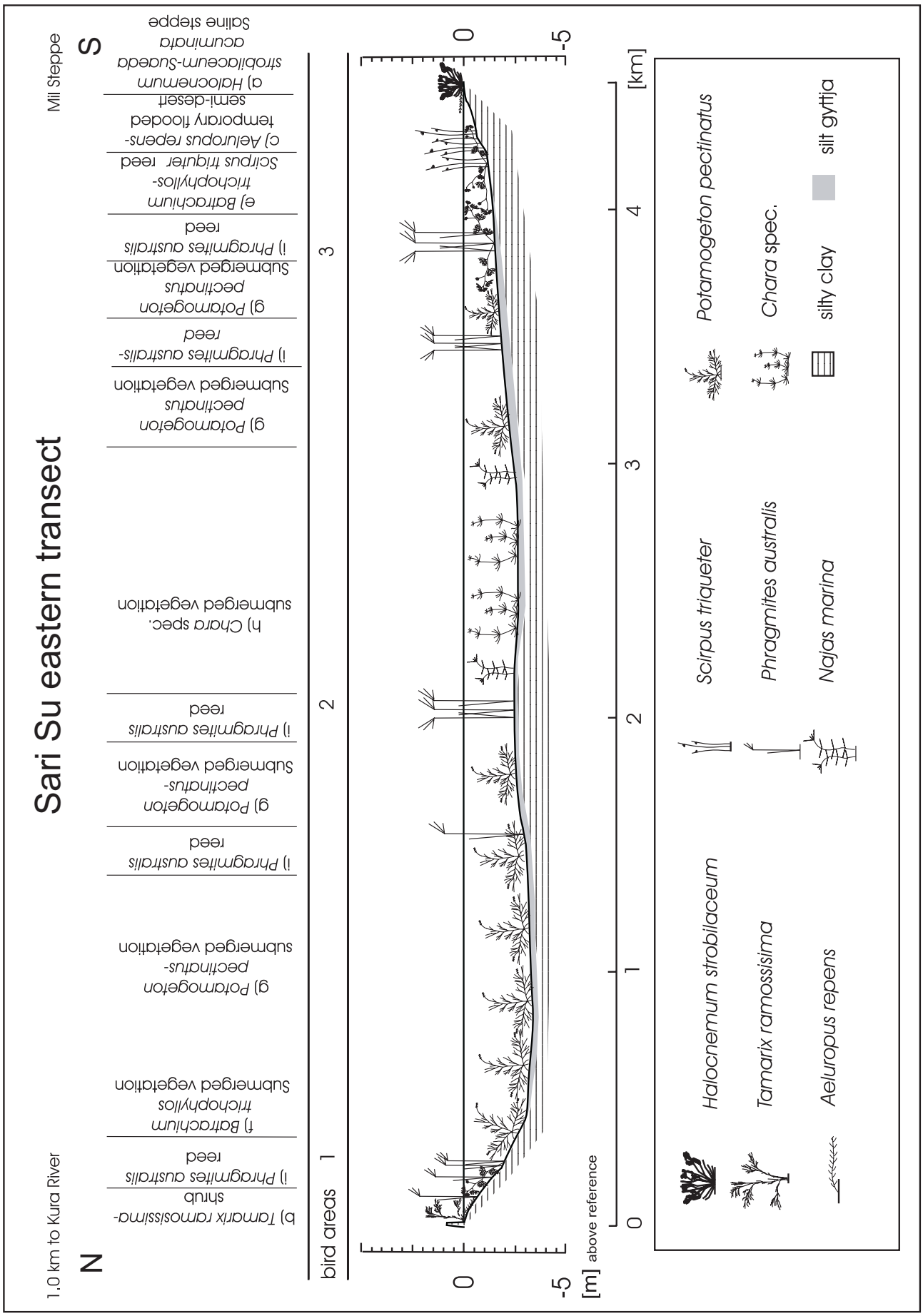


Fig. 17: Cross section through eastern part of Sari Su

Photo 27: Lake Sari Su. (S.Schmidt)

North of it, shrubs such as *Tamarix* sp. and *Halostachys caspica* occur as well. Near the lake, when the groundwater level is high enough, wetland vegetation appears. In the western, central and eastern parts, the lake shows the vegetation types described below (Fig. 15 - Fig. 17)

a) *Halostachys caspica - Suaeda acuminata* saline steppe: This vegetation type occurs almost everywhere around Sari Su on calcareous silty clay and clayey loam without flooding. It is typical for saline soils (Solonchaks). With approximately six species and a high proportion of open soil (pict. 4) it is obviously highly influenced by grazing.

b) *Tamarix ramosissima* scrubland: This vegetation type mainly occurs on the northern bank of the lake, directly associated with the artificial dam. With an average of barely 11 species it is the most species-rich habitat in the area. The northern lake shore is steeper, flooding proceeds more abrupt and the water runs off quicker than on the southern shore. *Tamarix ramosissima* scrubland was found on calciferous loam with high humus content and on clayey loam. The water stood up to two centimetres over ground during the investigation.

c) *Aeluropus repens* temporarily flooded semi-desert: The vegetation shows typical species of saline steppes, such as *Alyssum turkestanicum* and *Halostachys caspica* and typical wetland species such as *Scirpus triqueter* and *Zanichellia palustris*. It is relatively poor in species (~6 species) and can be assumed to be a transitional vegetation type occurring on periodically flooded sites. The water was up to 40 cm above ground during investigations, though water levels can change within short periods. The water stagnates or moves slowly and the evaporation is high during summer.

d) *Aeluropus repens - Scirpus triqueter* reed: This vegetation type occurs on sites with dynamic water tables; 10 to 68 cm above ground were measured. It shows an average of six species. The reeds fall dry when the water supply decreases and evaporation is high.

e) *Batrachium trichophyllos - Scirpus triqueter* reed: These reeds indicate permanently flooded sites and were found in places with a water depth of 30 to 120 cm. They cover areas of the southern shore bordering the *Phragmites* reeds and some small islands. Barely three species occur here on average.

f) *Batrachium trichophyllos* submerged vegetation: This type is scattered between the *Scirpus triquter* and *Phragmites australis* reeds and needs permanent flooding; 30 to 165 cm water depth were recorded. *Batrachium trichophyllos* prefers water depths of 30 to 80 cm in Sari Su; deeper waters are populated by *Potamogeton pectinatus*. The substrate is a typical clay gyttja.

g) *Potamogeton pectinatus* submerged vegetation: *Potamogeton pectinatus* accompanies *Phragmites australis* and was found at water depths of 180 to 310 cm. It is partly displaced by *Chara* sp. or *Najas marina*. The substrate was also clay gyttja.

h) *Chara* sp. submerged vegetation: This vegetation type mainly occurs in water depths of 160 to 250 cm but can also be found in a few highly conductive and stagnating

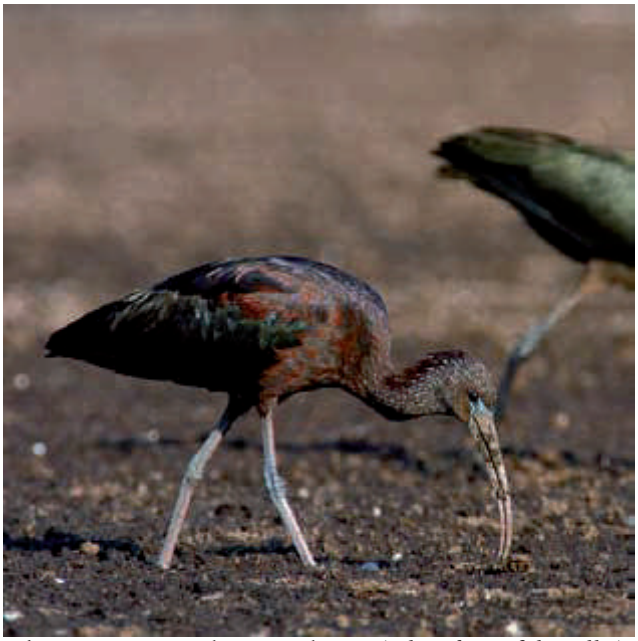


Photo 28: Glossy Ibis (*Pleagdis falcinellus*), (M.Meister)

water bodies near the banks of the lake. The species *Chara vulgaris, Chara canescens* and *Chara contraria* are typical for salt-rich mesotrophic conditions (Krause 1997). The *Chara* sp. submerged vegetation appeared on silt gyttja in deep water and poor clayey loam at the littoral sites.

i) *Phragmites australis* reed: Huge areas are covered by *Phragmites* reeds, which mostly consist of only this one species. On sites near the banks, it is accompanied by *Tamarix ramosissima. Phragmites australis* is able to grow in places with high water level fluctuations as well as nearly dry sites due to the ability to transport water and, if necessary, nutrients through its deep-reaching rhizomes. During the investigations, the water was between 15 and 250 cm deep. The substrate was mainly silt gyttja and, in one site, black clay, enriched with reduced sulphur.

Fauna - Birds: All species documented are listed in Annex III. In the following, threatened species will be named according to their critical status following Bird Life International (2007).

Dalmatian Pelican (*Pelecanus crispus*), VU: Being a former breeding species, it has recently been known to migrate or winter in the wetlands of the Central Lowlands and also on Lake Sari Su. Conservation measures have resulted in a population increase in Europe. However, rapid population declines in its remaining range are supposed to be continuing.

Glossy Ibis (*Pleagdis falcinellus*), LC: This species has a large range, with an estimated global extent of occurrence of 1,000,000-10,000,000 square kilometres. It is assumed to breed on Lake Sari Su.

Pygmy Cormorant (*Phalacrocorax pygmeus*), LC: The Pygmy Cormorant is widespread in the lowlands of Azerbaijan (Schmidt et al. 2008). Colonies are found at Lake Aghgöl, and the wide reed beds of Sari Su are also assumed to harbour colonies.

Marbled Duck (*Marmaronetta angustirostris*), VU: The Marbled Duck is a resident species on Lake Sari Su. It appears to have suffered a rapid population decline, evidenced in its core wintering range, as a result of extensive habitat destruction. 18 birds could be observed during the field survey (June 2007); no breeding activities could be confirmed. However, it is likely that these observations during breeding season

Photo 29: Juvenile White-headed Duck (*Oxyura leucocephala*) (S. Schmidt)

hint at breeding activity of this very seclusive species.

Ferruginous Duck (*Aythya nyroca*), NT: The European population is believed to have declined overall (BirdLife International 2007). In 2004, 200 birds were counted; in subsequent years no new sightings occurred.

White-headed Duck (*Oxyura leucocephala*), EN: The White-headed Duck is globally rare but a regular wintering bird in Azerbaijan. It breeds in the lower Volga Delta, Central Asia and southwest Siberia (BirdLife International 2007). Patrikeev (2004) names it exclusively as an irregular wintering bird for Lake Sari Su. However, Azerbaijan likely holds the largest wintering population of this species in the world!

Pallid Harrier (*Circus macrourus*), NT: This raptor breeds in steppe and forest steppe up to 2,000 m. The favoured nesting sites are wet grasslands close to small rivers and lakes and marshlands (BirdLife International 2007). No recent breeding record is known for Azerbaijan, but on migration it still regularly visits the Central Lowlands. It is possible that this species will return as a breeding bird to the less disturbed parts of the country's protected areas at some future date.

Greater Spotted Eagle (*Aquila clanga*), NT: Nowadays, important roosting and wintering sites of this former breeder in Azerbaijan are found in the wetlands of the lowland. Regular reports from the nearby Aghgöl indicate that the less-studied Sari Su is of the same importance. Overall, the species has a small population, which

appears to be declining owing to extensive habitat loss and persistent persecution (BirdLife International 2007).

Saker Falcon (*Falco cherrug*), EN: The Saker Falcon is a wintering and migrating species in the semi-deserts surrounding Lake Sari Su. This species qualifies as endangered because it has undergone a very rapid population decline, particularly on the central Asian breeding grounds, owing to inadequately controlled capture for the falconry trade.

Little Bustard (*Tetrax tetrax*), NT: The primary cause of its decline has been conversion of dry grassland and low-intensity cultivation to intensive agriculture, especially where this included the planting of monocultures, irrigation or afforestation (BirdLife International 2007). The eastern population of the species has its main wintering grounds in Azerbaijan's Central Lowlands. Undisturbed semi-deserts are crucial for its survival (Gauger 2007, Schmidt et al. 2008).

European Roller (*Coracias garrulus*), NT: Threats include persecution on migration in some Mediterranean countries and hundreds, perhaps thousands, are shot for food in Oman every spring. Use of pesticides reduces food availability. Furthermore, the species is sensitive to changing farming and forestry practices (BirdLife International 2007). It is still common in Azerbaijan, although only five observations of the European Roller occurred during this study in this region.

Mammals: 28 species of mammals have been recorded in the area of Lake Sari Su, 5 of which are listed in annex II and 10 in annex IV of the directive 92/43/EEC.

Of special local interest are several species of bats, including *Barbastella barbastellus* (VU), and the occurrence of *Felis chaus* and *F. lybica*. In the semi-desert surroundings *Vulpes vulpes, Canis aureus, Meriones lybicus, Allactagar elater* and *A. euphratica* are typical.

Erinaceus concolor, Hystix leucura and *Sus scrofa* as well as several species of bats inhabit the forest.

Amphibians and Reptiles: 4 species of amphibians and 18 reptiles have been recorded around Lake Sari Su. 3 of them are listed in annex II and 9 in annex IV of the directive 92/43/EEC.

Of special interest is the population of *Testudo graeca* (VU). The turtles *Emys orbicularis* and *Mauremys caspica* are common in all wet parts. There, *Natrix natrix* and *N. tesselata* can be also found, along with *Rana ridibunda* and *Bufo viridis*.

In the riparian forest *Ophisaurus apodus* and *Lacerta strigata* are abundant, and common species in the semi-desert areas include *Eumeces schneideri*, *Eremias arguta* and *E. velox*.

Human influence: Before the Mingächevir reservoir was built in 1953, the lakes Sari Su, Mehman and Aghgöl were periodically flooded in spring and autumn (Strauss 2005). After its construction, the reservoir retained great amounts of Kura water and the lakes lost their water supply. Also, an extensive system of drainage ditches and channels was constructed, and the landscape changed thoroughly.

Today, the steppe lakes Aghgöl, Mehman and Sari Su depend on artificial water supply diverting from the main river Kura (Thiele et al. 2008). However, although separated from the Kura by a dam, the two water bodies presumably still have a connection as high water levels correspond (Thiele et al. 2008).

Before the construction of the Mingächevir reservoir, Sari Su was a freshwater lake (Patrikeev 2004). Since then, the salt concentration increased because, along with the inflow from the Kura, the lake also lost its drainage. It became a perennially water bearing closed lake ('Endsee') (Marcinek & Rosenkranz 1996). Furthermore, the reservoir dam caused fewer fluctuations in water levels and slower water level changes.

Photo 30: European Roller (*Coracias garrulus*) (H.Müller)

The change of the hydrological regime caused by extensive draining systems in the Central Lowlands led to a drastic increase of salinisation (Thiele et al. 2008). Some of the wetlands that are artificially supplied with water, such as Lake Aghgöl and Sari Su, are endangered, since the channel system is in a poor state today (same as above).

Since an increased salinisation due to past drainage could already be observed, the new Mil-Mugan (map Sari Su) collector can even be expected to accelerate this development. It carves through the steppe two or three kilometres south of the lake. With changing groundwater levels caused by the collector, future changes in the vegetation can be expected.

The steppes around Sari Su are mainly used as pastures. The trophic status of the lake is influenced by excrements of animals on the lake shore. During the time of investigations, livestock, such as cattle, horses and sheep, were recorded constantly. The grazing activity increases in winter when the herds return from their summer pastures in the mountains.

Hunting takes place all year but has its main season in winter. It is extremely disturbing to all kinds of waterfowl. Hunting permits are issued by the National Hunting Association, which in turn is in charge for the lake. Fishing occurs mainly on subsistence level, and on a small scale also commercially. Cut *Phragmites* is used for thatched roofs, but reeds are sometimes burnt without apparent reason.

Significance & protection: Being one of the biggest steppe lakes in Azerbaijan and a remnant of the unique Kura-Araz floodplain, the Sari Su steppe lake with its brackish water of meso-to eutrophic conditions is a global ecological rarity in the nemoral belt.

Extensive reeds and water zones provide habitat for rare bird species. Highly dynamic wetlands within semi-arid surroundings enhance biodiversity. The area is of great international importance as a key resting and wintering site for migrating birds from large areas north of the Caspian See (Schmidt et al. 2008). The reason for significantly fewer breeding colonies on Lake Sari Su than on Aghgöl lies probably in the strong impact of grazing and in damaging hunting activities.

Qualification for Ramsar: Following the criteria for the designation of Wetlands of International Importance (see Annex I) Lake Sari Su fits in several criteria groups, such as:

Photo 31: Lake Sari Su (A.Thiele)

Group A-Criterion 1: Sari Su is a rare and near-natural wetland type within the biogeographic region. The salt lakes of the Near East deserts are rarely harbouring extensive reed beds. In Azerbaijan, only three additional wetlands of this type occur: Lake Aghgöl, Lake Mehman and Lake Chala in the Shirvan National Park.

Group B-Criterion 2: It supports vulnerable or endangered species like *Marmaronetta angustirostris*, Dalmatian Pelican, *Oxyura leucocephala* (see Annex II). Additionally, a considerable number of near-threatened species occur regularly on Sari Su. Some of them are threatened by further decline in their population size, so in the near future they may reach the status near-threatened!

Group B-Criterion 3: The lake supports populations of plant and animal species that maintain the biological diversity of the particular biogeographic region. The vegetation in the lake is azonal, it occurs frequently in wetlands on the northern hemisphere and contains cosmopolitan species (Schroeder 1998). No endangered plant species occur in Lake Sari Su. Nevertheless, this steppe lake with meso- to eutrophic brackish water is an ecological rarity and fosters the value of the entire ecosystem.

Group B-Criterion 4: The plant species diversity of the surrounding desert is increased by the existence of wetlands in this very dry region. However, as mentioned above, no threatened plant species occur.

Group B-Criterion 5: The wetland supports fourfold the required number of 20,000 waterbirds (see above).

The Ramsar Information Sheet was prepared and has been made available by the MSF.

Comparison with Natura 2000 and Emerald habitats: This special kind of ecosystem is not listed among European Union habitats, since such types of brackish water do not exist in the EU. There is a habitat type 'Pannonic salt steppes and salt marshes' (1530) which is comparable to Sari Su in climatic conditions. This habitat type is characterised by species such as *Halocnemum strobilaceum*, *Salicornia* sp. and *Frankenia hirsuta*. High temperatures, aridity and salt accumulation in the soil are some additional similarities between the two habitat types. The influence of grazing cattle is also named as a functional factor for the development of 'Pannonic salt steppes and salt marshes' (European Commission 2007). This habitat type could be applied in a slightly modified way in case of a participation in the European protection network, but the name of the habitat type would need to be changed to, e.g. 'Eurasiatic salt steppes and salt marshes'. There are two lakes, the Neusiedler See in Austria and Lake Balaton in Hungary, both located in the Pannonic Lowlands, which are designated as National Parks and Natura 2000 sites, mostly due to their high ornithological diversity.

Recommendations: The designation of Lake Sari Su as a Wetland of International Importance is very promising. Data for all relevant criteria are readily available and all relevant features of the ecosystem are compiled in an adequate way. We strongly recommend the transformation from a state hunting reserve into a protected area to preserve the high ornithological diversity and the ecosystem value of this wetland. A vision for the protection of this lake shall be developed in accordance with the national legislation. Initially, we recommend the RAMSAR protection regime, which opens the possibilities to introduce a stakeholder-relevant discussion and to develop all further measures - perhaps even protection with stronger criteria - in a participatory process.

The minimum requirements for establishing the protection of bird diversity are the following:

- prohibit or restrict and control the bird hunting activities during wintering season
- limit the grazing activities to maintain the natural cover of semi-desert vegetation and to avoid disturbance of breeding colonies
- keep the fishing activities on a low subsistence level
- provide a regular and sufficient water supply as soon as possible

By protecting Lake Sari Su and partly the surrounding steppes, a representative ecosystem complex of the Central Lowlands of Azerbaijan would be conserved, habitat and therefore species diversity could be enhanced. Especially the highly endangered, completely unprotected and in most parts destroyed floodplain forests of the lower Kura River could benefit from protection.

2.4. Dry Foothills

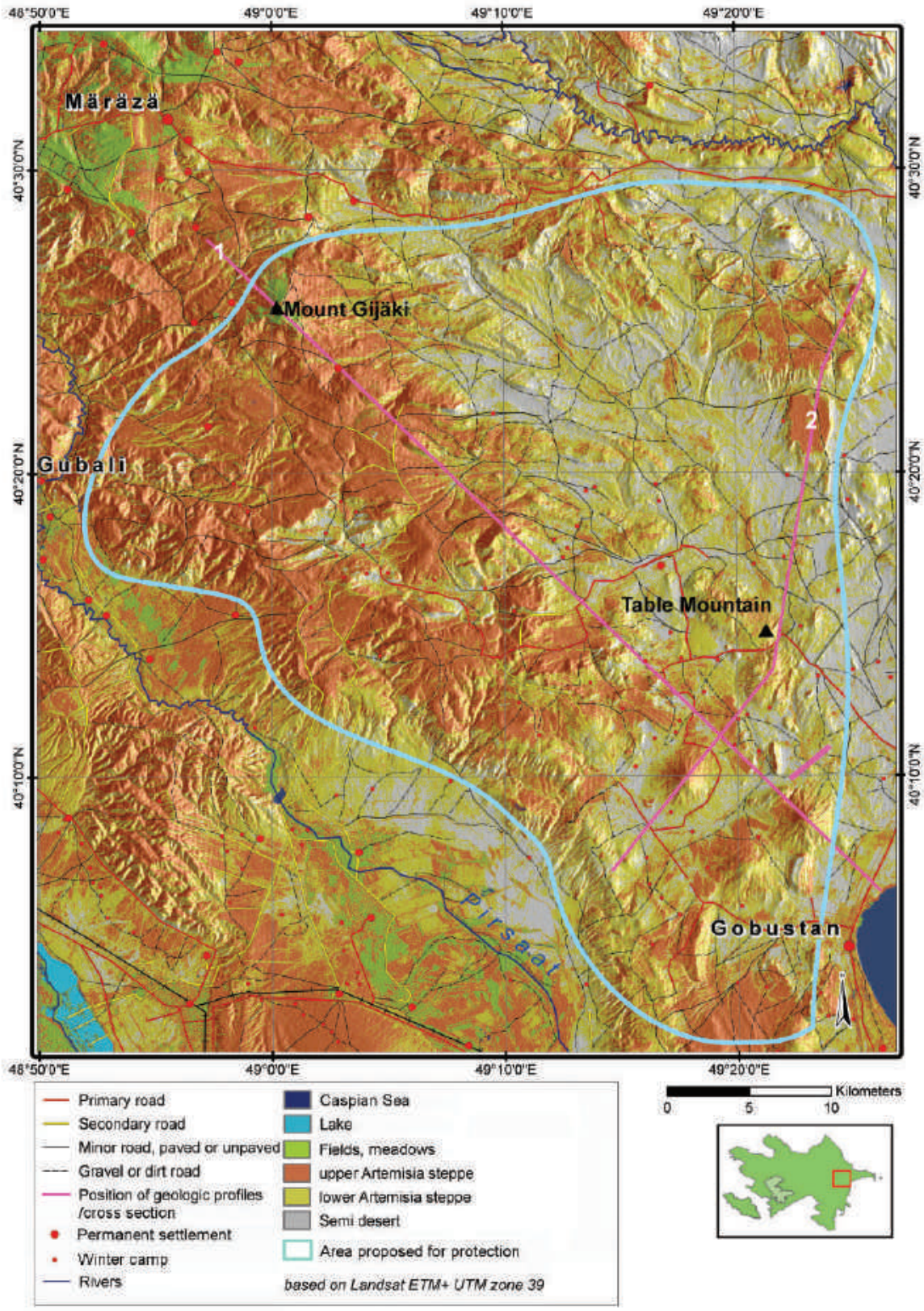
2.4.1. Gobustan

Location: Gobustan is a region in eastern Azerbaijan, between the south-eastern declivity of the Greater Caucasus and the Caspian Sea. The river Pirsaat borders it to the west and the Caspian and the surroundings of Baku to the east. The region extends over 100 km in south-north direction and 80 km in east-west direction.

Landscape characteristics: Gobustan, the easternmost part of the Greater Caucasus, ranges from the Caspian shore up to its highest point, Mount Gijäki at 1047 m a.s.l.

Numerous riverbeds and gullies carve through the landscape. They mostly belong to the drainage basin of the river Cheirankezchmez, which has a special water regime. Surface runoff occurs only shortly after rainfall and leaves a system of non-connected puddles. During summer, the rivers are completely dry and salt crusts cover their beds. Every rain event causes erosion in the loamy tertiary substrates. Therefore, the rivers have steep banks, sometimes with terraces, and high dynamics in sedimentation and denudation processes.

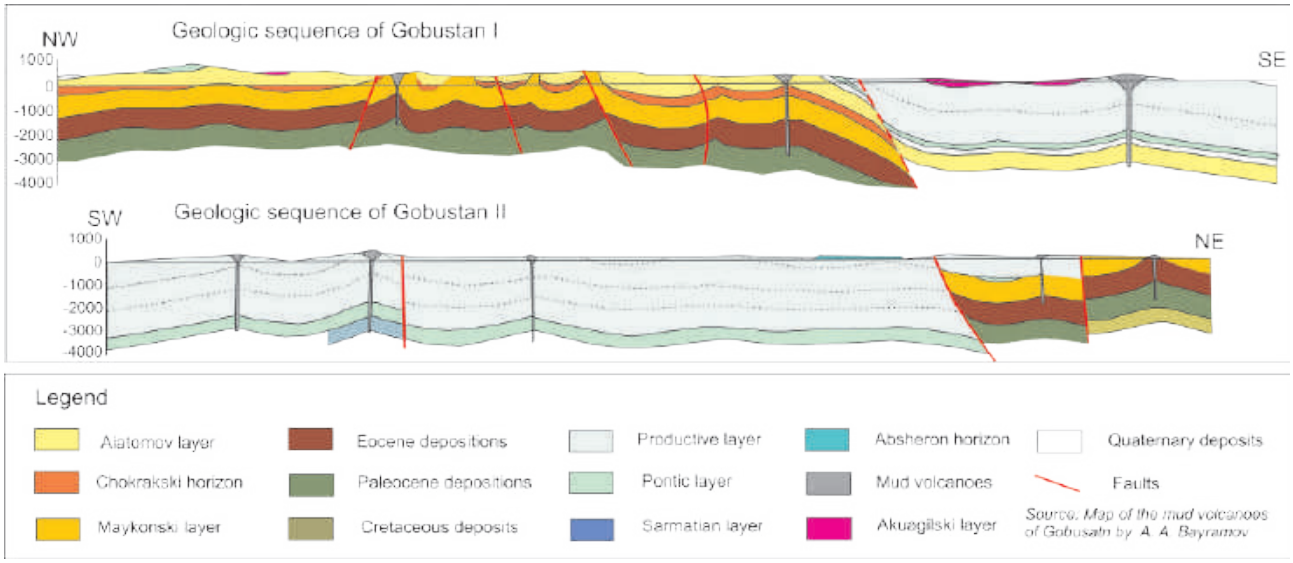
Special features are mud volcanoes in the east and middle part of Gobustan and rock outcrops of lime or sandstone scattered all over the region. Here, water is stored in cracks and the rocks provide shade. Hence, the microclimate is more humid than on adjacent clayey



Map 18: Supervised satellite image classification of Gobustan region. Based on Landsat 7 image

sites.

Climate: Gobustan has a semi-arid climate with mild winters and dry, hot summers (Mamedaliev 1963). The annual precipitation is very low (~250 mm) (World Climate Index Map 2009). Mainly, it rains in early spring and late autumn. In winter, the snow does not stay long. The highest mean temperatures occur in July (~32°C) and the lowest in January (~-1.6°C). The western part of Gobustan descends to the Kura lowlands and therefore receives more precipitation in spring and autumn than eastern Gobustan.



Map 19: Geological transsect accross Gobustan region

Soils: Grey-brown, salty soils can be found in the lowest parts of Gobustan (Mamedaliev 1963). Crusts of gypsum and salt on loamy soils are typical at altitudes between the Caspian Sea and 150 m a.s.l. With rising altitude, they give way to raw or brown soils with lower salt content, interspersed with Solontschaks. Chestnut and light chestnut soils can be found in the western part of Gobustan.

Mud volcanoes are essentially channels for releasing pressurized gas and mineral water, sometimes with traces of oil, together with associated mud from great depths (in Azerbaijan down to 4000 m) and depositing them on the surface of the earth where they form mounds ranging from 5 to 500 m in height. Those formations may be the result of a piercement structure created by a pressurized mud diapir which breaches the earth's surface or ocean bottom. Mud volcanoes are often created at points of weakness in the earth's crust along fault lines. They are associated with geologically young sedimentary deposits and the presence of organic gas from hydrocarbon deposits. Worldwide there are some 700 known mud volcanoes. About 300 of them exist in the Eastern region of Azerbaijan and in the Caspian Sea. In both appearance and behaviour, they outwardly resemble a magmatic volcano. The explosive release of pent-up gases combined with the burning of hydrocarbon gases adds to this similarity. But, unlike their magmatic counterparts, which carry molten rock, lava or enormous heat to the surface, mud volcanoes in Azerbaijan are at ambient temperature and may even be cool with not more than 2–3 °C above the ambient temperature. Because of the softness of the rock, mud volcanoes are considered to be rather ephemeral on a geological timescale. The mud or breccia quickly erodes with wind and rain into systems of gullies and ridges fanning out from the crater margins. Indeed, a tell-tale sign of a mud volcano are its deeply grooved flanks. Eruptions can occur when mud and sand are squeezed upwards by seismic forces. Here gravitational forces and tidal action appear to play a role. The sudden release and upward expansion of dissolved gases may also play a key role. In Azerbaijan, eruptions are driven from a deep mud reservoir, which is connected to the surface even during dormant periods, when seeping water still reveals a deep origin.

Mud volcano breccias usually pour out in a fan-like or tongue-like shapes, and the flows vary in width from a few centimetres to several hundreds metres, with a length up to several kilometres and with a capacity up to several metres. Breccia flows from various eruptions

Photo 32: Mud volcanoes within semi-desert of Gobustan. (S.Schmidt)

often meet and impede each other, and if the "tongues" from younger eruptions do not impede previous ones, these different-aged flows can easily be distinguished from each other by their colour, and they often bear different vegetation.

The material that composes the breccia depends on structural and textural features of the volcano, as well as its depth. It usually consists of: 1) fragments of rocks, 2) loam, 3) volcano pelite (volcano silt). Numerous minerals can be found in the breccia, e.g., quartz, calcite, field spars, dolomite, chalcedony, siderite, pyrite, yellow copper ore, barite, and others.

Although earthquakes trigger the occurrence of volcanic eruption, the majority of mud volcanoes erupt due to gas accumulation beneath surface. As a consequence, large cone-shaped volcanoes usually indicate rare but fierce eruptions, whereas flat and permanent mud-emitting volcanoes do not indicate great danger. Especially the latter are often associated with the occurrence of oil hydrocarbons.

Vegetation: The vegetation has steppe-like or semi-desert character. 45 % of all species recorded in steppes and semi-deserts in Azerbaijan (Grossheim 1936) were found in Gobustan in the actual study. The species are mostly annuals or geophytes. They develop during the humid season from October to May. The flowering time starts in March and lasts until the summer draught. A different behaviour is shown by ephemeral Chenopodiaceae, which are highly salt-resistant but cannot tolerate frost. They germinate in spring, flower in autumn and die with the first frost.

Sub-shrubs such as ligneous Chenopodiaceae and wormwood (*Artemisia fragrans*) reach wet soil layers with deep, far-reaching root systems and can therefore also grow in summer. Perennial species of Poaceae, Asteraceae and Lamiaceae, which are typical for steppes, occur in high abundance only at higher altitudes. Shrubs and trees are very rare and restricted to moister sites, such as floodplains, rock outcrops and the northern slopes of Mount Gijäki.

The vegetation changes with rising elevation from semi-deserts with salt shrubs to semi-deserts and steppes with wormwood to grass steppes at higher altitudes. In the rain shadow of hill ridges, it is generally more desert-like than in the surrounding area. Furthermore, a distinction can be made between northern and southern slopes of the tall mud volcano cones, rising up to 400 m above the surrounding.

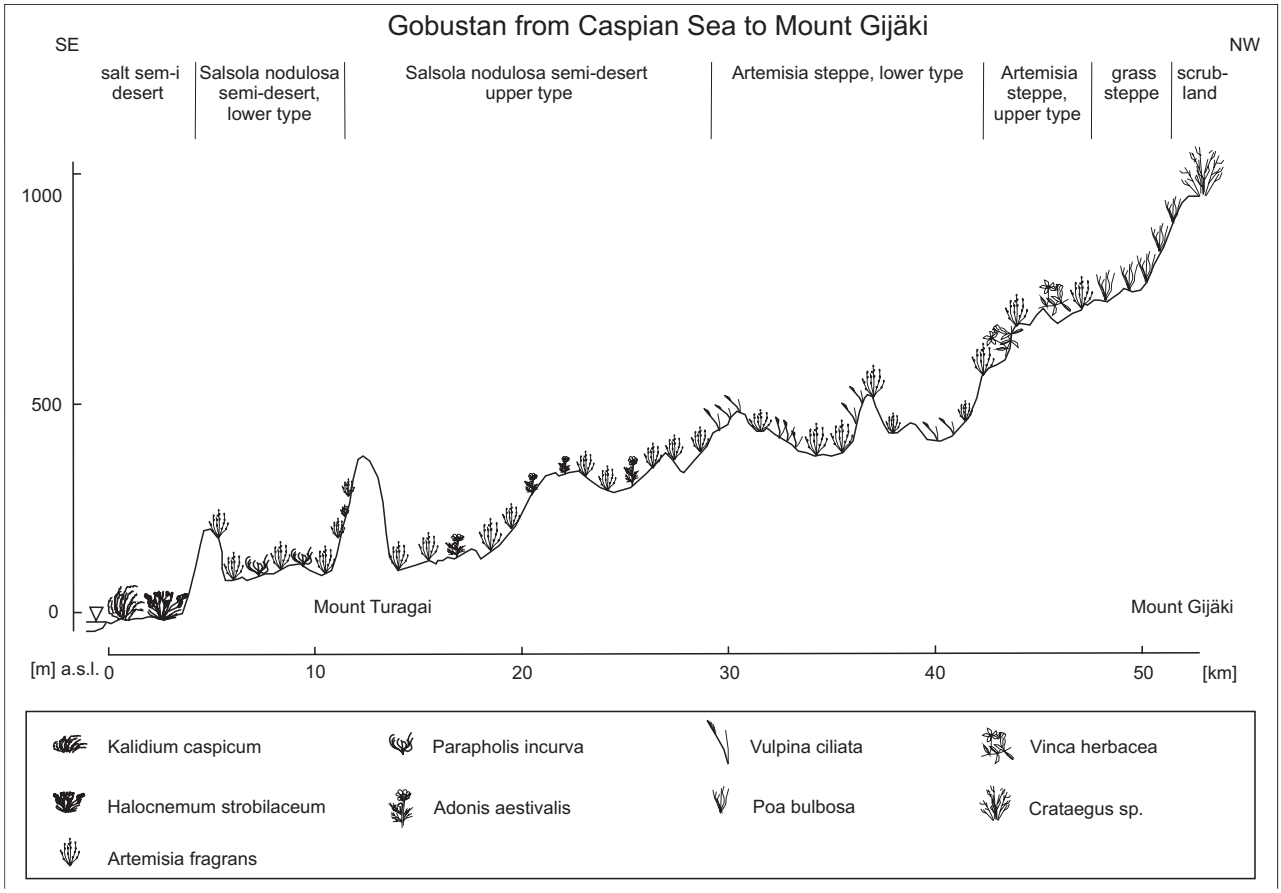


Fig. 18 Gobustan: Cross section from the Caspian Sea to Mount Gijäki

a) Salt semi-desert: At altitudes up to 150 m a.s.l. and on salt-rich lava streams, salt semi-deserts are common. Few shrubs such as *Kalidium caspicum* and *Halocnemum strobilaceum* and the dwarf-shrub *Suaeda microphylla* characterise the landscape. They are accompanied by salt-tolerant annuals. The first herbs to populate volcanic soils are *Petrosimonia brachiata* and *Lepidium perfoliatum*.

b) *Artemisia fragrans* semi-desert: This vegetation type is dominated by *Artemisia fragrans*, *Salsola gemmascens* and *Plantago ovata*. They are accompanied by ephemerals like *Bromus rubens*, *Medicago minima* and *Filago germanica*, and only few perennials.

Two types of the *Artemisia fragrans* semi-desert can be distinguished. One of them ranges from 30 to 115 m a.s.l. and is made up mostly of salt-resistant species, e.g. *Reaumuria hyericoides, Parapholis incurva* and *Psylliostachys spicata*, but also non-salt-adapted ephemerals. This vegetation type forms insular patches enclosed by salt semi-desert. It is probably limited to soils with high salt concentrations, for instance in flat, salt-accumulating pans.

The second type of the *Artemisia fragrans* semi-desert can be found between 175 and 560 m a.s.l. It is characterised by *Adonis aestivalis*, *Alyssum* sp., *Brachypodium distachyon* and the absence of salt-indicating ephemerals.

Photo 33: Steppe and mud volcanoes of Gobustan (S. Schmidt)

c) *Artemisia* steppe: A belt of dense steppe vegetation with *Artemisia fragrans* reaches elevations of 760 m a.s.l. The steppes contain a higher diversity of plants (20 to 27 species/100 m²) and are richer in perennials than the semi-deserts.

The lower *Artmisia* steppe ranges between 150 and 600 m a.s.l. Its species composition is similar to the semi-deserts but richer in ephemerals such as *Clypeola janthlaspi* or *Bupleurum tenuissimum*. This steppe type

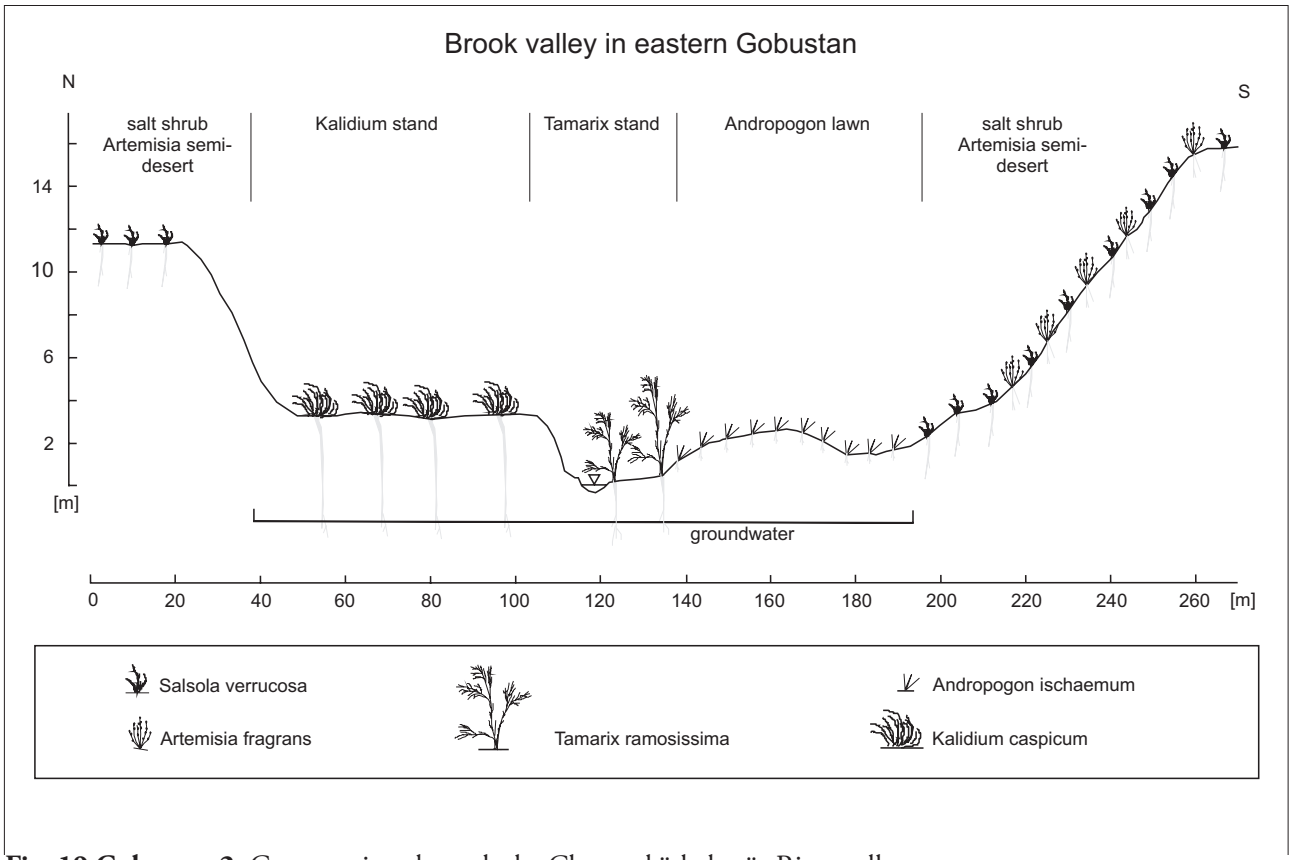


Fig. 19 Gobustan 2: Cross section through the Cheyrankäshchmäz River valley

Photo 34: Grazing in spring (S. Schmidt)

is restricted by grazing; it can only be found on sites inaccessible to livestock. While *Artemisia* steppes occur on table mountains or rock outcrops, the surrounding area is covered by *Artemisia* semi-deserts. On rock outcrops that even goats cannot reach, palatable plants or sub-shrubs can develop.

The upper *Artemisia* steppe occurs between 600 and 760 m a.s.l.. It is widespread in western Gobustan, where it occurs at lower altitudes, too. *Vinca herbacea, Bongardia rauwolfii, Vicia narbonensis* and *Nepeta racemosa* are some of the dominating species.

d) Table mountain (40°14'N; 49°20'E; 180 m a.s.l.): A table mountain with sharp ascents provides habitats for plants vulnerable to grazing. On the investigated mountain (1.5 ha), 62 vascular plant species occur. In the grazed steppes no more than 40 species were found. In contrast to the surrounding area, the vegetation on the mountain is 30 cm high.

e) Grass steppe: Only at the slopes of Mount Gijäki between 760 m and the top at 1,047 m a.s.l., steppes with single shrubs of *Pyrus salicifolia* or *Crataegus* sp. were detected. They comprise no sub-shrubs, but many herbaceous perennials such as *Achillea micrantha, Salvia aethiopsis* and *Rumex thyrsiflorus.*

f) *Euphorbia* slope in western Gobustan: On a north-west facing slope next to the village Gubali, upper *Artemisia* steppes grow very dense. The vegetation is about 40 cm high and dominated by tall herbs such as *Euphorbia iberica, Eremurus spectabilis, Prangos ferulacea* and *Cachrys alata*. Unique for the investigated sites in Gobustan are the orchids *Ophrys caucasica* and *Orchis caspia* in large numbers. Also, *Onosma setosum* and the blue flowering *Linaria schirvanica* were detected only here.

g) Fields: On the western border of the study area, wheat fields replace the steppes. They show an interesting weed flora with numerous geophytes and ephemerals.

h) Woodland at Mount Gijäki: On the northern slope of Mount Gijäki, about 10 ha of woodland still occur. It is dominated by *Prunus cerasifera* and *Crataegus* sp., associated with 11 other tree species. Single trees can be found down to 750 m a.s.l. The area is watered by springs coming from the limestone. The grass layer is made up of tall herbs such as *Arum elongatum, Asperula tinctoria* and *Urtica dioica* and reaches heights of up to 40cm.

i) Vegetation around stables: Sites near stables are strongly disturbed and highly eutrophic. In a range within 50 to 100m around the stables, the original vegetation generally disappeared completely. Especially in places with rain water accumulation, a thistle community dominated by *Sylibum marianum* and *Carduus pycnocephalus* develops in spring. The thistles are despised even by donkeys. During summer, no livestock is around the stables. When the thistles dry out at the end of May, ephemeral Chenopodiaceae can grow undisturbed (*Chenopodium ficifolium, Atriplex tatarica, Petrosimonia brachiata, Salsola crassa*).

Small dams were often built to store rain water near the stables. A number of water and wetland plants populate the reservoirs: *Ranunculus trichophyllus, Zannichellia palustris, Chara sp., Alisma lanceolata* and *Salicornia europaea*.

j) River valleys: The vegetation here mainly depends on groundwater. Tamarisks (*Tamarix ramosissima, T. tetragyna*), *Lycium ruthenicum* and *Nitraria sibirica* form the so-called Tugai scrubland. All of them germinate only on river banks and are salt-adapted. Lots of annuals - *Chenopodium album, Silybum marianum* and different species of Fabaceae - grow between the shrubs after flooding.

At the bottom of the banks, clay is accumulated and stores water. This allows taller herbs such as *Lepidium draba* and *Rhapistrum rugosum* or the grasses *Phalaris canariensis* and *Andropogon ischaemum* to form dense meadows.

Fauna - Birds: About 110 wild bird species have been recorded in the Gobustan region, 36 of them are listed in the annex I of the directive 79/409/EEC and

9 by the IUCN (4 NT, 3 VU, 2 EN). 9 species are included in the Azerbaijan Red Data Book and 53 are of special European conservation concern (7 x SPEC 1, 12 x SPEC 2, and 34 x SPEC 3).

The avifauna of Gobustan represents the typical breeding bird communities of the lowland semi-desert of Transcaucasia and dry steppes of the foothills of the southern Greater Caucasus.

Typical species in the open plains are larks, Isabelline Wheatear, Black-bellied Sandgrouse and Stone Curlew. The hills with loam cliffs are inhabited by Finsch's Wheatear, Rock Nuthatch, Rock Sparrow and Chukar. The few rock outcrops provide breeding sites for Red-billed Chough, Long-legged Buzzard, Lesser Kestrel (VU), Griffon and Egyptian Vulture (EN). Also, a brood of Lanner Falcon was recently rediscovered after 50 years without a record, and this is probably the only nesting place of this species in Azerbaijan.

During migration and in wintertime many more species occur in the area. Larks and Meadow Pipits are very abundant passerines, and flocks of Little Bustard forage in the wide plains, sometime together with geese, among which a Red-breasted Goose (VU) has been observed. Other species of conservation concern that regularly visit the site are Pallid Harrier (NT), Steppe Eagle, Saker Falcon (EN) and Black Stork. The most threatened species of Gobustan is the Sociable Lapwing (CR), which has a traditional resting place here. In March and April 2006 and 2007, several flocks of up to 180 birds have been recorded. This clearly shows the immense importance of the region for the protection of this critically endangered species.

Threats for the birds are hunting (for Chukars, geese and Little Bustards) and habitat destruction through intensive grazing.

Mammals: 28 species of mammals have been recorded in Gobustan, 4 of which are listed in annex II and 12 in the annex IV of the directive 92/43/EEC. The Azerbaijan Red Book includes 2 species and the IUCN list one.

The mammals are dominated by several species of rodents, with *Meriones lybicus*, *Allactaga elater* and *Microtus socialis* the most common. Also, bats are diverse with ten species. Another typical inhabitant of the semi-desert region is *Hemiechinus auritus*.

Common large carnivores include Red Fox (*Vulpes vulpes*) and Golden Jackal (*Canis aureus*), and Wolves (*C. lupus*) also occur here regularly. In 2007, Goitred Gazelles (*Gazella subgutturosa*) were recorded several times in the area. They migrate from Shirvan National Park and would probably inhabit the whole region if not for the strong poaching pressure.

Photo 35: Caucasus Agama (*Stellio caucasicus*) (S. Schmidt)

Locals hunt especially for hares, and a farmer told the authors that they regularly shoot small numbers of gazelles.

Amphibians and Reptiles: Two species of amphibians and 20 reptiles have been recorded in the Gobustan region. One of them is listed in annex II and 8 in annex IV of the directive 92/43/EEC. *Testudo greaca* is the only species included in the Azerbaijan and IUCN Red Data Book.

All species are typical for the Azerbaijan semi-desert lowland. *Eremias arguta* and *E. velox* are common in the saline semi-deserts, whereas all rocky areas are inhabited by *Stellio caucasicus* and *Cyrtopodion caspius*. *Macrovipera lebetina* and *Testudo graeca* occur all over the region. In the ponds, *Rana ridibunda* and *Bufo viridis* can be found.

Human influence: The semi-deserts and steppes of Gobustan are mainly used as winter pastures (Nov.-April/May) for various livestock. Herds are made up of up to 3,000 sheep and goats with an additional 35 to 50 heads of cattle. The grass steppe and upper *Artemisia* steppe are also used for hay making. Roots of *Prangos ferulacea* are dug up by villagers to prepare colourants. In the woodland on Mount Gijäki, firewood is cut. It can be assumed that the trees would become higher if they weren't used, and that adjacent steppes could potentially

be forests.

Since the livestock numbers increased tremendously after Azerbaijan's independence, grazing intensity is very high. The vegetation is heavily damaged from trampling, which leads to erosion, especially on the slopes. As can be seen in comparison between the vegetation on the table mountain and the surrounding area, long-term grazing has reduced biodiversity and changed steppes into semi-deserts.

Significance & protection: The greater Gobustan region with its semi-desert landscape contains the particular faunistic species composition of this habitat and is a refuge for many animal species. Among them are many species of international conservation concern, and therefore the area is highly valuable for nature conservation. Most important is the traditional spring resting site for Sociable Plover. Further studies have to be conducted to get a clearer picture of this species' occurrence and needs here.

Most of the plant species are common and widespread; none of them are listed in the IUCN Red List or are endangered in Azerbaijan. Two Transcaucasian endemic species, *Ophrys caucasica* and *Linaria schirvanica*, grow in the grass steppes of Gobustan. Since the table mountain is not accessible for livestock, it acts as a naturally protected area. The mountain may play an important role in further research on grazed and ungrazed steppes and semi-deserts. With increased intensity in agriculture, the weed communities in the fields may also become endangered.

Furthermore, the region's peculiarity originates from the density of mud volcanoes that occur here. While compiling this report, several mud volcano clusters have been protected as National Monuments, so their importance has been recognized. Nevertheless, the habitat diversity, the species composition and the traditional land use scheme (winter pasturing) need to be protected on a larger scale. The Gobustan region is surely one of the natural highlights of Azerbaijan.

The authors strongly recommend increasing protection measures (especially to ban poaching), establishing wise land use plans to avoid overgrazing, and develop a protection concept for the region. It is further advised to apply biosphere reserve methodology for further planning. Due to its vastness, its importance as winter pasture, its suitability for sustainable agricultural production and the proximity to Baku, the application of a BR concept seem to be appropriate.

The region is large enough that Goitred Gazelles would have the chance to live here alongside the high numbers of sheep. Therefore, awareness among the local population needs to be developed to stop all hunting activities targeting this species.

2.4.2. Western steppe zones around the Mingächevir Reservoir

Location: The investigated area lies at altitudes between 80 and 800 m a.s.l. and can be divided into the following three parts (all depicted at Fig 20 to 22):

- The Ajinohur depression with Akharbakhar Hills in the south and Dashüz Hills to the north. The Alazan River valley and its delta are included.
- The Bozdagh Hills south of Mingächevir Reservoir.
- The eastern parts of the Jeyranchöl Steppe between Kura and Iori River. The whole area between the Kura River and the Georgian border is covered by the Jeyranchöl Steppe, except the lowlands in the Kura valley.

Landscape characteristics: Large areas around Mingächevir Reservoir are covered by steppes. Neogenic clay and loam form ridges of an escarpment landscape (Fig. 20) with steep, often southwards-inclining slopes (Mamedaliev 1963). The ridges are eroded, especially on the slopes, and form badlands with karst caves and erosion gullies. At some sites of the Bozdagh territory, sandstone occurs as well. In contrast to these cliffy landscapes, the northern slopes of the Dashüz Hills are characterised by rolling, grass-covered hills made up of old quaternary material. Since the climate is semiarid and precipitation seeps into the karst caves, only small, periodically water-filled brooks run through the hills and perennial springs are rare.

Between the ridges, three noteworthy depressions are embedded. Eroded material accumulates at their bottoms or is carried away by rivers. The northernmost depression is enclosed in the Dashüz Hills and inclines from 400 m a.s.l. in the east down to 200 m a.s.l. in the west, where it drains through a gorge into the Alazan River. This drainage prevents salt accumulation. Completely different conditions can be found in the Ajinohur depression at about 110 m a.s.l., where surface

Map 20: Supervised satellite image classification of Steppes around Lake Mingächevir: purple lines mark the locations of three cross sections: 1) General overview, 2) Akhbakhar Hills, 3) Alazan River to Lake Ajinohur. Based on Landsat 7 image

runoff from the adjacent hills feeds the Ajinohur salt lake. The evaporating water leaves the salt to accumulate in the basin.

Lake Mingächevir fills the depression between Bozdagh and Akharbakhar Hills. In former times, the Kura cut a valley through the hills with a cataract near Mingächevir and transported its bed load downstream. By building a water reservoir, the valley was transformed into an accumulation system. Lake Mingächevir is fed by three large rivers with catchment areas in the mountains; the runoff from the surrounding hills is negligible. Deltas developed at the mouths of Kura, Iori and Alazan. Especially the deltas of Alazan and Kura with their high material loads extend into the lake (Fig.23, 24).

The Jeyranchöl Steppe is an escarpment landscape as well, with a patchwork of steep, loamy hills and wide plains. One prominent ridge marks the edge of the Kura valley, another runs parallel to the Iori River at the border to Georgia.

Climate: The steppes around Lake Mingächevir lie in semi-arid climate in a triangle between the climate

Photo 36: Juniper woodland at steep loam escarpments. (H.Müller)

stations of Gänjä, Yevlakh and Shäki. The area receives about 300 to 340 mm precipitation per year and a hot drought period in summer. At higher altitudes and towards the Greater Caucasus, the precipitation increases (Shäki - 770 mm annually). The highest mean temperatures are measured in July with about 34°C and the lowest in January with about -2°C.

Soil: North and south of Lake Mingächevir, chestnut and light chestnut soils and saline soils prevail. In the northernmost, well-drained depression, thin, carbonate-

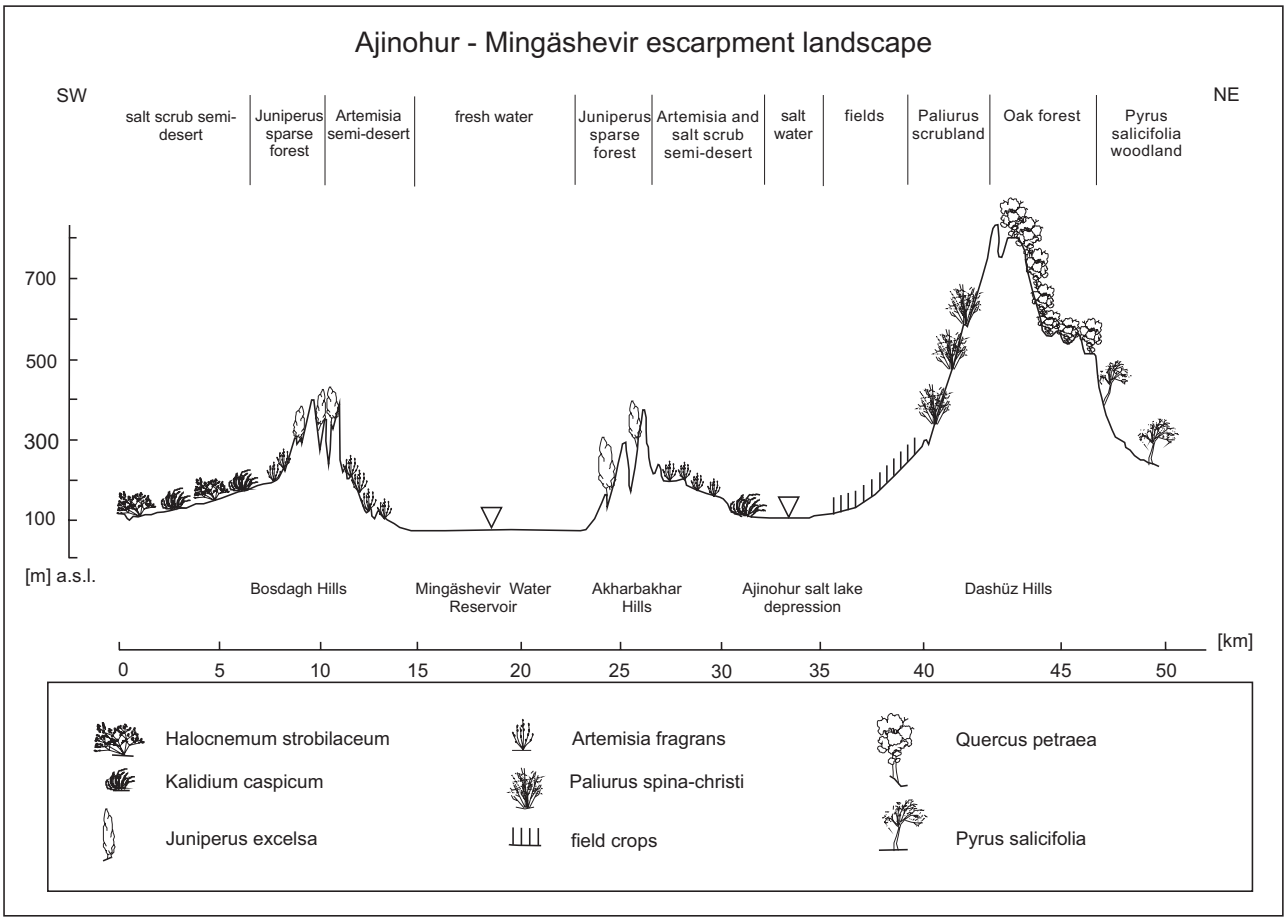


Fig. 20: General overview of vegetation types around Mingächevir reservoir

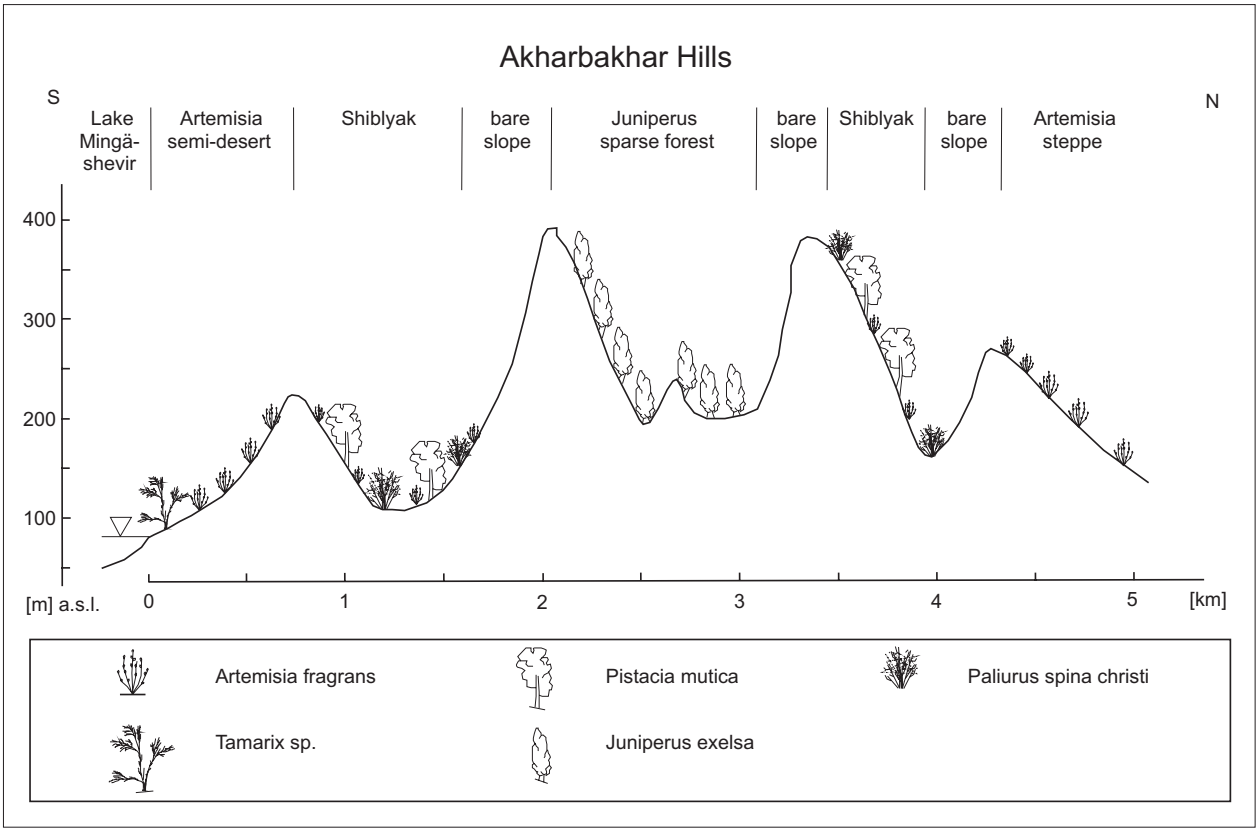


Fig. 21: Cross section through Akharbakhar Hills

rich Chernozems can be found. The Jeyranchöl Steppe west of the reservoir has grey-brown and chestnut mountain soils, brown mountain-forest soils and chestnut and light chestnut soils. (Mamedaliev 1963)

Vegetation: The cross section in Fig. 20 shows the main habitat types of the surveyed area. Semi-desert with salt shrubs, mostly ligneous Chenopodiaceae, or with *Artemisia fragrans* on less salt-influenced sites is widespread in depressions and on moderate slopes. Bare soil and communities of salt-resistant annuals occur on sites with seasonal flooding, especially around Lake Ajinohur.

Due to diverse site conditions, a pattern of sparse forests, scrublands and grasslands with *Stipa* sp. or *Artemisia fragrans* covers the lower ridges. On moist sites in the northern part, scrublands called "Shiblyak" grow from about 300 up to 550 m a.s.l., where they blend in with Georgian oak forests. Open woodland with single specimen of *Pyrus salicifolia* covers the northern slopes of the Dashüz Hills. Fields with weed communities were not investigated.

Along the rivers, floodplains with cottonwood forests, tamarisk scrublands and reeds form a contrast to the adjacent dry landscape. *Tamarix* sp. grows everywhere along the shore of Lake Mingächevir.

The following chapters describe habitat types and show their distribution in the investigated area. Cross sections focus on the sequence of vegetation types in dependence on elevation and aspect and show the connections amongst them.

a) Salt lake: Lake Ajinohur is a shallow steppe lake with changing water levels. It is fed only by surface water from the adjacent hills, which evaporates from the basin, whereas the salt accumulates. Near the lake, only salt-resistant plants occur.

b) Salt shrub semi-deserts: On clayey and badly drained soils, salt accumulates in the upper horizons. Only some salt-resistant annuals and ligneous Chenopodiaceae are adapted to such conditions. Various sub-shrubs such as *Halostachys caspica, Kalidium caspicum* and *Halocnemum strobilaceum* depend on groundwater but tolerate high salt concentrations. They often predominate; *Parapholis incurva* and *Psylliostachys spicata* grow in their shadow. Between the sub-shrubs grow herbaceous Chenopodiaceae with flowering periods in autumn, e.g. *Petrosimonia brachiata* or *Salicornia europaea*.

A one-kilometre-wide belt of *Halocnemum strobilaceum* grows at the southern edge of Lake Ajinohur and mingles

Photo 37: Bozdag Hills south of Mingächevir Reservoir (S. Schmidt)

with semi-deserts predominated by *Kalidium caspicum* and *Suaeda microphylla*. Sites with *K. caspicum* can also be found on the Korchay plain south of the Bozdagh ridge.

c) Salt herb meadow: Meadows of salt-resistant herbs develop under wet conditions on salty soils. They occur on the western banks of Lake Ajinohur and in some basins of the Jeyranchöl Steppe. *Agropyron triticeum, Salsola crassa* and *Petrosimonia brachiata* predominate here. Perennial plants like *Scorzonera laciniata* and puny individuals of *Artemisia fragrans* occur in low abundance. It can be assumed that these communities are transition stages between bare soils and semi-deserts, and that they colonise fresh sites such as the dry-falling bottom of declining Lake Ajinohur.

d) *Artemisia* semi-deserts: Semi-deserts with a high proportion of bare soil are common in the Ajinohur depression, on southern hill slopes, around Lake Mingächevir and in the foothills of the Bozdagh mountains. Wormwood (*Artemisia fragrans*) is a characteristic sub-shrub in Transcaucasian arid zones. It can be associated with ephemeral communities, perennial grass communities and even with scrublands. Communities made up of Chenopodiaceae sub-shrubs and annual herbs are further called *Artemisia fragrans* semi-deserts, while communities dominated by perennial grasses are called *Artemisia fragrans* steppes.

Suaeda microphylla, Salsola dendroides and *S. verrucosa* are also typical sub-shrubs besides wormwood and are often embedded in meadows of *Brachypodium distachyon*, *Medicago minima*, *Helianthemum salicifolium* and other ephemerals. As the annuals depend on moist topsoils, they dry up immediately during summer droughts. Special features of the semi-desert are various *Orobanche* species, plants that parasitise on the roots of sub-shrubs.

A special type of semi-desert can be found on sandy soils in the Bozdagh Mountains. Since sand cannot fix water as well as clay, only plants with deep roots are able to survive here, like *Rhamnus pallasii*, *Lepidium vesicarium, Nepeta micrantha* and *Euphorbia seguieriana*. They often grow solitarily with large patches of bare sand between them.

e) Sparse *Artemisia* steppe: Slightly moister conditions enable grasses to grow here (*Stipa* sp., *Festuca ovina*, *Lolium perenne*) and the occurrence of many other perennial species such as *Allium rubellum* and *Linum austriacum*. Although rich in species, the vegetation is only up to 15 cm high and sparse. This allows light-requiring ligneous Chenopodiaceae such as *Kochia prostrata* and *Salsola verrucosa* to occur in high abundance. The sparse type of *Artemisia* steppe is widespread in the Jeyranchöl Steppe and on elevations above 150 m a.s.l. in the Bozdagh and Akharbakhar Hills.

f) Dense *Artemisia* steppe: This type is restricted to northern slopes with low grazing intensity. *Stipa* sp. and Apiaceae such as *Prangos ferulacea* grow here, together with many annuals; they reach heights of up to 80 cm. The best-preserved stands can be found in the Akharbakhar mountains and on glades in juniper sparse forests. In the Eldar Pine Nature Reserve, *Artemisia* steppes with *Stipa* are more common because pasturing is forbidden.

g) Juniper sparse forests: *Juniperus excelsa* reaches heights of up to six metres, a diameter of 30 cm, and develops a dense crown. *Amelanchier ovalis, Lonicera iberica, Spirea crenata* and *Jasminum fruticans* are often associated with the forests. At the bottom of deep gorges with dry brooks and slightly moister conditions, *Cotinus coggyria, Berberis vulgaris* and *Ulmus minor* grow as well. In May, several orchids (*Orchis punctulata, O.militaris, O.simia*), *Polygala*

anatolica and *Dictamnus albus* flower in the herb layer at the bottom of the gorges. In glades, a vegetation similar to *Artemisia* semi-deserts with ligneous Chenopodiaceae (*Kochia prostrata, Salsola gemmascens*, etc.), *Festuca ovina* and *Ephedra distachya* occurs. Considering the fact that the forests do not receive more precipitation than adjacent steppes, it is obvious that they are restricted by pasturing, cutting and burning.

h) Bare, south-inclining slopes: Steep, loamy southern slopes are exposed to high insulation, fast dehydration and strong erosion during rainfall. Only few specimen of *Acantholimon lepturoides, Reaumuria hypericoides* and *Salsola verrucosa* brave such conditions. As a result, badlands with gypsum accumulations and karst features are widespread in the escarpment system around Lake Mingächevir.

i) Shiblyak or Paliurus scrublands: Shiblyak is an open scrubland vegetation with thorny or unpalatable shrubs left over by grazing animals. In the investigated area, Shiblyak is a degradation state of juniper sparse forests or of oak forests. Like the latter, it also often gets burnt to extend pastures.

On warm and dry sites, a Shiblyak type with *Paliurus spina-christi* and *Pistacia mutica* occurs. Furthermore, the species of dense *Artemisia* steppes and, additionally,

Photo 38 : Griffon Vultures (*Gyps fulvus*) (H. Müller)

Falcaria vulgaris, Galium verum, Andropogon ischaemum, Rhapistrum rugosum and *Veronica multifida* grow here. This type of Shiblyak can be found at the transition zone between *Artemisia* steppes and juniper sparse forests down to 200 m a.s.l.

The Shiblyak becomes richer in species on the Dashüz Hills north of the Ajinohur depression, where it climbs up to 550 m a.s.l. Here, *Rhus coriaria, Colutea orientalis* and *Punica granatum* enrich the scrubland. Sometimes, *Cotinus coggyria*, which is even despised by goats, builds dominant stands on northern slopes. Two Ulmaceae species can be found in smaller valleys (*Celtis australis* and *Ulmus minor*).

j) Georgian Oak forests: The Dashüz ridge (up to

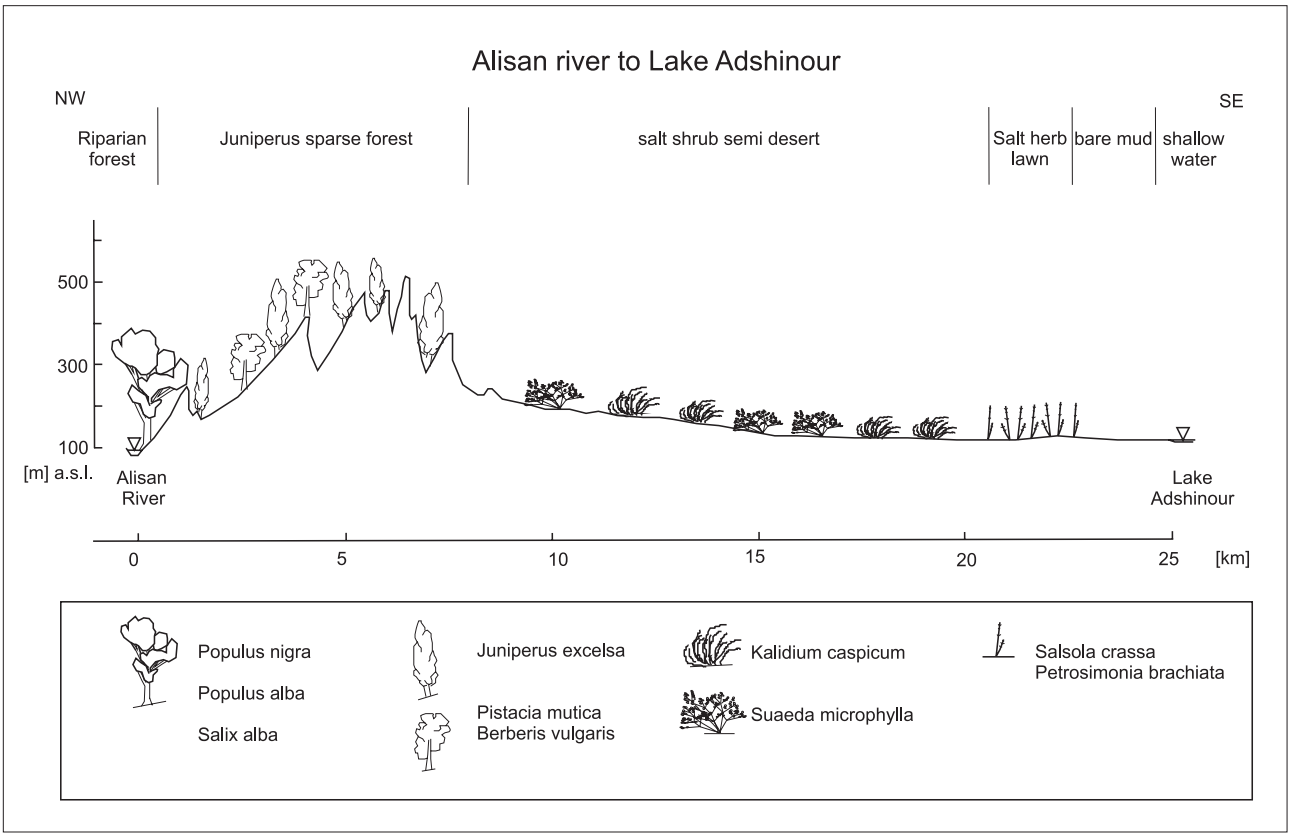


Fig. 22: Cross section from Alazan River to Lake Ajinohur

Photo 39: Iori River Valley with remnants of poplar floodplain forest (S. Schmidt)

828 m a.s.l.) is covered by forests of oak (*Quercus iberica*) and hornbeam (*Carpinus betulus*) at altitudes higher than 550 m a.s.l.. Thirty-seven ligneous and 130 herbaceous species occur here. The trees are often cut or branched and not higher than seven metres. Open patches are overgrown by *Ligustrum vulgare, Prunus spinosa* and *Viburnum lantana*. They build a coppice with proliferating trees such as *Acer monspessulanum, A. campestre* and *Prunus cerasifera*. Lianas such as *Lonicera caprifolium, Vitis vinifera* and *Humulus lupulus* often cover the coppice.

In gullies and on steep northern slopes *Fraxinus excelsior* and *Cornus sanguinea* have become established. Typical herbs for thermophilic Georgian oak forests grow here, e.g. *Buglossoides purpurocaerulea, Melissa officinalis* and *Lathyrus rotundifolius*. The endemic *Ophrys caucasica* grows on dry, exposed slopes together with *Scutellaria orientalis, Stipa* sp. and *Veronica multifida*. Gently inclined northern slopes are covered with open woodland with single trees of *Pyrus salicifolia* and *Quercus petraea* and a closed grass layer of *Bromus erectus* and *Andropogon ischaemum*. Flat sites are used for wheat production.

k) Floodplain forests: The Alazan River is accompanied by a narrow and fragmented fringe of softwood floodplain forests along its way down to Lake Mingächevir. The river valley has steep slopes and the floodplain is seldom wider than 200 m. Cottonwoods (*Populus alba*, *P. nigra*) and willows (*Salix alba*) grow on the banks. Sometimes *Quercus robur* and *Ulmus minor* are intermixed with *Periploca graeca, Vitis vinifera* or young lime trees (*Tilia begonifolia*). On the Georgian side of the Alazan, the forests are in better condition than on the Azerbaijani side, where high grasses such as *Erianthus ravennae* and *Arundo donax* are burned regularly. Only along the Alazan River, the floodplain forests expand into the new delta; the deltas of Kura and Iori are covered by Tamarisk scrubland and reeds.

l) Tamarisk scrubland: The water reservoir with its changing water levels provides difficult habitat conditions for perennial plants. During springtime, banks and deltas are flooded; they dry out three months later. Only *Tamarix ramosissima* and, in some places, *Elaeagnus angustifolia* brave such conditions and proliferate even after long flooding periods. The shrubs are associated with annuals (*Xanthium strumarium, Fallopia convolvulus, Alopecurus myosuroides*) and perennial grasses (*Cyperus rotundus, Calamagrostis epigejos, Cynodon dactylon*). The Tamarisk scrublands are spreading more and more with the extension of the deltas into the water reservoir.

Fragments of an old, planted belt of shrubs and trees around Lake Mingächevir are conserved in some places. They consist not only of Tamarisks but also of more

Fig 23: River inflow to Mingächevir Reservoir 1990 Source: NASA World Wind

Fig 24: Landsat 7 scenes of Lake Mingächevir with the deltas of Kura, Iori and Alazan in 1990 (Fig 23) and 2000 (this Fig.). The deltas significantly expanded. Source: NASA Worldwind

demanding trees such as *Cleditsia caspica, Salix alba, Morus alba* and *Rosa canina*. Most of them are in bad state and not able to regenerate.

m) Phragmites reeds: Some sites of the deltas provide fluctuating groundwater levels near the surface and highly fertile soils. They are covered by stands of *Phragmites australis,* reaching heights of 5 m. Reed is used to build simple stables, but it is also burned down without apparent reason. The herb layer contains *Calystegia sepium, Fallopia convolvulus* and about ten additional species.

Birds: About 200 wild bird species have been recorded in the Mingächevir region, 58 of them are listed in the annex I of the directive 79/409/EEC and 13 by the IUCN (6 NT, 5 VU, 2 EN). 14 species are included in the Azerbaijan Red Data Book and 87 are of special European conservation concern (11 x SPEC 1, 22 x SPEC 2, and 54 x SPEC 3).

Due to the variety of different habitats, the region has a high diversity of breeding, migrating and wintering birds during the year.

In spring and summer the species of high conservation concern can mainly be found in the valleys of the Iori and Alazan Rivers. They are Imperial Eagles (VU) with probably up to 4-5 pairs in old poplars, and Lesser Kestrels (VU) with some hundred breeding pairs in colonies in loam cliffs along the rivers. There is also a sizeable population of European Rollers (NT) breeding in the cliffs as well as in the riparian forests. The remains of forest also hold many species of woodpeckers, tits, and warblers, as well as Golden Oriole, Nightjar, and Scops Owl.

The breeding bird communities of the wide steppes and semi-deserts are dominated by larks and Isabelline Wheatear. Black-bellied Sandgrouse and Stone Curlew occur widely but in small numbers. Typical nesting species of the surrounding hills with steep and high cliffs are Black Vulture (NT) and Egyptian Vulture (EN), which are still numerous in the entire region. In the hills Red-billed Chough, Rock Nuthatch, Finsch's Wheatear and Chukar are typical.

In wintertime the area is an important resting place for Little Bustards (NT). For this threatened species the Mingächevir region is a key site for entire populations. In 2006 more than 40,000 Individuals were counted in the plains of Ajinohur basin, Jeyranchöl and Bozdagh

Photo 40: Demoiselle crane (*Grus virgo*) (S. Schmidt)

steppe. Other birds wintering in this habitat are larks in very high numbers (e.g. 100,000 Calandra Larks at Ajinohur in January 2006) and several raptors such as Hen and Pallid Harrier (NT), Golden and Imperial Eagle, Merlin and the endangered Saker Falcon (EN).

In wintertime the water reservoirs of the Kura are attractive to waterbirds. Besides high numbers of ducks and coots, up to 300 Dalmatian Pelicans (VU), hundreds of Pygmy Cormorants (NT) and also Ferruginous Ducks (NT) have been recorded. During migration many species of waders, terns and gulls rest around the reservoirs and in the deltas of the Kura, Iori and Alazan Rivers. As a species of special local interest, Flamingos have to be noted, with up to 700 counted at the salt lake Ajinohur.

The main threats to the birds of the region are hunting and habitat destruction. Poaching activities have been reported for Little Bustards in the semi-deserts, for Chukars in the hills and waterbirds around the lakes. There is very heavy fishing, especially on Mingächevir reservoir, which also influences the resting birds there. The riparian forests are subject to intense tree cutting, and in the delta of the Iori River wide reed and scrub areas have been burned.

Mammals: 34 species of mammals have been recorded in the Mingächevir region, 8 of which are listed in annex

II and 11 in the annex IV of the directive 92/43/EEC. The Azerbaijan Red Book includes 5 species and the IUCN list 5 (2 NT, 2VU, 1 EN).

The region is rich in bats, with 7 species recorded. Among them are the vulnerable *Rhinolophus mehelyi* and *Myotis emarginatus*. Rodents are represented by 9 species and their density is very high in some parts of the region. Most abundant are *Meriones libycus, Microtus socialis* and *Allactaga elater*. Several large carnivores live in the area, of which *Vulpes vulpes* and *Canis lupus* are common. Much rarer are *Ursus arctos, Canis aureus* and *Hyaena hyaena*, which have been recorded in the Ajinohur region. The dry oak and pistachio forests may still hold a few *Panthera pardus saxicolor*, which have been reported from the Georgian terrain of this landscape. Along the streams of the region *Lutra lutra* can be found regularly.

The hunt for hares was reported and although not proven, there is probably also poaching for the larger mammals.

Amphibians and Reptiles: Four species of amphibians and 21 reptiles have been recorded in the Mingächevir region. Four of them are listed in annex II and 10 in annex IV of the directive 92/43/EEC. *Testudo greaca* is the only species included in the Azerbaijan Red Data Book and in the IUCN list (VU).

The rocky slopes and loam cliffs all over the region are inhabited by several lizards, snakes and *Stellio caucasica*. In the semi-desert plains *Eremias arguta* and *Eremias velox* are common, and *Macrovipera lebetina* has been recorded at different sites.

Along the rivers and at the shores of the reservoirs *Natrix natrix* and *N. tesselata* can be found, together with *Rana ridibunda* and *Bufo viridis*. In reed areas of the lakes and small ponds, e.g. in the Bozdagh area, *Mauremys caspica* and *Emys orbicularis* are common, and *Testudo graeca* is widespread all over the region. *Hyla arborea* and *H. savignyi* occur in riparian and oak forests.

Human influence: All the ridges with their cliffy relief are only used as winter pastures because of the long summer drought. Shiblyak and juniper sparse forests are burnt or cut regularly to enlarge the pastures. At the end of May, the herds of sheep and cattle move up to the Greater Caucasus; during October, they return.

Farms are scattered all over the steppe on flat sites; they are connected by dirt tracks. Irrigated arable land is

Photo 41: Mingächevir Reservoir (J.Etzold)

restricted to river banks and to a small strip around Lake Mingächevir. At higher elevations east of Lake Ajinohur and on the plains between the Dashüz Hills, even rain-fed farming is possible. In the Ajinohur depression, only animal husbandry can be carried out due to strong salinisation.

Fishery is important everywhere around the reservoir. The fishermen live in simple huts at the beach and sell their fish to the Caspian Fish Company. Forestry is only important in forest remnants on the Dashüz Hills. Yet, those forests are used intensively, mostly for fuel and for wood for fence posts.

Around Lake Ajinohur, the runoff from the hills is often collected in ponds or used for irrigation, so it does not reach the lake. Fig 23 & 24 slightly indicate a decline of the lake surface. The decline may have three different reasons or be caused by a combination of them: 1.) water retention, 2.) climate change and 3.) natural oscillation.

Significance & protection: Some parts of the investigated area are already under protection (map prot areas p. xy) - the National Parks Eldar Sham and Gakh and the Nature Reserve (Zakaznik) Korchay.

The faunistic composition of the entire region around Mingächevir reservoir makes this area highly valuable for nature conservation. Due to the rich habitat structure it holds an immense biodiversity with many globally threatened species.

Especially the riparian forests are important breeding

sites for endangered birds of prey and shelter many other species of birds, bats and larger mammals. It is of immense importance to stop the rapidly ongoing destruction of the last remains of riparian forest along the rivers of the area. The steppes and semi-deserts in the region are still in rather good condition, despite heavy grazing activity, and harbour the typical faunal communities of this landscape.

Only little information is available about the actual distribution of the large carnivores, which probably still live in the region. Intensive monitoring is necessary to prove especially the occurrence of Striped Hyena and Caucasian Leopard.

The Ajinohur Lake is the largest natural salt lake in Azerbaijan. It offers habitat for more than 250 Greater Flamingos (*Phoenicopterus ruber*), which could be observed nesting. It may be at risk of drying up due to water retention in the surrounding area; however, additional research is needed on this subject.

As sparse *Artemisia* steppes represent a degradation of dense *Artemisia* steppes, an increase of the latter can be expected if pasturing should increase. Juniper sparse forests could also be more widespread with lower grazing intensities.

Establishing a link between Türyanchay Zapovednik farther east and Vashlovami Zapovednik in Georgia is highly advisable. The loam escarpments with their sparse juniper forests south of Ajinohur Lake should be covered by a strict protection regime and, as a consequence, become a retention area for large mammals such as brown bear and leopard. It would be desirable to include all juniper forests in the existing, strictly protected areas and to stop their destruction

At present, three protected areas exist in the region (see Map 20). However, all of them belong to different regional administrations; the Zapovednik at the Georgian border only is a sub-part of Ilisu Zapovednik. Given the importance of the region for biodiversity conservation, their status as Zakazniks does not seem appropriate and the protection should be strengthened. Additionally, the floodplain deltas of all three rivers to the Mingächevir reservoir should be included in their entirety. The Zakaznik status should be sustained in areas still under utilisation and should act as a buffer to the strict nature reserves, the latter including the loam escarpments with juniper. Sustainable land use criteria need to be developed for the state nature sanctuaries (Zakazniks).

2.5. Mountainous Ecosystems

The mountainous ecosystems are manifold in Azerbaijan, although the pre-dominantly beech forest shows similarities to the European forest communities. Despite these protected areas located at the occupied territories, the majority of reserves is found along the southern slope of the Greater Caucasus. A connection between these is highly advisable. The survey conducted focused on regions in between the existing PA's.

2.5.1. Evaluation of further nature conservation potential for mountainous regions in Azerbaijan

Outside of the existing nature reserves in the Greater and Lesser Caucasus there are still semi-natural forests, which are suitable as potential reserves. Following a pre-selection based on existing data, four regions have been chosen for further detailed investigation. Hereby, the Lesser Caucasus is certainly underrepresented, but due to the inaccessebility of large parts, it is impossible to conduct surveys in theses areas.

Transect I – Gakh: In the Gakh region there is a higher potential for the establishment of further reserves. Especially in the montane and also in the subalpine altitudinal zones, little disturbed hangers are found, which are relatively difficult to access. In the colline zones there are smaller areas of suitable, well-preserved forest.

Gakh is a popular tourism region. It can be expected that the touristic use will restrict the forest use. At the moment, however, the rapidly expanding tourist settlements in the valley bottoms displace the use of grazing lands. A stronger sylvan grazing may result from this.

Transect II – Oguz: Adjacent to Oguz there are near-natural forests, which are suitable as a potential reserve. Of major importance is the semi-natural valley complex above Oguz. The special scarcity value of the valley results from the fact that the valley bottom with its different hydrological conditions and various

Table 4: Overview of potential for further reserves in the forest area of Azerbaijan

	Greater Caucasus				**Lesser Caucasus**	
	Western part	**Middle part**		**Eastern part**		
	Transect I	Transect II		Transect III	Transect IV	
	Gakh	Oguz		Lahij	Sämkirchay	
	Humid	Moderately humid		Dryer	(moderately) humid	
Conservation potential total	**high**	subarea low	subarea **high**	low - medium	generally low	subarea **high**
Upper areas (subalpine zone 1800 - >2000m)	medium - high	low	**high**	low - medium	low	**high**
Middle areas (montane zone 1000 - 1800m)	**high**	low	**high**	low - medium	low	**high**
Lower areas (colline area approx. 500 – 1000 m)	Medium but advisable	low	medium	low - medium	low	medium

substrates is widely covered with semi-natural forest as well. One has to keep in mind that the near-natural valley is adjacent to an intensively used valley. Currently unused areas at the upper anthropogenic timberline and the subalpine upland pastures in regeneration, which are worthy of protection, are located in the transition zone.

Transect III – Lahij: The potential for the establishment of new forest reserves in transect III is only moderately high, because of the high intensity of use. However, there are hard-to-reach, rocky scarps with high biodiversity, which are suitable as reserves. In the region at the upper anthropogenic timberline there are still small-area residual occurrences of the formerly widespread Persian oak forest in the cultural landscape, which is characterized by grazing. These areas absolutely ought to be preserved. A reserve adjoins to the west of the transect III – Lahij in the alpine and subalpine zone. There are definitely possibilities for an expansion. In the montane areas there are intensively cultivated coppice forests and coppice-with-standard forests, with great importance to the local population. The cultivation should be implemented in a sustainable fashion, thereby preserving the productivity and the protective function of the forests for the long term.

Transect IV – Sämkirchay: In the Lesser Caucasus only relatively little forest is preserved. Therefore, the extensively forested upper Sämkirchay Valley, likely which contains the best-preserved forest outside of the reserves in the Lesser Caucasus, is of special conservation value. Significant conflicts concerning its use can be expected if it will be put under protection. In the lower areas of the Sämkirchay Valley the intensity of use is not very high, as well. Therefore it offers the potential for a reserve, which includes the whole range of altitudinal zones from the colline zone up to the montane/subalpine zone.

2.5.2. Comparison with the habitat types of annex I of the FFH guideline (Natura 2000)

The Europe-wide ecological reserve system NATURA 2000 is supposed to admit and develop habitats and species that are of a particular conservation value from a common point of view. Hereafter, the most widespread montane forests of the Greater and Lesser Caucasus in Azerbaijan are compared with the habitat types of the European NATURA 2000 – nature reserve system. For the majority of the forest types equivalents can be found.

For the *Quercus macranthera* forests situated at the

Table 5: Comparison of habitat types of the European FFH-Guideline (Annex I) with widespread forest types of the Eastern Great Caucasus and the Lesser Caucasus in Azerbaijan

NATURA 2000 habitat types	Forest types in the Greater and Lesser Caucasus in Azerbaijan	Comments
Asperulo-Fagetum beech forests NATURA 2000-Code 9130 with *Fagus sylvatica* central European beech forests on base-rich soils, with balanced soil hydrologic balance, mostly humus form mull (abundance of geophytes, productive)	***Fagus orientalis* forests** oriental beech forests in the montane zone under humid conditions	different *Fagus* species, further similar site conditions, similar soil vegetation (*Galium odoratum*, abundance of geophytes etc.)
Pannonic wood with *Quercus petraea* and *Carpinus betulus* NATURA 2000-Code: 91G0 (subcontinental, thermophilic oak-hornbeam-forests) on clayey-loamy, periodically dry soils, in heat-advantaged sites.	**Quercus iberica-Carpinus caucasica-forests** oak-hornbeam-forests of the more dry montane areas	The particular *Quercus*- and *Carpinus*-species are closely related. (*Quercus iberica* can be regarded as subspecies of *Quercus petraea*, and *Carpinus caucasica* as subspecies of *Carpinus betulus* (Schmidt, 2003, 2004). Similarities in habitat conditions and composition of species.
Galio-Carpinetum oak-hornbeam forests NATURA 200-Code: 9170 (periodically dry – periodically wet)	more humid form of the **Quercus iberica-Carpinus caucasica-forests** at the transition zone to *Fagus orientalis* forests	
* ***Tilio-Acerion* forests of slopes, screes and ravines** (ravine forests and mixed hangers) NATURA 2000-Code: *9180 with different subtypes Often in escarpment sites and slip of the substrate.	Hangers of different forms in the montane zone - *Acer-Tilia caucasica*-forests - *Tilia caucasica* forests on rocks, - *Taxus baccata-Tilia caucasica* forests - species-rich hangers with *Tilia caucasica, Acer platanoides, Acer. pseudoplatanus, Ulmus glabra, Fraxinus excelsior, Corylus colurna*, etc.	various hanger types of the Caucasus can be classified in the group of the ***Tilio-Acerion*** forests
No equivalence at NATURA 2000 yet	**Quercus macranthera forests** Persian oak forest at the upper forest line	the admission to NATURA 2000 should take place. Distribution centre in South Caucasia (Schmidt 2004). Because of overgrazing and timber use, endangered in their stands.

upper timberline there are no equivalents in NATURA 2000, but they are worth being protected and should be admitted in the European nature reserve system. The *Quercus macranthera* forests have their centre of distribution in South Caucasia (Schmidt 2004), and their stands are endangered because of overgrazing and timber usage.

2.5.3. Greater Caucasus Mountains

2.5.3.1. Mountain forests near Gakh

Location: The Gakh transect describes mountain forests near the town Gakh on the southern slope of the Greater Caucasus in West Azerbaijan. It ascends up the Kürmükchay main river valley and its tributary valleys.

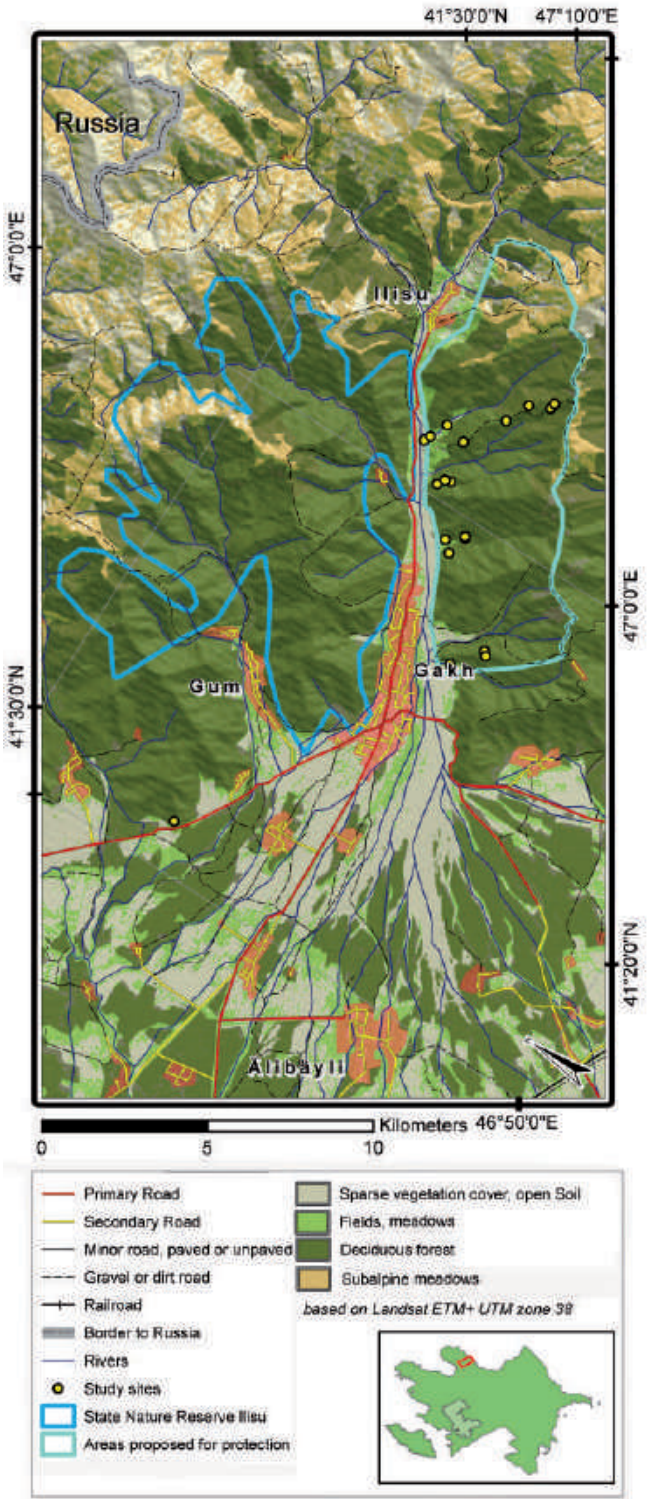
Landscape characteristics: Caucasian Mountain forests - if not overused - harbour an uncommon wealth of species. In the Gakh region, closed deciduous mountain forest is found from the colline stage up to the timberline.

Climate: The Gakh transect shows the highest rainfall of all project areas in the Greater Caucasus. It is situated in the middle between the climate stations of Shäki and Zakatala. The annual rainfall on the lower stages is about 830 mm; the highest mean temperatures occur in July (30°C) and the lowest in January (-2°C) (World Climate Index Map 2009). From the lowest, the colline stage to the highest, the subalpine stage, the climate undergoes a significant change. At the colline stage it is rather warm and dry; up the mountains it grows increasingly colder and wetter. This climatic sequence is reflected in the vegetation zones. The timberline in the Gakh region is determined by pasturing, not by climate.

Soil: Deep, loamy soils prevail in the transect. In the lower and upper montane stages carbonate-rich and skeleton-rich soils are also found. Generally, the soils are shallower on very steep slopes.

Vegetation: Several forest zones can be distinguished between 350 and 2,000 m a.s.l. They are determined mainly by climatic factors and to some extent by human influence.

In the lowest, rather warm and dry colline zones, Georgian



Map 21: Partly supervised satellite image classification of mountain forest above Gakh. Based on Landsat 7 image

Oak (*Quercus iberica*) and Caucasian Hornbeam (*Carpinus caucasica*) dominate the tree population. On dry southern slopes, oak is accompanied by Oriental Hornbeam (*Carpinus orientalis*) instead of Caucasian Hornbeam. In the higher and wetter montane zones, Oriental Beech (*Fagus orientalis*) is dominant, often

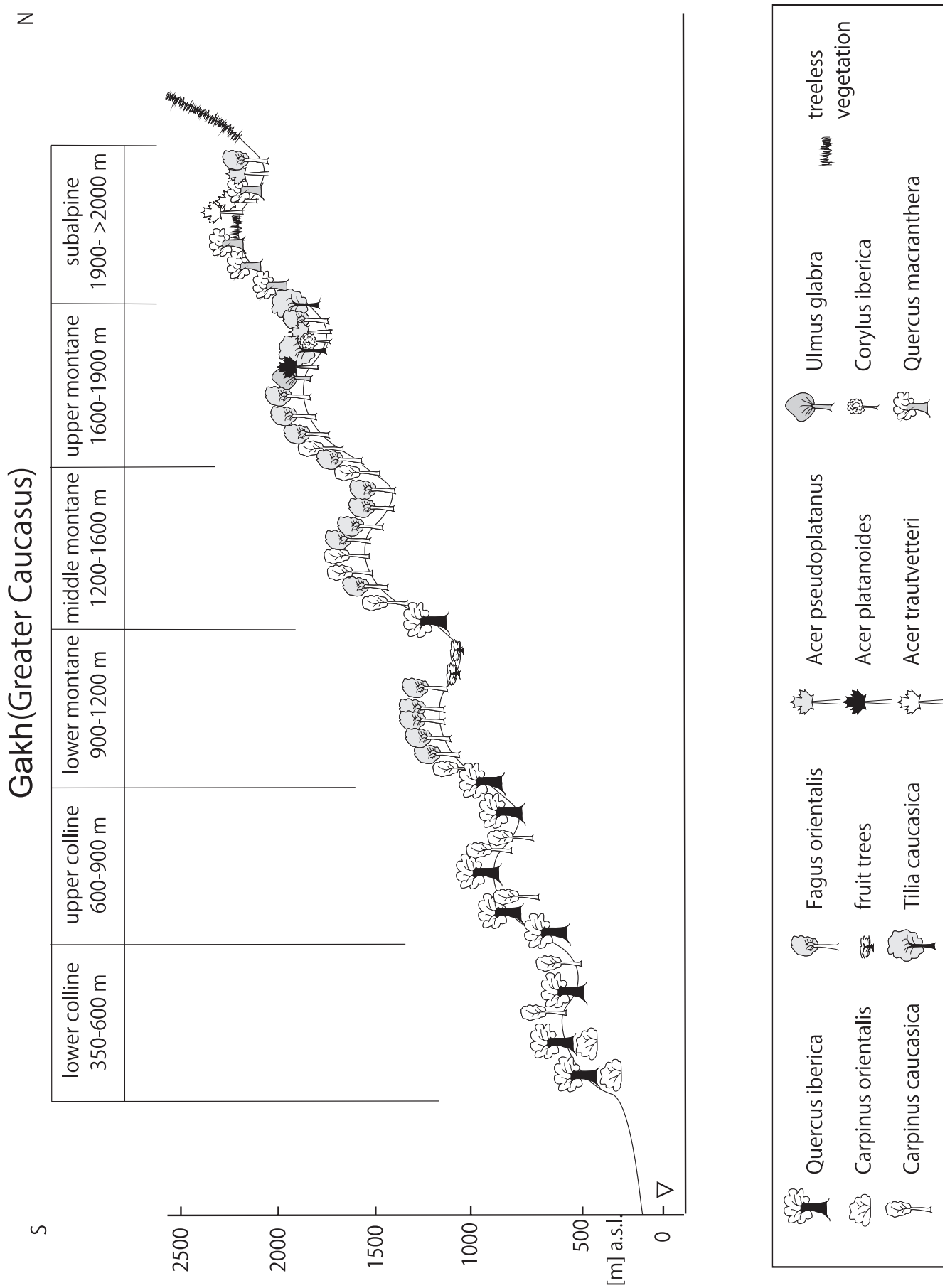


Fig. 25: Gakh: Cross section through the sequence of forest types on the slope

Table 6: Characterisation of forest communities along Gakh transect

Stage	Lower colline	Upper colline	Lower montane	Middle montane	Upper montane	subalpine
Altitude in m	350-600	600-900	900-1,200	1,200-1,600	1,600-1,900	1,900-2,000
Dominating tree species	Georgian oak, hornbeam	Georgian oak, hornbeam	beech	beech	beech	Persian Oak, Trautvetter's Maple
Other tree species	Service Tree, Oriental Hornbeam hawthorn	beech, Service Tree	hornbeam, lime, maple, aspen, yew, Service Tree	hornbeam, lime, maple, aspen, ash, wych elm	hornbeam, lime, maple, ash, wych elm, Tree Hazel, Persian Oak	beech
Forest types on northern slopes	oak-hornbeam forest	oak-hornbeam forest with beech	beech forest, hornbeam-beech forest	beech forest	beech forest	Trautvetter's Maple forest, beech forest (patches)
Forest types on southern slopes	oak-Oriental-Hornbeam forest	oak and oak-hornbeam forest	beech forest, hornbeam-beech forest	beech forest	hornbeam-beech forest	Persian-Oak forest
Forest types in special habitats			ravine forest with maple & lime, steep northern slopes with lime and yew, southern rock faces with oak	on steep slopes forests with lime, maple, ash, hornbeam & elm	on shallow soils diverse slope forest with maple, lime, ash, elm, Tree Hazel & hornbeam	
Felling	moderate to intensive, felling of oak & hornbeam, coppice	moderate to intensive, felling of oak & hornbeam, coppice-with-standards	moderate, coppice-with-standards, felling of single trees	moderate, coppice-with-standards, felling of single trees	little, felling of single trees	moderate, for firewood on the summer pastures
Pasturing	very intensive	intensive on the valley bottom, moderate on the slopes	intensive on the valley bottom, moderate on the slopes	low to moderate pasturing	low pasturing or no pasturing	moderate to intensive pasturing
Consequences of use	oak replaced by hornbeam, stool shoot	forests replaced by scrubland on valley bottom, restrained regeneration on the slopes	forests replaced by scrubland on valley bottom, replacement of beech by hornbeam and oak	promotion of hornbeam	forest regeneration	forests are thinning out, restrained regeneration, downward shift of the timberline
Impact of use	very high	high	high to moderate	moderate	low	very high
Regeneration potential if used less	high	high	high	high	high	low to medium
Threat	high to very high	high	high to moderate	moderate	low	high

accompanied by Caucasian Hornbeam. The timberline is located at about 2,000 m a.s.l. It is formed by Persian Oak (*Quercus macranthera*) and Trautvetter's Maple (*Acer trautvetteri*). Caucasian Hornbeam occurs on nearly the whole transect up to 1,900 m a.s.l. At the upper montane stage, the Tree Hazel (*Corylus iberica* = *C. colurna*), a Caucasian endemic species, is found. It is distributed only in the western part of Azerbaijan.

Birds: About 100 wild bird species have been recorded in the Gakh region, 22 of them are listed in the annex I of the directive 79/409/EEC and 5 by the IUCN (2 NT, 2 VU, 1 EN). 7 species are included in the Azerbaijan Red Data Book and 35 are of special European conservation concern (2 x SPEC 1, 12 x SPEC 2, and 22 x SPEC 3).

The avifauna of the region mainly consists of forest species, accompanied by several species of cultural landscapes. As there still is old growth forest with a sufficient breeding potential left in the area, raptors of many species occur in good numbers here. Among them are Imperial Eagle (VU), Egyptian Vulture (EN), Lesser Spotted, Booted and Golden Eagle, Honey Buzzard, Sparrowhawk, Goshawk and Montague's Harrier; the latter breed in meadows in the foothills and the river fan.

Typical species of the old and wet riparian forest are Golden Oriole, Nightingale, several woodpeckers and Black Kite. Also, Black Stork is still suspected to breed in remote areas. The dry parts of the gravel fan with Georgian Oak and hornbeam forest hold many Scops Owls, Nightjars, Lesser Whitethroats, Olivaceous Warblers and Black-headed Buntings.

The mountain forest is dominated by finches, tits and warblers, including the Caucasian endemic Green Warbler. On meadows, Quails and Skylarks breed and in their surroundings occur Stonechats and Red-backed Shrikes. Along fast-flowing streams, Dipper and Grey Wagtail can be found breeding.

The main threat for the avifauna in this region is destruction of forest habitats.

Mammals: 48 species of mammals have been recorded in the Gakh area, 9 of which are listed in annex II and 16 in the annex IV of the directive 92/43/EEC. The Azerbaijan Red Book includes 1 species and the IUCN list 3 (1 NT, 2VU).

Very rich is the bat fauna with ten species, including *Barbastella barbastellus* and *Myotis emarginatus* (both VU).

Typical small mammals of the forests are *Erinaceus concolor*, *Crocidura leucodon*, *Sorex raddei* and, among the rodents, *Glis glis, Arvicola terrestris, Microtus arvalis* and *Hystrix leucura*. Common carnivores are *Vulpes vulpes, Canis aureus* and also *C. lupus*, *Ursus arctos, Lynx lynx* (NT) and *Felis sylvestris* inhabit the region in smaller numbers. Among the ungulates, *Cervus elaphus maral* and *Capreolus capreolus* occur here.

Amphibians and Reptiles: Five species of amphibians and 18 reptiles have been recorded in the Gakh region. Four of them are listed in annex II and ten are listed annex IV of the directive 92/43/EEC. The Azerbaijan Red Book contains two species and the IUCN list one.

Rana ridibunda, Hyla arborea and *Bufo viridis* are common in the entire region. While *Bufo bufo verrucosissima* is restricted to wet forest areas, *Rana macrocnemis* only occurs at higher elevations in clean mountain streams.

Common reptiles of the region are *Testudo graeca* (VU), *Anguis fragilis, Lacerta pratincola*, *Lacerta strigata* and *Ophisaurus apodus.* On the dry gravel fan, *Elaphe quatuorlineata, Malpolon monspessulanus* and *Typhlops vermicularis* occur, among others. At ponds and along small flows of the lower altitudes, *Natrix natrix, N. tesselata, Maremys caspica* and *Emys orbicularis* are widespread.

Human Influence: All investigation sites of the Gakh transect are outside of protected areas. The mountain forests here are mainly influenced by felling, pasturing and tourism. Compared to other regions in the Greater Caucasus, the Gakh forests are not yet intensively used. In parts, the forests still approach oldgrowth. Steep slopes and low infrastructure prevented the forests from industrial use on a larger scale. Tourism is well developed, which may also be a reason for restricted forestry usage.

Large continuous tracts of forest can be found on steep slopes, especially on the montane stages. Wide parts of the middle and upper montane stages are not used for logging. On the other stages, only individual trees are cut. Clearcuts are rarely found; where they occur, the wood (mostly of best quality) is mainly used for firewood.

Easily accessible areas are used as coppice-with-standards forest. At regular intervals, some of the trees

Photo 42: Mountain forest Gakh, Greater Caucasus (S. Schmidt)

are pollarded. They are usually cut at a height of 2.5 to 3.5 m to keep the young shoots out of the cattle's reach. The branches are then used for dry forage or firewood. Intensive pasturing, especially cattle, and logging have degraded easily accessible valleys to open scrubland with Oriental Hornbeam and Christ's Thorn (*Paliurus spina-christi*). Sloped areas are less strongly influenced by pasturing. In summer, the cattle is driven into the forest every day. Despite this practice, the forests on the colline stages still regenerate at an acceptable rate; damage only occurs in well-trodden parts of the valleys and lower slopes.

The colline and subalpine stages are most strongly influenced by pasturing. The subalpine stage is used intensively for summer pasture; hence the forest regeneration is badly constrained. It is likely that pasturing over a long period shifted the timberline about 300 m downwards. Recently, the intensity of pasturing has declined on some summer pastures.

The montane stages are less severely influenced by pasturing. In some parts the pasturing even stopped; the forests are regenerating very well. Only near the village Ilisu in the upper Kürmükchay River valley, montane forests are used for pastures on a larger scale.

Significance & Protection: Compared with other parts of the southern slope of the Greater Caucasus in Azerbaijan, the forests in the Gakh region are still in relatively good shape. The Gakh transect contains mountain forests only marginally affected by humans. Especially on the montane and subalpine stages, there are hard-to-reach slope forests in very good condition. On the colline stages, patches of well-preserved forest occur as well. Similar forests are degraded in most other parts of the country except in existing protected areas. The Gakh forests represent one of the last refuges for rare species that depend on intact mountain forests. Therefore, it is recommended to give the area protection status, preferably to include the area depicted on Map 21 into the existing Ilisu Zapovednik to the west.

Of high interest are especially the Caucasian Red Deer and Roe Deer, which, due to strong poaching pressure, have become extremely rare in the Azerbaijani part of the Greater Caucasus and still live in the Gakh region. The main goal for the future must be to stop the destruction of forest habitats by logging and re-establish a self-developing forest in the already devastated stands. Furthermore, the hunting for large mammals has to be prohibited to ensure the survival of endangered species

suffering from persecution.
In addition, the mountain forests are highly attractive for tourists. Tourist management within a protected area offers the chance to secure the valuable forests and to further promote tourism, which in turn can provide an alternative income for the current forest users.

However, until the fuel situation is solved at large and the local population no longer depends on wood as fuel, the pressure will not decline substantially. Almost all forests in Azerbaijan face this problem and a solid solution is yet not available. An intermediate solution is the establishment of buffering "energy forests", enabling the region to bridge the gap until other energy sources, e.g. gas supply or green energy schemes, become available. If approved by the MENR, this sustainable approach is due to be tested within the first Biosphere Reserve in the Zakatala-Balakan region as part of the German Caucasus Initiative in 2009.

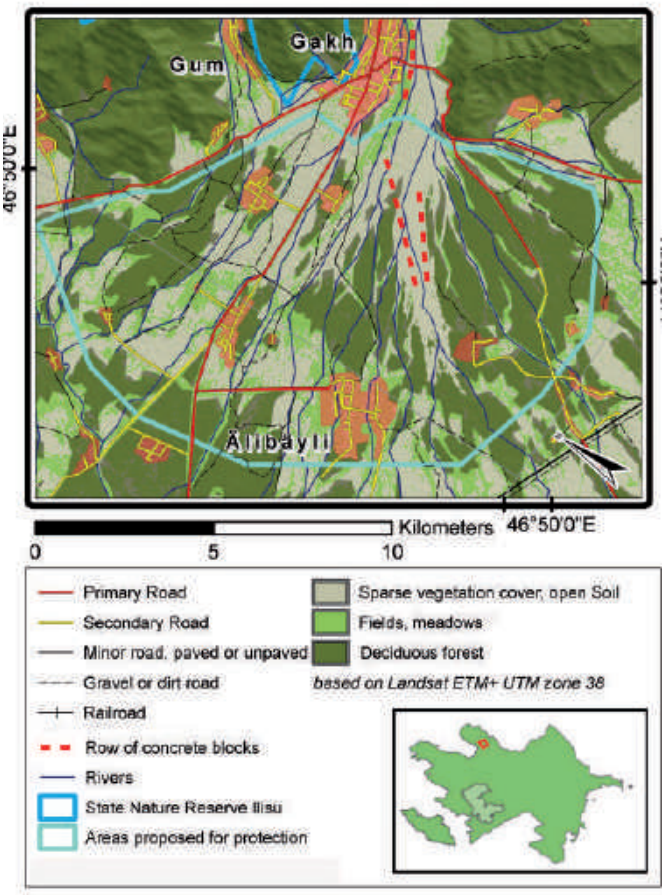
2.5.3.2. Forests of the alluvial soil fans near Gakh

Location: The soil fan of the river Kürmükchay is located southwest of Gakh in north-western Azerbaijan. The entire fan covers an area of approximately 20,000 ha.

Landscape characteristics: The narrow valleys of the mountain streams concentrate the force of the water. Thus, even large boulders are carried downstream. Where the streams leave the mountains, they branch out and loose force quickly. Boulders are the first sediments to be accumulated when the water slows down. The farther the water leaves the mountains behind and the slower it gets, the finer the sediments that are accumulated. Nevertheless, the annual amount of snow and the soil cover in the accumulation area also influence the size of the accumulated sediments.

In the river valley and in the upper part of the soil fan, only coarse material is accumulated. Due to this fact, most of the summer runoff in the river valley and in the upper part of the soil fan flows underground. The water comes to the surface farther down the fan, where the accumulation of fine material prevents the percolation underground.

Above the springs, the topsoils dry out in summer. It depends on the mineral size classes within the topsoil how fast and how deep it dries out. Moist soils can be found only near the streams, but since the streams may change their course annually, moisture is not a permanent site condition.



Map 22: Partly supervised satellite image classification of Gakh gravel fan. Based on Landsat 7 image

Below the springs, the streams are permanent and their beds are well-formed. Usually, they do not change their course. High amounts of fine material in the soils prevent them from desiccation.

The forests of alluvial soil fans are unique and, due to a different fluvial regime, not comparable to the vegetation along lowland floodplains. During spring, enormous amounts of snow melt spill into the alluvial forests. As a result, flooding and subsequently the supply with water vary strongly over the annual cycle, thus shaping a patchy coexistence of various stages of forest succession.

Climate: See chapter 2.5.3.1.

Soils: In the upper part of the soil fan, carbonate-free alluvial soils are found; in the lower part the alluvial soils can contain carbonate (Mamedaliev 1963).

Vegetation: Recurrent flooding affects the vegetation

Photo 43: Gakh gravel fan with White Poplar floodplain forest (S.Schmidt)

of the soil fan. Its influence is greatest in the upper parts of the fan and smallest in the lowest parts. Hence, the plants in the upper part have to be better adapted to the flooding than in the lower part, e.g., possessing thick bark like the Black Poplar or being able to colonize raw soils quickly. The vegetation is influenced directly - trunks and roots are damaged, roots are washed out or the sites are waterlogged for a short time. Indirectly, flooding affects the water supply, soils, density of the forests, and the climate within the stands.

Depending on the type of substrate and on water supply, different forest types can be found. Sessile oak forests grow on dry gravel sites; oak-hornbeam forests occur where the groundwater level is higher. Caucasian Hornbeam is replaced by Common Hornbeam in the latter.

Poplar forests occur as an early succession stage on soils that are waterlogged in spring; they develop into oak or mixed Persian Maple forests. Alder is the dominant tree on wet soils. With increasing accumulation of humus, Caucasian Wingnut becomes more and more prevalent and finally replaces the alder completely.

The following paragraphs describe the basic forest types. They characterise only parts of the forest precisely because most stands are subject to various natural or anthropogenic disturbances. However, they give a compact overview:

a) Dry oak forest: This vegetation type develops on sites with dry topsoil in spring and summer. It can be found in the upper part of the soil fan where mainly coarse material is accumulated and the groundwater level is deep below ground. The dominating trees are *Quercus iberica* and *Carpinus caucasica*.

b) Fresh and moist oak forest: On sites with dry topsoil in spring but good water availability in summer, fresh oak forests occur. The soils also have a higher content of fine material than in the dry oak forests. Hence, their capacity for water-retention is better. Moreover, the sites are situated in the lower parts of the soil fan where the groundwater level is higher. The forests appear very similar to the dry oak forests, except that, besides *Carpinus caucasica,* they are dominated by *Quercus pedunculiflora*, not *Q. iberica*.

Degraded forms of oak forests are: Smoke-tree scrubland (*Cotunus coggygria*), Smoke-tree-oak light forest with Oriental Hornbeam, hornbeam scrubland or oak light forest. They can be accompanied by *Eleagnus* sp., *Juniperus communis* on dry sites or *Acer campestre* on

moister sites. Degraded forms develop due to logging and selective grazing.

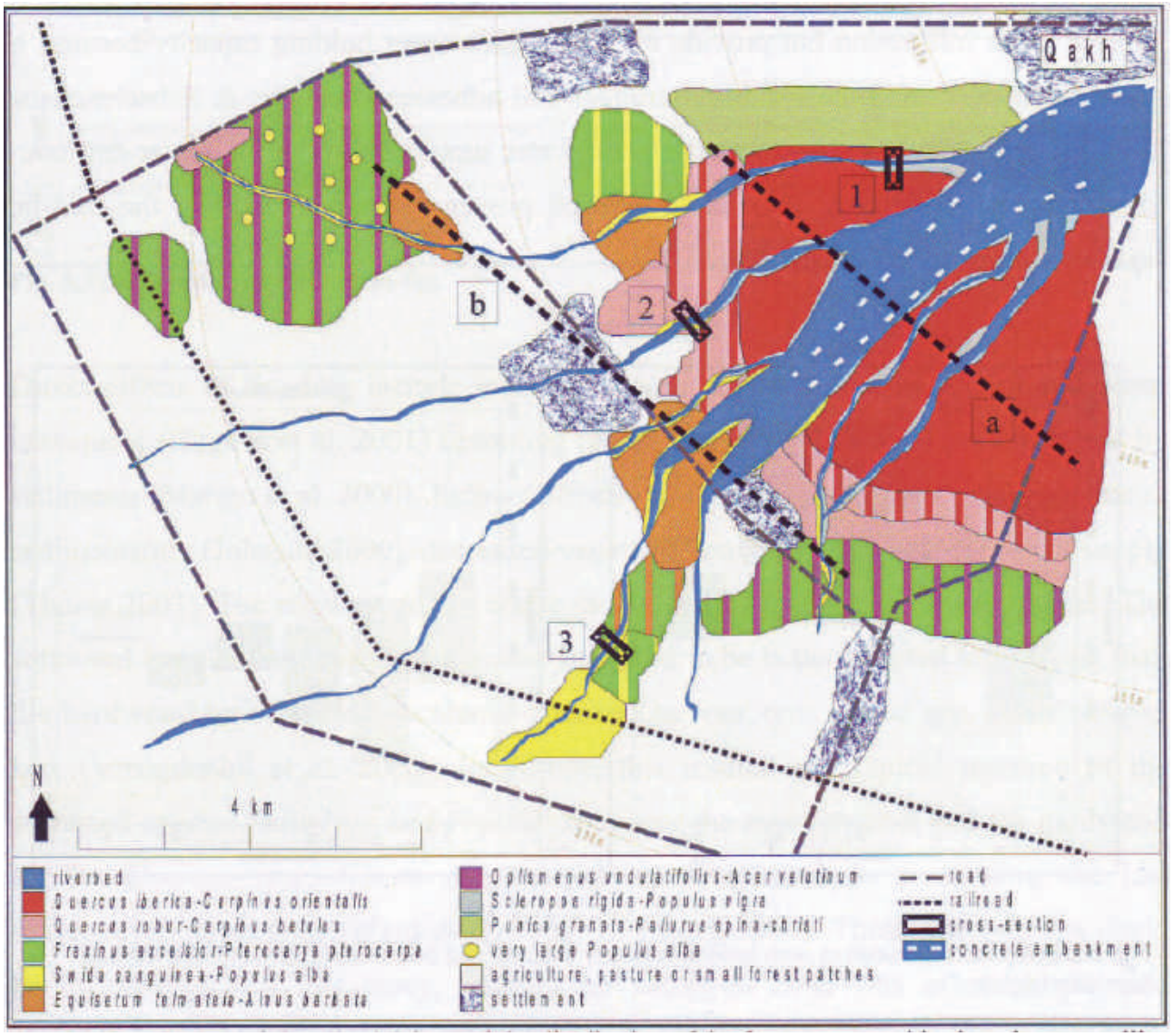
c) Oak-hornbeam forest: On sites with high groundwater level, oak-hornbeam forest follows the oak forests in succession. Its presents demarcates wet sites from the dryer ones. With increasing moisture and maturity, oak-hornbeam forests are interspersed with *Acer velutinum*. Other typical species are *Cornus mas, C. sanguinea* and *Mespilus germanica*.

Felling of oak promotes the establishment of maple in oak-hornbeam forests. *Acer campestre* preferably colonises dry sites, while *A. velutinum* occupies moister areas.

d) Black Poplar forest: Black Poplar rejuvenates on raw soils with coarse material, which are wet in spring. It is very sensitive to drought until the roots reach the groundwater. The aggregation of coarse material is typical for Black Poplar forests; the trees are well adapted to it with their thick bark. The amount of aggregated fine material is one of the deciding factors for the development of a specific type of oak forest later.

e) Mixed poplar forest: Mixed poplar forests develop on sites with good water availability in summer. They are dominated by Black and White Poplar. When the roots reach the water flowing underground, the White Poplar grows higher and outcompetes Black Poplar.

f) White Poplar forest: These forests consist mainly of White Poplar and grow on soils that are moist in spring and summer. Due to fine substrates and therefore good nutrient availability, they are very dense and dark. Later



Map 23: Coarse overview of Gakh gravel fan and the distribution of forest communities. Mixed stands are depicted striped. The fan cross section indicated by dashed black line, the river bed cross sections by numbers.
Graphic taken from M.Zimmermann (2009): Ecology and regeneration of forest communities on the alluvial fan near Qakh. Attached to this report.

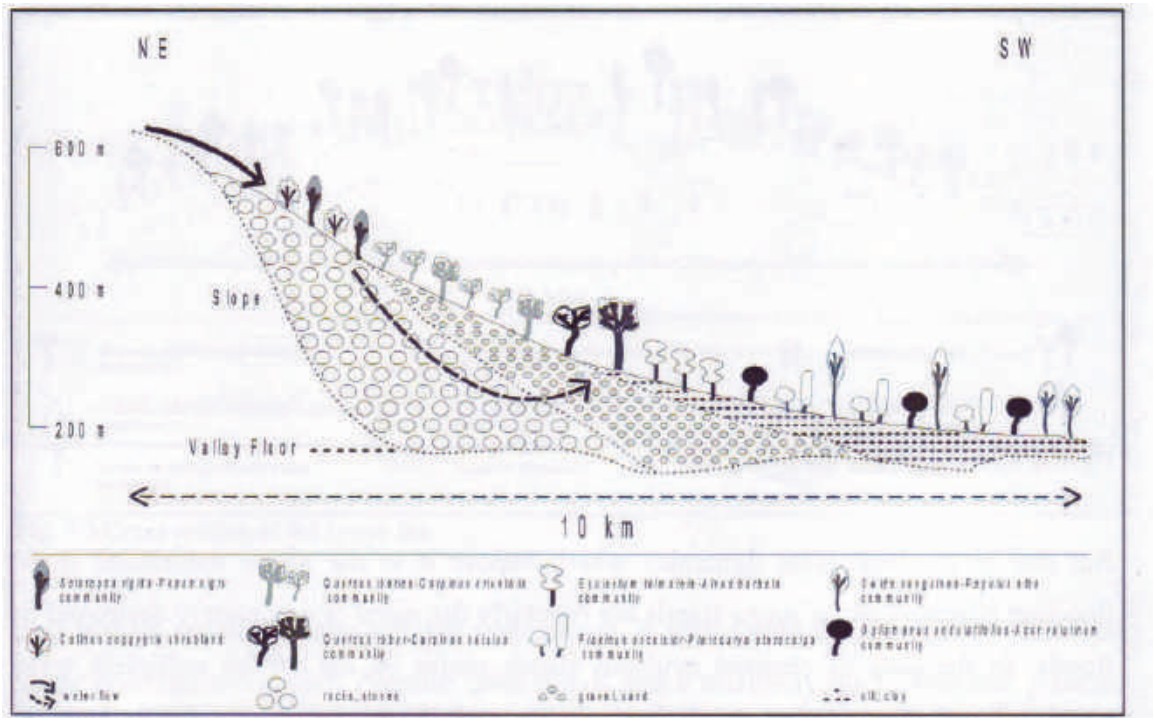


Fig 26: Longitudinal cross section of the gravel fan

Fig 27: Cross section through upper fan

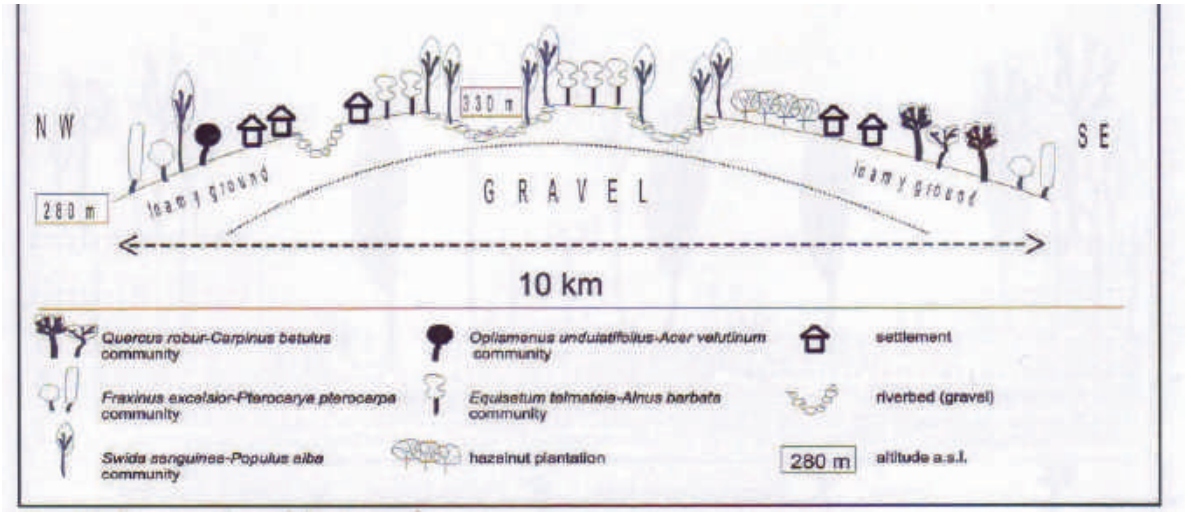


Fig. 28: Cross section through lower fan

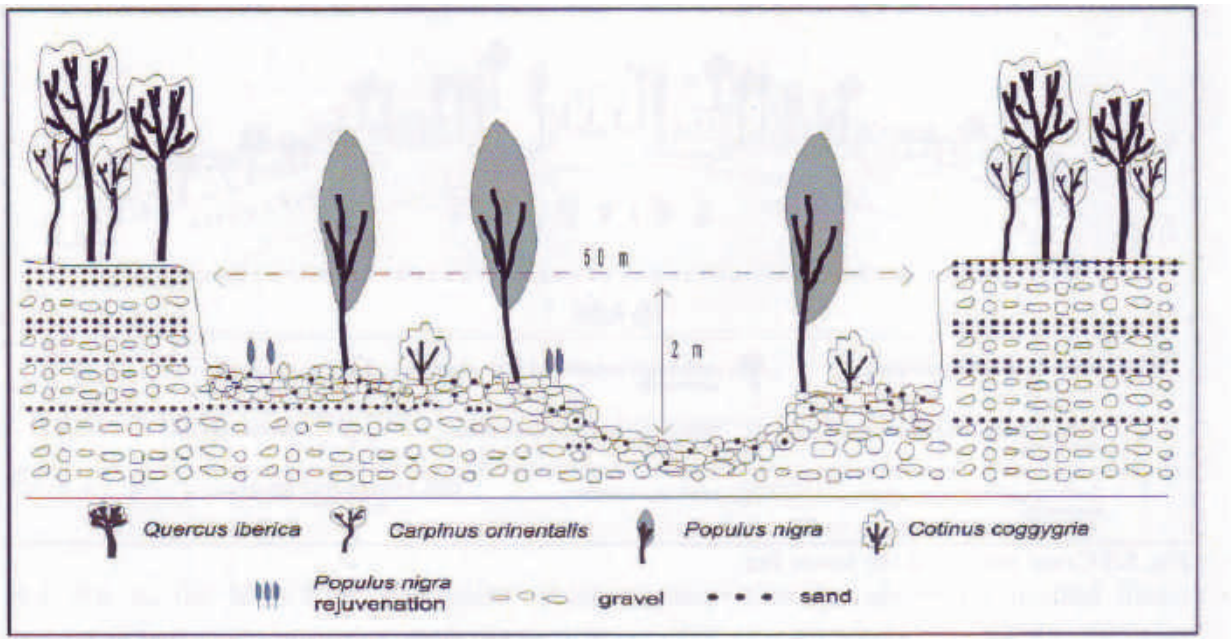


Fig. 29: Cross section through riverbed, upper fan

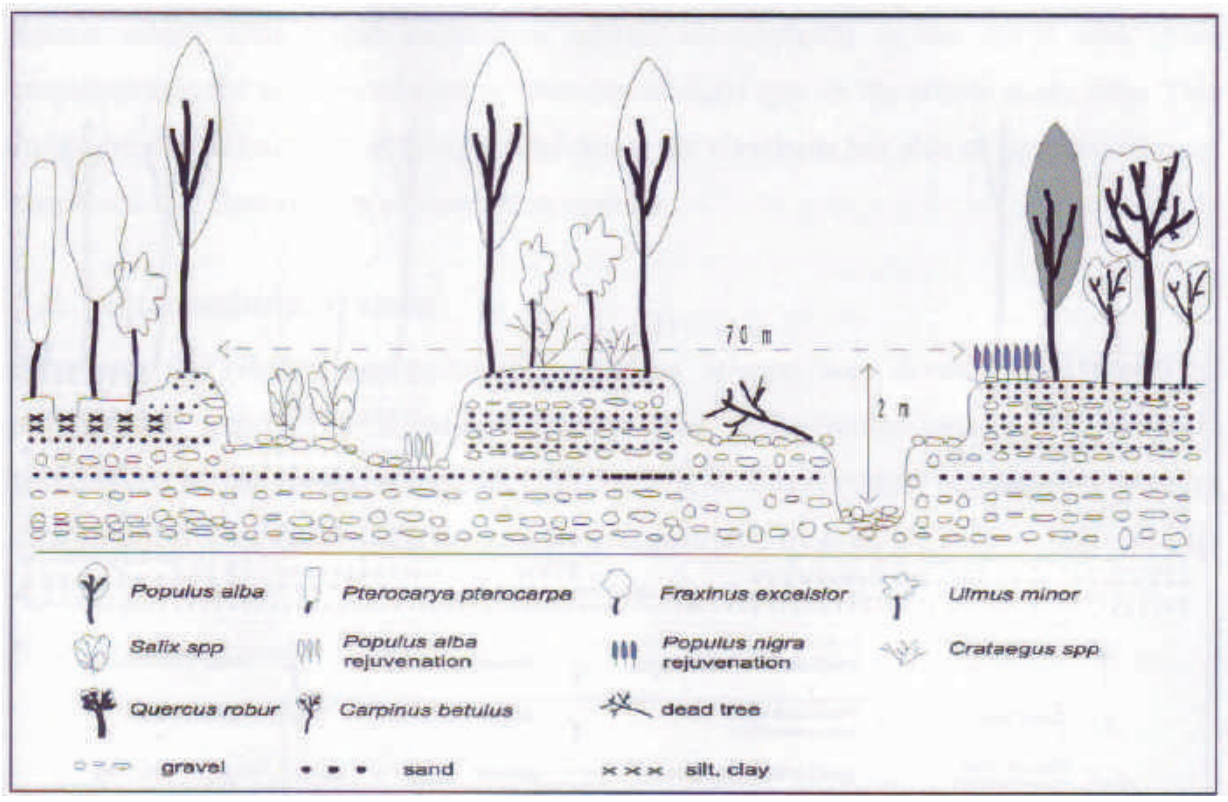


Fig. 30: Cross section through riverbed, mid-fan

in succession, when the White Poplar gains in height, more light can penetrate the trees and soils start to develop. The White Poplar is then accompanied by *Cornus mas, C. sanguinea* and *Euonymus europaeus*.

Felling of White Poplar promotes the establishment of *Carpinus betulus*, elm, *Acer campestre* and *A. velutinum* in dark poplar forests.

g) Mixed Persian Maple (*Acer velutinum*) forest: This forest type follows the dark poplar forest in succession on sites with high groundwater level. Like the dark poplar forest, it is also very dense. One of the few trees besides maple is *Tilia caucasica*, which is well adapted to shade. On dryer sites, mixed Persian Maple forests contain a larger share of hornbeam. On wetter sites the Caucasian

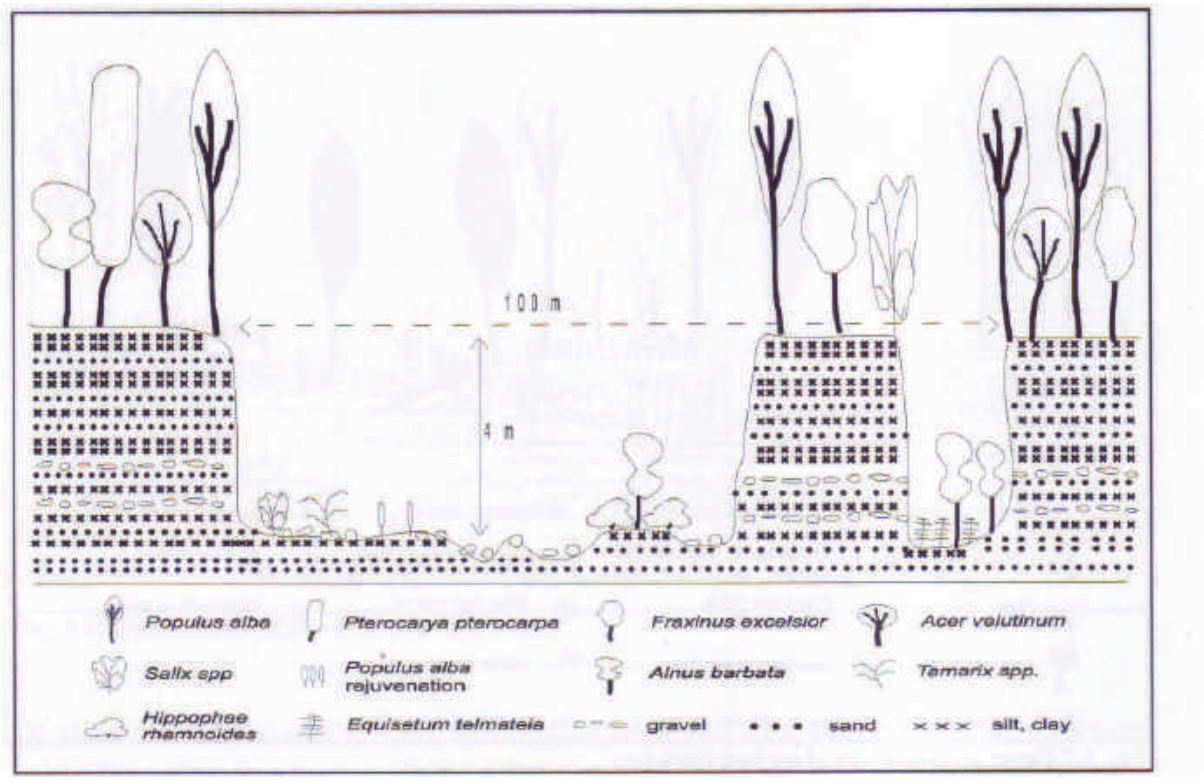


Fig. 31: Cross section through riverbed, lower fan

Wingnut (*Pterocarya fraxinifolia*) takes root.

h) Alder forests: In places where the water flowing underground comes to the surface, alder (*Alnus barbata*) forests occur. The soils are wet year-round; one of the indicator species for such springs is *Equisetum maximum*. On the banks and in wet depressions near the perennial rivers below the springs, alder forests are also common. They are accompanied by a rich herb layer with e.g. *Salvia glutinosa* and *Mentha aquatica*.

When the alder forests grow denser and the spiny liana *Smilax excelsa* ascends into the crowns of the trees, the herb layer disappears except for a few species. With increasing humus accumulation, the Caucasian Wingnut mixes with the alder and together they form the alder-wingnut forest.

Many attempts have been made to convert periodically dry alder forests into walnut plantations. *Spinax excelsa* is cut to allow access for cattle. If pasturing is impeded by flooding, *Rubus* sp. invades the area, followed again by alder. If the area can be kept open, it dries out quickly after the last alders are removed, whereupon many walnut plantations die off, too.

Human influence: Without interference, the volume of the soil fan would grow steadily and the streams in the upper part would change their course within a short period, thus setting back succession and subsequently destroying construction.

The only reason to colonise such a risky area was its agricultural value. Facing south, heating up quickly and being well-supplied with water and providing good quality soil in the lower reaches, the area is very attractive for settlement. All three villages on the soil fan are situated near the springs.

Already before World War II, dikes and ditches were built to regulate the river dynamics. Yet, they did not withstand greater flooding. After the war, the riverbeds were dredged out annually and more dikes constructed. The breakthrough in river regulation came with funnel-shaped rows of concrete blocks, which allow the water to pass but determine the main course of the river (Map 23). At times of high water discharge, the riverbed is deepened by the concentrated force of the water. To prevent the riverbed from filling up afterwards, it is dredged out annually. The dredging of the riverbeds caused the forest on the river isles to increasingly fall dry. As a result, productivity dropped significantly in those forests.

The dredged material is used for the construction of dikes along the riverbanks. Large amounts of gravel from the soil fan are extracted for asphalt production.

Photo 44: Gakh gravel fan (S. Schmidt)

Since the river regulation reliably prevents flooding, the villages on the soil fan expand.

Overall, the river regulation caused many areas to be completely cut off from the river dynamics, and a few areas to be affected by it unnaturally often. Tree species of latter succession stages, such as Persian Maple or Caucasian Wingnut, were able to spread widely, whereas species of earlier succession stages, such as Black and White Poplar, declined. The consequences of logging and pasturing are explained individually for the vegetation types in the previous paragraph (see above).

Significance & protection: Despite its alteration in parts, the soil fan near Gakh probably harbours the largest remaining forest area as part of this geomorphologic formation. Soil fans at the foot of the southern slope of the Greater Caucasus still occur east and west of Gakh, although the forest on these fans has been altered more heavily, or they have been deforested entirely.

Although the river dynamics have been restrained artificially to a large degree, in places the forests still display the unique vegetation types of undisturbed, dynamic soil fans. Furthermore, the forests have a very high regeneration potential. If the active measures of river regulation would discontinue, we assume the river dynamics would soon restore natural conditions.

Hence, the preservation of these remnants of a formerly widespread landscape - a characteristic but threatened ecosystem - is of utmost significance for the country.

Yet, the renaturation of the soil fan would require to abandon villages in the area, since they would no longer be safe. If this possibility shall be considered, socio-economic surveys among the population of the villages and a cost-benefit analysis are needed. The investigations should concern:

- the people's willingness to resettle,
- costs of resettlement,
- management costs of the protected area,
- possible new income from tourism,
- savings from the discontinuation of river regulation, and
- income from the use of poplar forests in buffer zones for energy production.

It would also be possible to limit renaturation to only part of the soil fan - a "cake slice". But since this part would

then accumulate material and grow, the protection of the adjoining areas would soon require disproportionate efforts.

If resettlement is ruled out entirely, it would be advisable to investigate the uninhabited soil fans in Azerbaijan with regard to their vegetation and regeneration potential. Until a protected area on a soil fan is established, the forests of the soil fan near Gakh should not be used for logging or pasturing to preserve them as a source for diaspores.

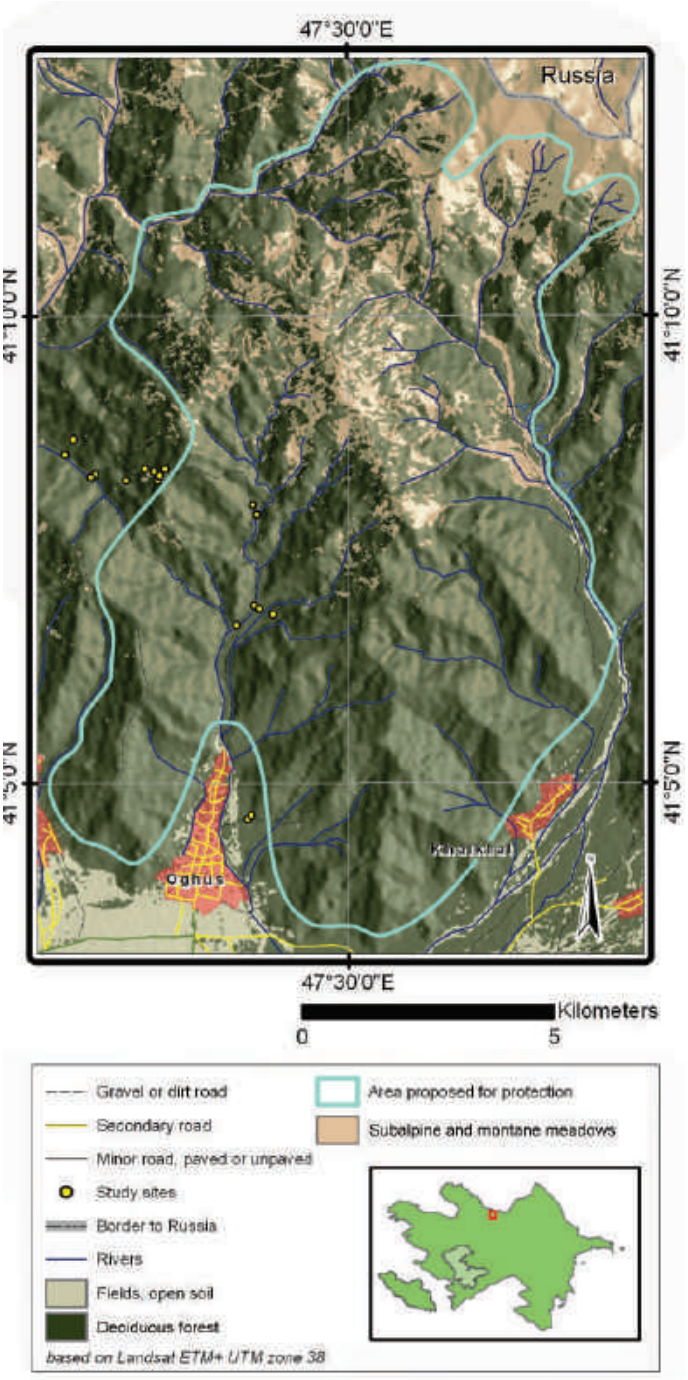
2.5.3.3. Oguz mountain forests

Location: The transect describes stream-valley and mountain forests above the town Oguz on the southern declivity of the eastern Greater Caucasus. From Oguz, the transect ascends up the mountain stream and its tributary valleys.

Landscape characteristics: The stream valley, situated directly above Oguz, possesses only a small catchment area. As a result, the valley is characterized by rather weak river dynamics and low runoff peaks. The mountains are covered with well-preserved deciduous forest from the colline stage up to the timberline. Even the valley floor is covered with forest - which is rarely found in similar valleys in Azerbaijan.

Climate: The Oguz transect receives less precipitation than the Gakh transect. The climate station of Shäki, which lies 30 km to the north at a similar elevation, measures an annual rainfall of 770 mm. The highest mean temperatures on the lowest stage occur in July (29.5°C) and the lowest in January (-2°C). From the lowest, the colline stages, to the highest, the subalpine stage, the climate undergoes a significant change. On the colline stage it is rather warm and dry; higher up the mountains it grows increasingly colder and wetter. This climatic sequence is reflected in the vegetation zones. The timberline in the Oguz valley is determined by rocky scarps; in the surrounding region it is determined by pasturing.

Soil: On the colline stage, deep loamy soils prevail; on the lower montane stage, gravel and deep, loamy soils alternate. Rubble with varying shares of earth and colluvia occurs on the middle montane stage of the transect; shallow soils on rubble or bedrock and deep, loamy soils occur on the montane stage. On the



Map 24: Partly supervised satellite image classification of mountain forest Oguz survey area. Based on Landsat 7 image

subalpine stage, a deep loamy soil was found.

Vegetation: Between 650 and 1,900 m a.s.l., several forest zones can be distinguished. They mainly depend on climatic factors, which change gradually with rising altitude.

Caucasian Oak (*Quercus iberica*) and Caucasian Hornbeam (*Carpinus caucasica*) dominate on the rather warm and dry colline stage. On the lower and middle montane stages, Oriental Beech (*Fagus orientalis*) prevails

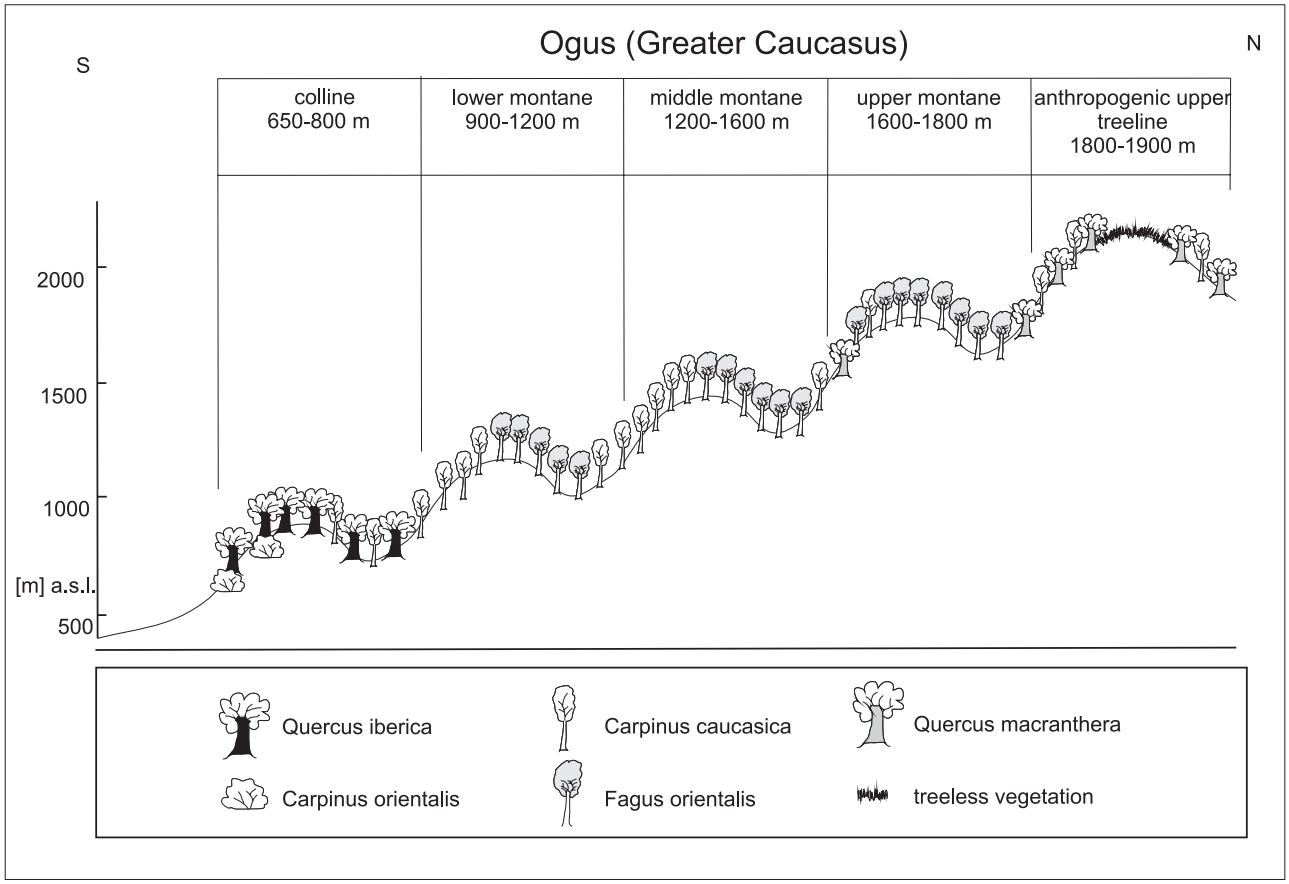


Fig. 32: Oguz: Cross section through the sequence of forest types on the slope

on the humid northern slopes and Caucasian Hornbeam on the dryer southern slopes. In the upper montane stage, Oriental Beech is predominant on all expositions. The timberline lies at 1,900 m a.s.l. and consists of Persian Oak (*Quercus macranthera*) and Caucasian Hornbeam. It probably was a lot higher once but shifted about 300 or 400 m downslope due to summer pasturing (albeit not very intensive in this region) at high altitudes.

Human influence: There are no other settlements in the valley except Oguz at the valley's entrance. Due to the steep, rocky relief on top of the mountains, there are no summer pastures directly around the valley. Hence, it is influenced by pasturing only on a very low scale. In the wider area around the valley, many mountain pastures are abandoned or little used and the forests are regenerating. However, in well-accessible areas, cattle graze in the rare valley-bottom forests, thus constraining the forest regeneration.

In Soviet times, the valley was under protection. Now the lower valley is used for local recreation, and logging still only proceeds at a low, but recently increasing rate.

Significance & protection: The Oguz valley contains extremely rare valley-bottom forests and well-preserved mountain forests. They are still approaching the oldgrowth stage. In most cases, forests like this have long since been turned to pastures or scrubland. Especially on the valley bottom, the forests in the Oguz valley are threatened by the recently increasing pressure from human use. The preservation and remaining natural condition of the forest surrounding Oguz – in particular its altitudinal intactness, from colline to high montane - is remarkable and should be preserved. Whether the designation of a protected area is necessary needs to be decided by the government – a chain of protected areas does exist already along the southern slope of the Caucasus. However, the designation of Shahdag National Park, currently (2009) conducted by the World Bank should target the inclusion of the well-preserved Oguz forest. As well as the river-bottom forests, the surrounding mountain forests may become part of the protected area, the latter in particular as the forests are still in excellent condition; and they fulfil important functions for the forests on the valley floor.

Table 7: Forest characteristics Oguz transect forest communities

Stage	Colline	Lower montane	Middle montane	Upper montane	Upper montane/ subalpine
Altitude in m	650-800	900-1,200	1,200-1,600	1,600-1,800	1,800-1,900
Dominating tree species	Georgian Oak, hornbeam, Oriental Hornbeam	beech, hornbeam	beech, hornbeam	hornbeam	Persian Oak, hornbeam,
Other tree species	Caucasian Maple, hawthorn	maple, lime, Service Tree, wych elm, fruit shrubs, Black Poplar, alder	lime, maple, aspen, ash, Georgian Oak , wych elm	hornbeam, Persian Oak	lime, Bird Cherry beech, ash, sycamore,
Forest types on northern slopes	Georgian Oak -hornbeam forest	beech forest	beech forest	beech forest	Persian Oak-hornbeam forest
Forest types on southern slopes	Georgian Oak forest, Georgian Oak -Oriental-Hornbeam forest	hornbeam forest	hornbeam forest	beech forest	Persian Oak-hornbeam forest
Forest types in special habitats		gravel terrace with beech and beech-hornbeam forest or with Oriental Beech, riparian forest with Black Poplar and alder	rocky slope with lime, ravine forest with maple, slope forests with ash, maple & lime	shallow soil with beech, if used more intensively promotion of Persian Oak & hornbeam	
Felling	intensive felling of Georgian Oak, hornbeam & Oriental Hornbeam	felling of single trees	felling of single trees	no felling in study area	no felling in study area, felling in the past
Pasturing	intensive to very intensive	low to moderate	low to moderate	recently no pasturing	recently no pasturing, formerly intensive summer pastures
Consequences of use	replacement of GeorgianOoak by Oriental Beech	forests replaced by fruit or Oriental-Beech scrubland in the valleys, promotion of hornbeam on the slopes	forest rejuvenation because of felling, moderate influence from pasturing	forest rejuvenation because of felling, former intensive pasturing promoted oak & hornbeam and suppressed beech	Former intensive pasturing promoted Persian Oak, restrained the forest regeneration and shifted the timberline downwards
Impact of use	very high	high	moderate	low	-
Regeneration potential	medium to high	high	high	high	high
Threat	high to very high	high to very high	high	medium	high

2.5.3.4. Lahij mountain forests

Location: The Lahij transect is situated about 30 km east of Ismayilli in the outermost ranges of the Greater Caucasus near the Ismayilli State Nature Reserve. The transect stretches along the Girdimanchay River valley between Täzäkänd and Burovdal.

Landscape characteristics: The area around Lahij is an ancient cultural landscape. Long-term use as pastureland caused most of the mountain forests to be replaced with grass and scrublands.

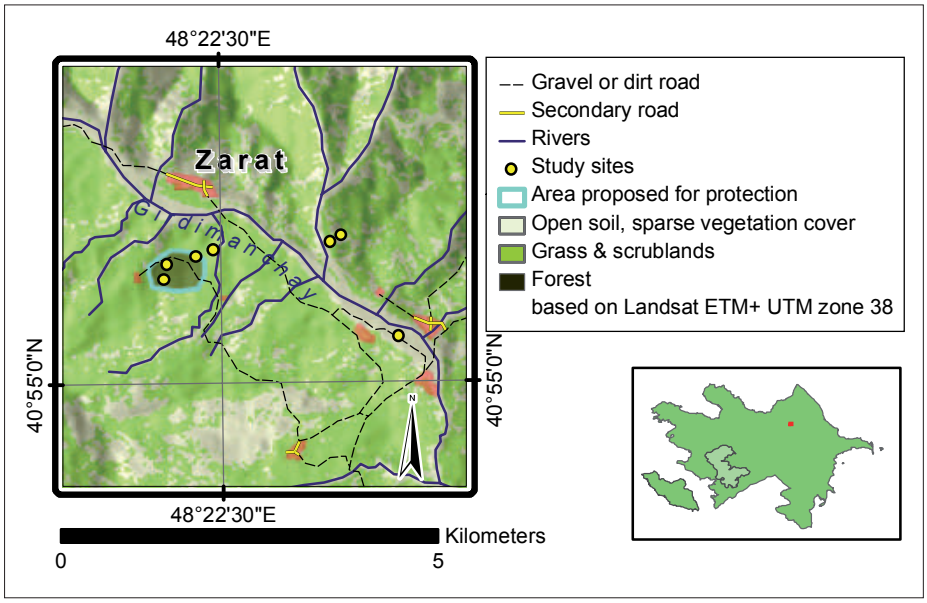
Climate: On the lowest stage, the climate is hot with dry summers. Precipitation increases and temperatures drop with rising altitude. The transect is located midway between the climate stations of Ghäbälä (682 m a.s.l.) and Shamakhi (749 m a.s.l.) and starts at 800 m a.s.l. The highest mean temperature on the lowest stage is about 29.7°C in July and the lowest mean temperature is about -3.5°C in January (World Climate Index Map 2009). Precipitation amounts to about 700 mm annually, which is less than on the Oguz or the Gakh transects. The actual timberline is determined by human use, not by climate.

Soil: The soils in the Lahij transect are mostly carbonate-rich or at least stock on carbonate bedrock (Mamedaliev 1963). On the lower colline stage, sites with thin soils on bedrock, sandy river sediments on gravel and bare rock were investigated. On the lower montane stage, humus or fine soils on carbonate bedrock, bare carbonate bedrock and gravel with fine soil were found. Skeleton-rich loam and gravel were found on the upper montane stage, and mountain loam near the timberline.

Vegetation: On the Lahij transect, forests can be found from 800 to 2,000 m a.s.l. Caucasian Oak (*Quercus iberica)* and Caucasian Hornbeam (*Carpinus caucasica*) are the dominating trees on the lower stages; Persian Oak (*Quercus macranthera*) dominates on the higher stages. However, the forests here have mostly been replaced by pastures or scrubland. On southern slopes, degraded scrubland of Persian Oak can be found up to 1,700 m a.s.l.; on northern slopes, forests with fruit trees and shrubs and sometimes Persian Oak occur up to 2,000 m.

Beech is rare in the area because of dry conditions and perhaps also because of human influence. It is restricted to gorges or northern slopes on the colline and lower montane stages.

Particularly the upper montane stage deserves to be mentioned in detail, as this altitudinal belt is characterised by the occurrence of fruit tree species, which dominate the landscape. The upper montane belt has been transformed into pastureland over a long period, thus representing a historically grown cultural landscape. Without utilisation, Persian Oak would dominate to the upper treeline. Within this pastoral scenery, fruit trees occur at significant numbers, but they are mainly restricted to sheltered areas and locations with a higher water supply (e.g. northern slopes, depressions, colluvial areas, etc.).



Map 25: Partly supervised satellite image classification of suryev region above Lahic. Based on Landsat 7 image

Given the lower anthropogenic impact, northern slopes are still covered with a mixture of Persian Oak and fruit tree forest. On southern slopes, Persian Oak shrub can be found. Hornbeam no longer occurs here, due to the rather intense utilisation and the altitude.

Fruit trees promoted by grazing and spreading in the area are mainly barberry, buckthorn, hawthorn, *Morus* and various *Prunus* sp. Most of the species carry thorns, which prevent heavy grazing.

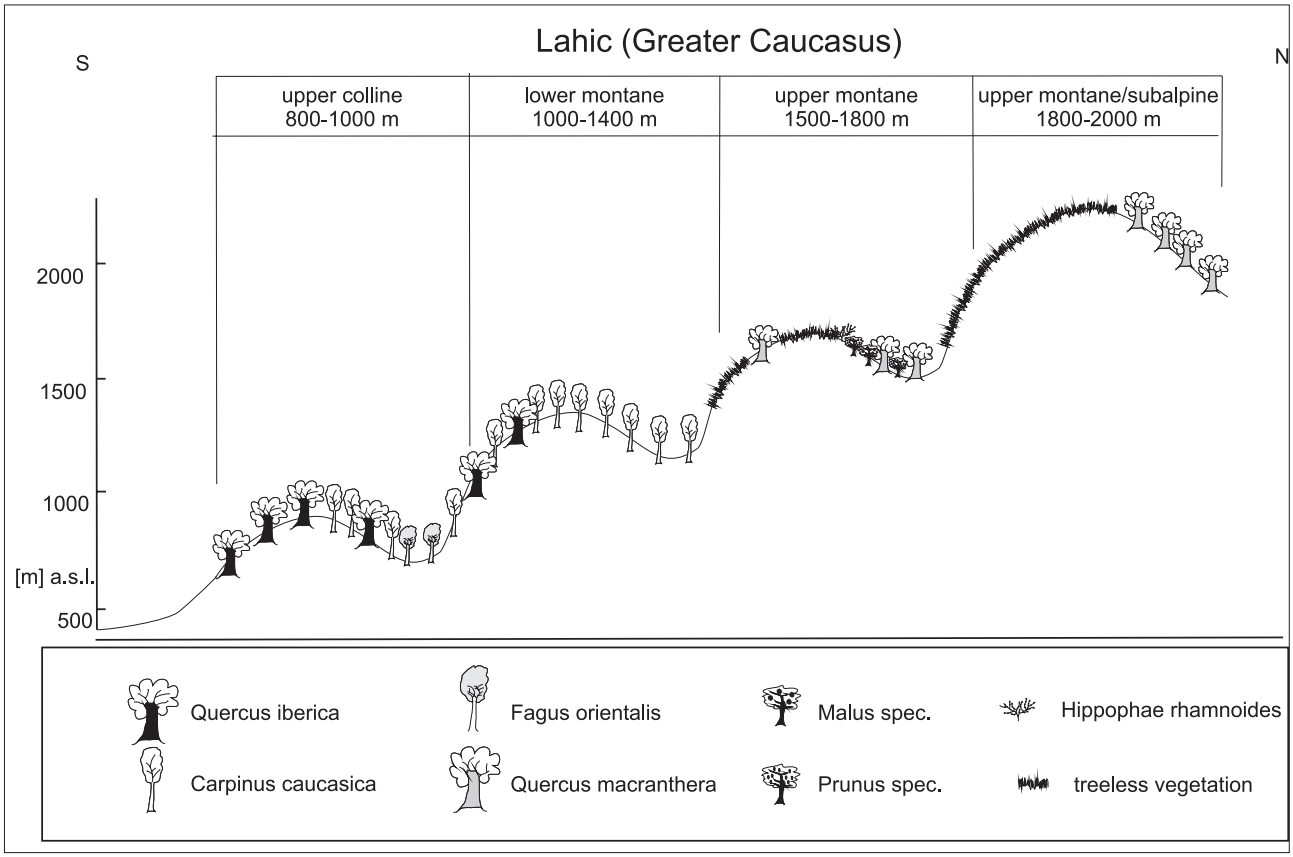


Fig. 33: Lahij Cross section through the sequence of vegetation types on the slope

Human influence: Owing to past and present intensive use, forests have declined dramatically in the area. On the upper colline stage, high forests are still present, whereas they have vanished from the lower montane stage. Supposedly, the forests on the colline stage are used less intensively than those on the montane stages. High forests on the montane stage have been entirely replaced with intensively used simple coppice or coppice-with-standards. Recent hillside slides could be observed on this stage.

Many steep slopes on the lower montane stage show skeleton-rich soils and sparse forests or scrubland. It can be assumed that these slopes were formerly covered by dense forests - as can be seen on the Oguz transect. After past felling, the soils probably eroded and the forests could not regenerate.

Especially in the grasslands on the upper montane stage, only insular patches of forest remain. Still, they illustrate the potential for the mountains to be covered with forests. It can also be assumed that the timberline generally shifted downwards a few hundred metres due to long-term use.

Significance & protection: The area, in particular the upper treeline, is characterised by the abundance of fruit tree species. Also, near the timberline, some patches of the formerly widespread Persian Oak forests are preserved. However, in general, the forest that formerly occurred in the area mainly disappeared due to the intensive use. For the Azerbaijani part of the Greater Caucasus the situation, location and conditions of the Lahij region are unique.

Especially in the Lahij region it would be advisable to pay attention to sustainable use. The continuation of land use – albeit under certain pre-conditions - is advisable. The establishment of a protected area with IUCN category IV (Zakaznik in Azerbaijan) is recommended. Within the frame of this Zakaznik, participatory land use planning and guidance to establish sustainable value chains should be enabled. As part of the Zakaznik, core zones with the exclusion of any land use should be established, e.g., hard-to-reach, rocky scarps with little used woodlands featuring a high biodiversity, or the investigated Persian Oak forest near Burovdal.

The diverse ethnic composition of the population of the Lahij region, the holy Mountain Babadag (a popular destination for many pilgrims in summer), a growing but still rural tourism and the historically grown

Table 8: Overview of colline to upper montane vegetation types and characteristics of Lahic transect

Stage	Upper colline	Lower montane	Upper montane	Upper montane/ subalpine
Altitude in m	800-1,000	1,000-1,400	1,500-1,800	1,800-2,000
Dominating tree species	Georgian Oak, hornbeam	Georgian Oak, hornbeam	Persian Oak, apple, pear	Persian Oak
Other tree species	beech, ash, wild cherry, maple, pear, hawthorn, lime, walnut, White Poplar	beech, ash, wych elm, Service Tree, pear, White Poplar, walnut, hawthorn, hedge maple, Caucasian Maple	pear	hornbeam, birch, Hedge Maple, pear, wild cherry
Forest types on northern slopes	Georgian Oak -hornbeam forest	Georgian Oak -hornbeam forest	mostly grasslands, Scrubland with Persian Oak & fruit trees	Mostly grasslands, Persian Oak forest
Forest types on southern slopes	Georgian Oak forest	Georgian Oak -hornbeam forest or scrubland	mostly grasslands, Persian Oak scrubland	Grasslands, no forests
Forest types in special habitats	beech forest in gorge	hornbeam forest with lime, yew, ash, White Poplar & walnut, on steep, northern slope with thin soil, oak-hornbeam forest on rocky southern slopes		
Felling	high forest, felling of single trees, in some places simple coppice or coppice with standards	simple coppice and coppice with standards	Cutting of thin wood for firewood	moderate to intensive felling in the remaining forest
Pasturing	intensive	hampered by dense coppice	hampered by dense fruit scrubland	intensive on the grasslands, moderate in the remaining forest
Consequences of use	thinning of forests, constrained rejuvenation	rejuvenation, scrub encroachment, erosion on steep slopes	promotion of fruit scrubland by felling and pasturing, groves only on northern slopes or colluvium	downwards-shift of timberline, threat to the remaining forest
Impact of use	high	high	high	high to very high
Regeneration potential	relatively high	high	within the scrubland good rejuvenation, no regeneration on grassland	within the scrubland or forest good rejuvenation, no regeneration on grassland
Threat	high	high	moderate to high	high to very high

cultural landscape make the Lahij region a prefered area for the development and implementation of regional development concepts. Detailed regional planning, development of a vision for the region, evaluation of the landscape and its natural products, integration of ecotourism and adaptation of these plans are promising and may lead to the establishment of a protected area, but do not necessarily need to do so.

Table 9: Fruit tree forest formations of the upper montane and its site condition

	1	2	3	4
Forest type	**Persian Oak – Fruit tree -Shrubbery forest with sea buckthorn**	**Fruit tree - Shrubbery**	**Sea buckthorn - Pastures – Shrubbery-Floodplains**	**Persian oak - Shrubbery**
Altitude (m NN.)	1720m	1700m	1540m	1650m
Exposure	North	North	flat site	South
Relief	moderately to strongly inclined slope, sheltered relief site	moderately to very strongly inclined slopes, also smaller slope sections	gravel terrace, closeness to the river	strongly to very strongly inclined slope
Substrate	mountain loam, high skeleton grade	mountain loam	river gravel	mountain loam, high skeleton grade
Dominating tree species	**oak, apple, plum**	**plum, apple, willow**	**sea buckthorn** (as shrub)	**Persian Oak** (as shrub)
Other tree species	pear, Shrubs: sea buckthorn, roses, whitethorn, and others	Pear, **as shrubs:** berberis, sea buckthorn, roses, whitethorn, whitebeam, bird cherry, field maple, Persian oak, and others	as shrubs: White poplar, willows, berberis, and others	apple, sea buckthorn, juniper, berberis, roses, and others
Stand height	8m	2 – 8m	2,5 – 4m	1 – 5m
Wood stock (m^3/ha) total	-	-	-	-
Intensity of use	moderate – high	moderate - high	moderate	very high
Use of wood	strong use of wood (coppice)	low at the moment	?	(Previously strong felling for fire wood)
Grazing	moderate – strong grazing	low – moderate, (dense bushes resp. steep sites prevent of grazing)	hardly grazing, because of dense bushes, difficult to access	strong grazing
Development of population	limited regeneration of the oak, development of fruit shrubbery, which is relatively resistant against grazing (sea buckthorn, roses, juniper and others) shrub layer is strongly developed	regeneration of fruit shrubbery (Persian Oak was eliminated through wood harvest)	distribution of sea buckthorn	grazing of the shrubbery, low increase of the Persian Oak, possibly due to location (at the southern slope anthropogenic timberline, lower than at the northern slope)
Rejuvenation of trees	moderate	moderate – good (fruit shrubbery)	low	moderate, grazed
Distribution	widespread	widespread – common	small-area spread	widespread - common
Degree of danger	moderate – high	moderate	moderate	moderate – high
Reasons of danger	intensification of wood felling and grazing, danger of erosion	intensification of wood felling and grazing, danger of erosion	intensive felling combined with intensive grazing	
Biodiversity:				
Tree species :	4	total:	total:	total:
Shrub species:	9	15	10	14
Closeness to nature	moderately semi-natural	moderately modified	semi-natural	semi-natural
Conservation value/ Priority	medium - high	medium	medium – high	medium – high

Photo 45: Fruit tree formations at upper montane, Lahic transect. (H. Gottschling)

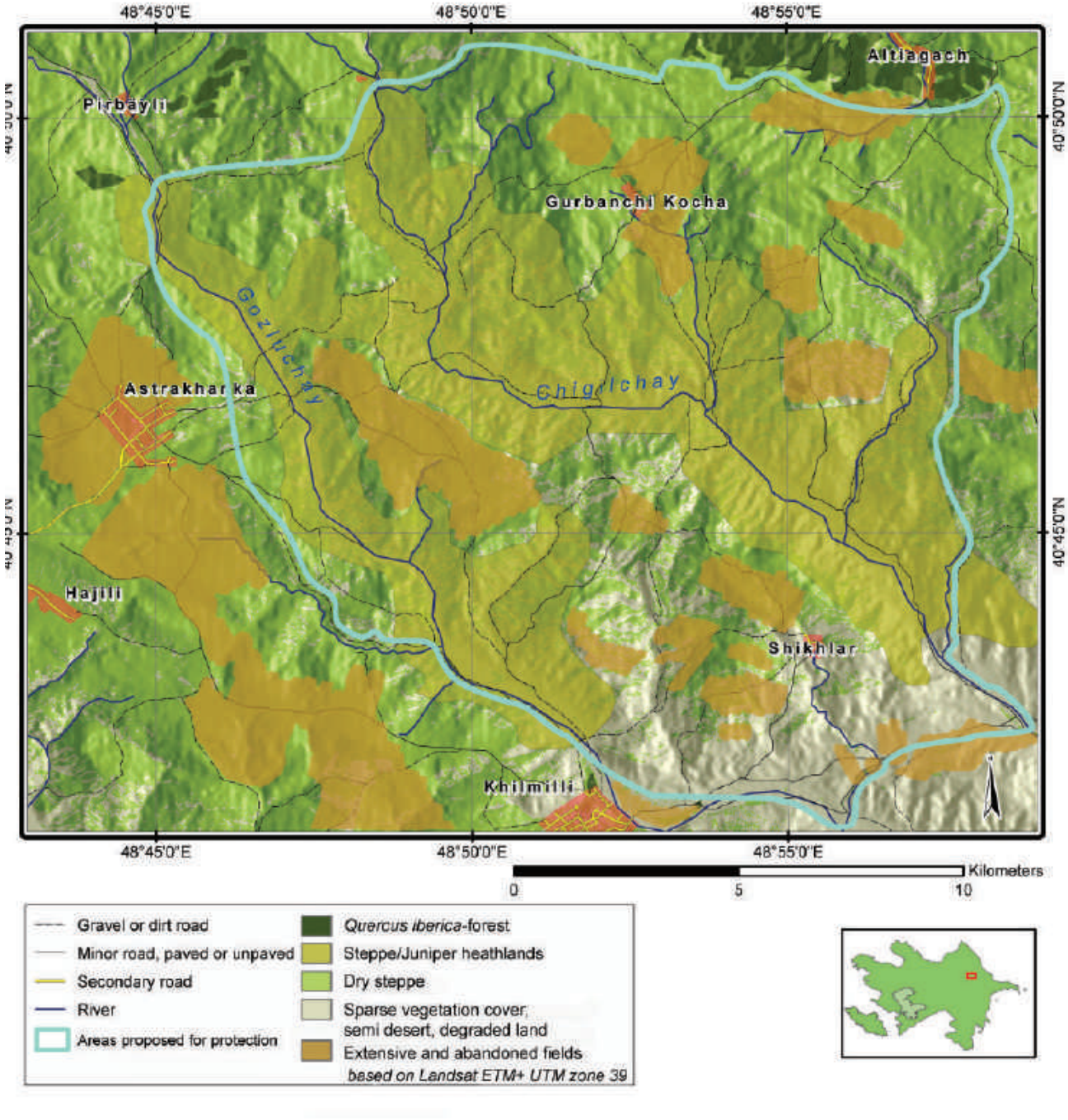
2.5.3.5. Juniper heathlands south of Altiaghaj

Location: *Juniperus excelsa* grows in the valleys of the Chigilchay and the Gozluchay Rivers in the mountains south of Altiaghaj between 830 and 1300 m a.s.l. Coloured badlands of cretaceous rocks on the slopes (Mamedaliev 1963) and up to one kilometre wide, braided floodplains filled with gravel are typical for this area. Steppes and heathlands are limited to moderate slopes, while plains are used as arable land. Here, however, agriculture is based on a rather less intensive approach, due to limitations in precipitation and water availability for irrigation.

Landscape characteristics: Sparse forests and scrublands of xerophilous tree species form the natural lower timberline in the eastern Greater Caucasus (Henning 1972). These sites especially are strongly influenced by domestic animals, artificial burning and selected felling. As a result, they appear like steppes with single stress-adapted shrubs of *Juniperus* sp. and Rosaceae. It seems problematic to call the steppe-like formations sparse forests or scrublands. Given that their appearance and origin are comparable to European heathlands, in the following they will be referred to as 'heathlands'.

The transition from Georgian Oak forest at the northern slopes to Juniper heathland farther south, and sheltered from the Caspian influence, occurs as follows:

South of the oak-covered ridge, a species-rich shrubland extends, with *Pyrus salicifolia, Crataegus orientalis* and *Crataegus pentagyna,* interspersed with flower-rich patchy meadows. The most elevated parts along this gradient are vegetated by a *Stipa* sp.-*Inula aspera*-steppe with low-growing shrubs such as *Rosa* sp. and *Juniperus sabina*. On the southern slopes the herb-rich vegetation changes to tragacanthic vegetation of *Astragalus* sp., *Juniperus sabina* and *J. communis*. The habitat with tragacanthic vegetation, such as *Astragalus* sp.-*Stipa* sp. steppe, is comparable to habitat type 4090 of the European habitat directive (Endemic oro-Mediterranean heaths with gorse). It is characterised as heath of dry mountains of the Mediterranean and Irano-Turanian regions with low, cushion-forming, often spiny shrubs, such as *Astragalus* (etc.) and various composites and labiates. The FFH-directive lists juniper heathlands as habitats of community interest (Council of the



Map 26: Partly supervised satellite image classification of Altiaghaj suryev region. Based on Landsat 7 image

European communities 1992).

In this region, herb-rich habitats with *Hordeum bulbosum* occur due to spring activity, which is caused by landslides. Little kettle-like lakes and wetlands occur in the higher reaches, some of them periodically falling dry in summer. For the most part, these eutrophic lakes do not accumulate peat (although some do), and their origin is mainly runoff water, collected in depressions created by landslides. Heading southwest, the conditions get drier and a low shrub vegetation with a loose herb layer grows on rubble-rich soil.

Several (temporarily flooded) riverbeds carry large amounts of gravel across the area in northwest-southeast direction, originating in the high Greater Caucasus. The water runoff is very low in summer and only intense for a short period following snowmelt or heavy rains in the high mountains.

In principle, Juniper heathlands and sparse forests can also be found at different altitudes of the Southern Caucasus (Prilipko 1954). Lowland types with *Pistacia mutica* occur around Lake Mingächevir and in the Türyanchay Reserve. They differ strongly from the

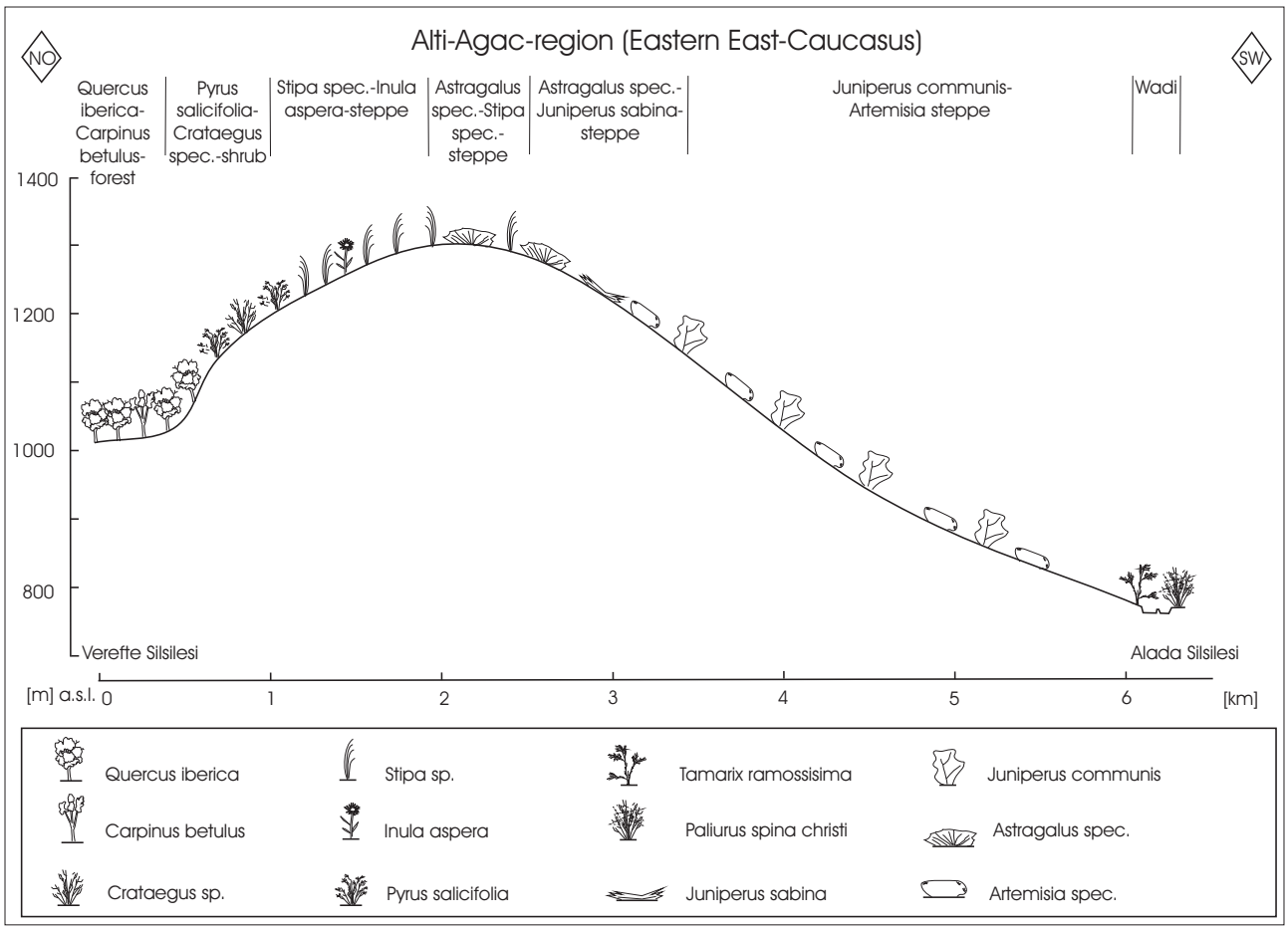


Fig. 34: Altiaghaj: Cross section

submontane and montane type presented here, with numerous species of Rosaceae.

Climate: Mamedaliev (1963) characterises the climate in the region as moderately warm with dry summers and winters. The climate station of Shamakhi (749 m a.s.l.), about 25 km from the investigated area, measures the highest mean temperatures in July at 29.8°C and the lowest mean temperatures in January at -3°C. The annual precipitation here is about 600 mm, although this amount is dispersed very irregularly over the annual circle.

Soil: Dark chestnut mountain soils, brown mountain forest soils, grey-brown mountain soils and thin mountain Chernozems occur in the investigated area (Mamedaliev 1963).

Vegetation:

a) Juniper heathland: Juniper shrubs of no more than four metres height are sparsely distributed on the slopes, with a density of rarely more than 40 plants per hectare. Especially at intersections with other scrubland types, many ligneous species such as *Berberis vulgaris, Spirea crenata* and *Viburnum lantana* are intermixed. South of the village Gurbanchi Kocha, *Juniperus excelsa* forms a particular type of scrubland, together with *Crataegus orientalis*, *Lonicera iberica* and *Pyrus salicifolia*. On dry sites at higher altitudes, *Pyrus salicifolia* displaces the juniper. The best-preserved juniper heathlands can be found in a tributary valley to the Chigilchay River (N 40°47'; E 48°52'), where juniper shrubs are associated with *Jasminum fruticans* and *Cytisus* sp.

b) Adjacent vegetation: At altitudes of 1,300 m a.s.l., scrublands become more closed or change into hornbeam forests. Here, only small shrubs of *Juniperus communis* occur, while *J. excelsa* disappears completely. Below 830 m a.s.l., summer droughts prevent the existence of shrubs, except for *Rhamnus pallasii* on rock formations. Other sites at lower altitudes are occupied by different types of steppe. Only on a sea-exposed slope southwest of Shirvan in northern Gobustan a small group of *Juniperus excelsa* grows at 450 m a.s.l.

c) Floodplains: Old remnants of poplar and willow trunks indicate that parts of the floodplains were covered by forests. Today most floodplains are treeless, with only small patches of scrubland. The latter are mostly

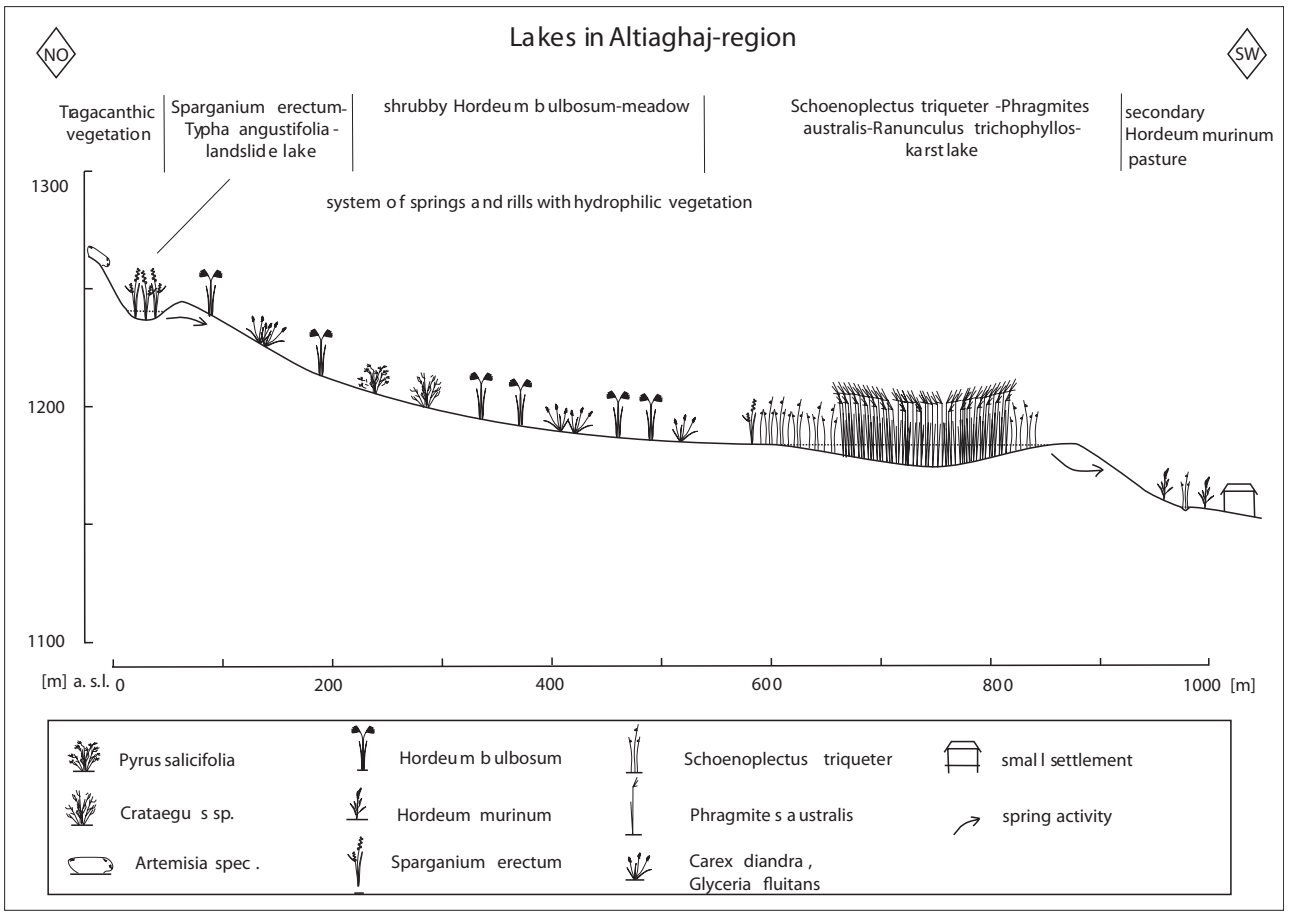


Fig. 35: Cross section through lake region close to Altiaghaj National Park

composed of *Salix purpurea, Hippophae rhamnoides* and *Clematis orientalis*. Sometimes young stands of *Ulmus minor, Fraxinus excelsior, Pyracantha oxycoccus* and *Ligustrum vulgare* are intermixed. Frogs (*Rana ridibunda*) and tracks of Water Voles (*Arvicola terrestris*) were detected at the edge of small ponds.

d) Special habitats are flat swamp-like lakes fed by runoff and/or groundwater year-round. Most of these lakes occur just south of Altiaghaj National Park on the southern slope of the main ridge. Most lakes are eutrophic, alkaline and fed by spring water, and sedimentation of clay gyttja or coarse detritus gyttja occurs. Peat accumulation is rather rare, due to the inconsistent availability of water over the annual cycle. Where peat does occur, the peat types are radicell peat mainly composed of sedges of low decomposition degrees, and in some cases *Phragmites* peat. Water level fluctuations, occasional desiccation and salinisation are frequent. During rainy periods in spring and autumn the inflow brings clay from the surrounding slopes, and the organic material is mixed with clastic material. Small reedbeds of *Typha minima* and *Phragmites australis* with species typical of carbonate-rich swamps, such as *Juncus inflexus* and *Mentha longifolia,* grow here. In most of the lakes the submerged vegetation is dominated by *Batrachium trichophyllos, Chara vulgaris* and *Potamogeton pectinatus,* indicating the eutrophic-calcareous conditions and a certain salinity.

Birds: About 150 wild bird species have been recorded in the Eastern Greater Caucasus region, 40 of them are listed in the annex I of the directive 79/409/EEC and eight by the IUCN (3 NT, 3 VU, 2 EN). Eight species are included in the Azerbaijan Red Data Book and 60 are of special European conservation concern (6 x SPEC 1, 17 x SPEC 2, and 38 x SPEC 3).

The lower altitudes are dominated by semi-desert breeding communities, consisting of wheatears, Rock Sparrow, Lesser Grey Shrike and Chukars. In the steppes, Ortolan Bunting and several larks are common, along with Grey Partridges and Quail.

At the lakes, Great Reed Warbler, Little Grebe, Moorhen and Ruddy Shelduck breed, and the forests are very rich in passerines (tits, warblers, woodpecker), accompanied by Scops Owl, Nightjar, and others.

The entire region shelters a high number of raptors,

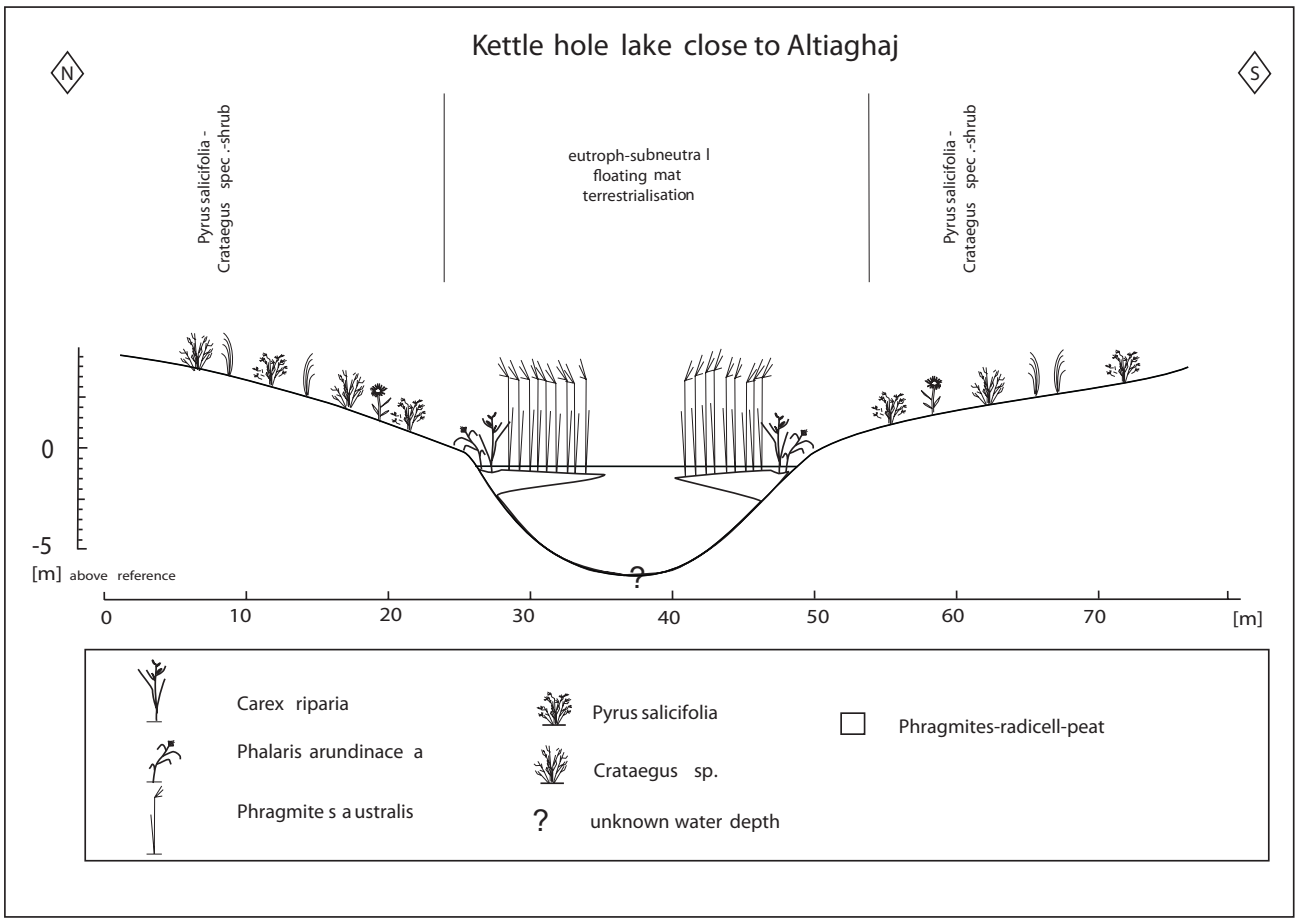


Fig. 36: Cross section trough kettle hole at Altiaghaj region

most of which breed in the forests. Among them are Short-toed, Booted, Imperial (VU) and Lesser Spotted Eagle and Levant Sparrowhawk. Montague's Harriers breed in the steppes and valleys of the juniper woodland region. In migration, Lesser Kestrel (VU), Saker Falcon (EN) Pallid Harrier (NT), Greater Spotted (VU) and Steppe Eagle also are regular guests.

Poaching (mainly for Chukar), the disturbance and destruction of the lakes by cattle and strong tree cutting and grazing activities in the forests have been identified as the main threats.

Mammals: Due to the different habitat types in this region the mammal fauna is very diverse and consists of 55 species, eight of which are listed in annex II and 20 in the annex IV of the directive 92/43/EEC. The Azerbaijan Red Book includes 3 species and the IUCN list three.

Of special conservation concern are *Lynx lynx, Lutra lutra* (NT) and *Barbastella barbastellus (*VU).

The region is very rich in bats (14 species) and rodents (21 species). Of special interest are the large carnivores, which live in the dry Georgian Oak forests. They include

Photo 46: Juniper heathland and *Stipa* spec. steppe of Altiaghaj region (S.Schmidt)

Photo 47: Juniper spec. heathland of Altiaghaj (J.Peper)

Wolf (*Canis lupus*), Brown Bear (*Ursus arctos*), Wildcat (*Felis sylvestris*) and Lynx (*Lynx lynx*). Their habitats have decreased during the last decades, thus the area is of high conservation concern for them. Also, Caucasian Red Deer (*Cervus elaphus maral*) still occurs in the area. Along larger streams, River Otters (*Lutra lutra*) have been found.

Several times during the investigation, hunters were observed and shots were heard in the region. Locals reported that there is hunting for Hares, Wolves and Brown Bears.

Amphibians and Reptiles: Four species of amphibians and 16 reptiles have been recorded in the Eastern Caucasus region. Four of them are listed in annex II and eight in annex IV of the directive 92/43/EEC. *Testudo greaca* is the only species included in the Azerbaijan Red Data Book. The IUCN list the latter as vulnerable and *Vipera ursinii* as endangered.

Typical species of the lower and dry altitudes are *Eremias velox* and *E. arguta*. The steppes host *Vipera ursinii* and *Macrovipera lebetina*, as well as many *Ophisaurus apodus* and *Testudo graeca*. In the forests, *Lacerta strigata* is most abundant. Along water in the wadis, *Natrix tesselata* and *Rana ridibunda* are widespread, as they are around ponds all over the region, where *Emys orbicularis* and *Bufo viridis* are also very common.

Human influence: The examined sites are partly used as summer pastures for cattle and sheep. Near the villages, grazing occurs year-round. In part, the area is kept as a retention area and is reserved for the seasonal movements of livestock between summer and winter pastures. Around the small lakes described above, small but permanent houses can be found. The lakes with their reedbeds are grazed almost entirely.

Selective burning and cutting of juniper and other thorny shrubs takes place. Juniper recovers poorly or not at all from burning. It can be assumed that the current vegetation structure is a result of long-term selection processes through pasturing and wood-cutting, comparable to European heathlands with juniper.

Significance & protection: Due to its rich habitat structure, the eastern foothills of the Greater

Caucasus shelter a very high faunal diversity. Among the species found here are many of conservation concern, especially several raptors and the larger carnivores. Large parts of the region are barely settled and offer an important refuge for large animals such as bear, lynx and wolf. This makes the region highly valuable for nature conservation.

The habitat described is peculiar for the greater Caucasus. Although Juniper sparse forest also occurs within the steep loam escarpments around Türyanchay and south of Lake Ajinohur, this formation here is embedded into a semi-cultural landscape and might be supported by land use and.

The natural extension of sparse Juniper forest is to the east, in Turkmenistan. There, the Kopetdag Mountains are, to large extend characterised by this habitat, and this is where it has its main natural extension, reflecting the ecological pre-conditions. However, the species composition is partly different, with *Juniper turcomanica* dominating.

The area is an important link between the ecosystems of the eastern Greater Caucasus and the Gobustan area. It is not only used by herdsmen as a migration corridor between summer and winter pastures, but possibly also by wolves, vultures, and other migrating animals. It must be a main goal for the future to stop the persecution of mammals to ensure their survival in these easternmost forests, juniper shrublands and steppes of the Eastern Caucasus.

Photo 48: Crested Lark (*Galerida cristata)* (S. Schmidt)

It seems appropriate to include and/or attach further parts of this unique region (the steppes, the dry river valleys and the juniper scrublands) into existing protection regimes. Herewith the designation of a Zakaznik, creating a "National Park Region" around Altiaghaj National Park is advised. As a result, land use management schemes need to be developed to preserve and protect this cultural landscape and foster protection measures. A strong connection to the national park administration will be beneficial for the immediate implementation.

Immediate actions to strengthen the conservation measures in the region would be:

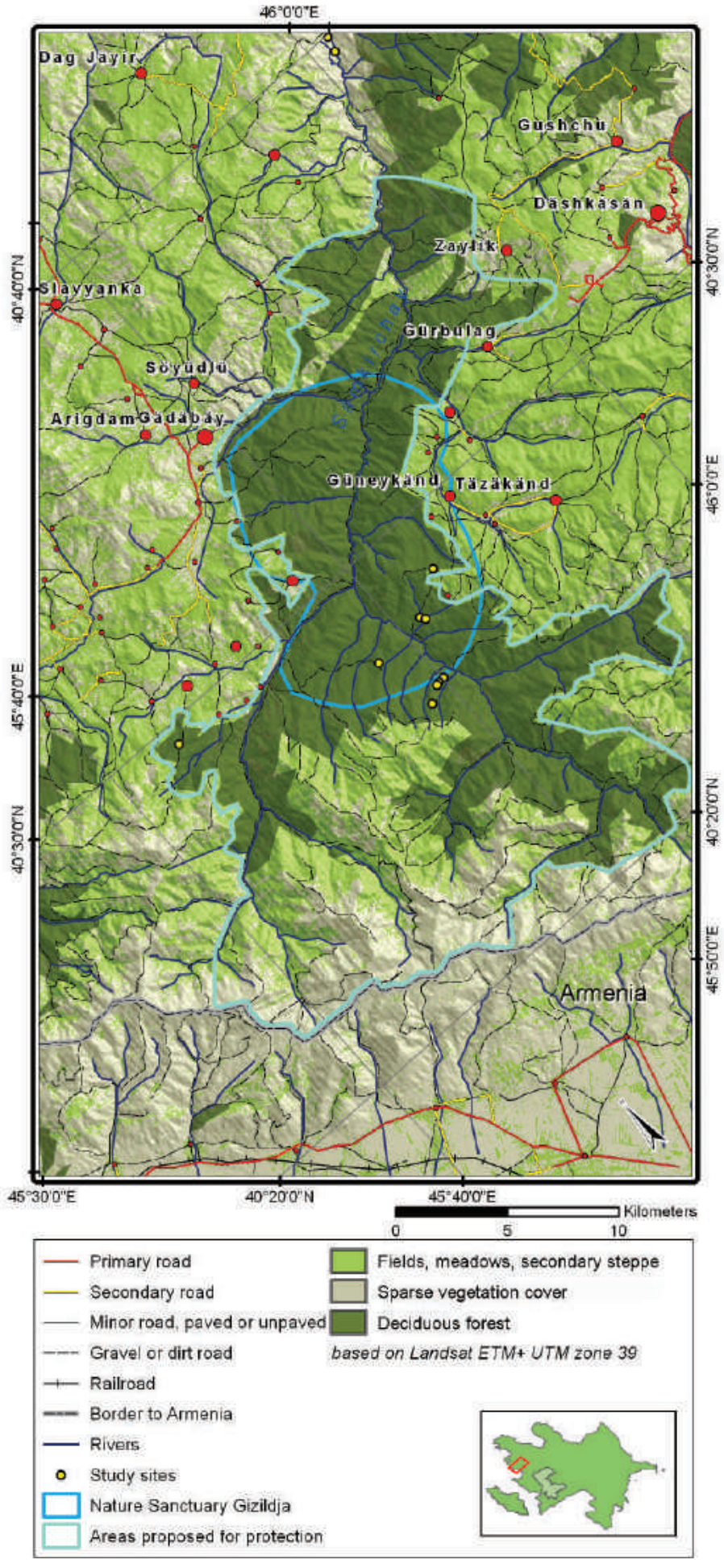
- burning or cutting of juniper should be halted immediately
- grazing should be managed extensively to prevent erosion,
- livestock numbers should be reduced in general to avoid damaging the grass layer, which promotes erosion and decreases soil fertility

2.5.4. Lesser Caucasus Mountains

2.5.4.1. Mountain forests of the Sämkirchay valley

Location: The Sämkirchay valley is situated in the northern part of the Lesser Caucasus between the district towns of Dashkäsän and Gädäbäy and stretches from the southwest to the northwest. It encompasses a sequence of steppes and fields in the lowlands, areas with fruit trees and scrubland at middle altitudes, and forests at higher altitudes. The forested part stretches about 45 km along the valley. The lower montane belt could not be reached by researchers during the project, so no data is available for it.

Landscape characteristics: In the Lesser Caucasus, the slopes are generally gentler than in the Greater Caucasus. The mountainous areas are more easily accessible and therefore more intensively used than in the Greater Caucasus. By contrast, because of its narrow entrance, the upper Sämkirchay valley is accessible only via passes from neighbouring valleys. Due to the clayey soils, during rainfall the tracks become



Map 27: Partly supervised satellite image classification of Sämkirchay valley . Based on Landsat 7 image

so muddy that only caterpillars and special lorries can negotiate the passes. Therefore, there are still well-preserved mountain forests within the valley, which elsewhere in the Lesser Caucasus have mostly become degraded or replaced with pastures or secondary steppe.

Climate: The annual rainfall in the foothills (Gänjä, 303 m a.s.l.) is about 300 mm. The highest mean temperatures occur in July (31.7°C) and the lowest in January (-2.3°C). From the lowest, the colline stage, to the highest, the sup-alpine stage, the climate undergoes a significant change. In the colline stage the weather is rather warm and dry; higher up the mountains it grows increasingly colder and wetter. This climatic sequence is reflected in the vegetation zones. The timberline at 1,800 to 1,900 m a.s.l. is determined by pasturing.

Soil: In the Sämkirchay valley, there is often only a shallow soil layer on the bedrock. On the upper colline stage, shallow colluvium, gravel and skeleton-rich soils over bedrock were found. Shallow and deep loamy soils, colluvium and gravel occur on the middle montane stage; loamy soils of medium depth and deep loams are found on the upper montane stage.

Vegetation: On the upper colline stage, forests concentrate near the rivers, where water is more freely available than on the slopes. These forests are made up of walnut, hackberry and various maple species. On

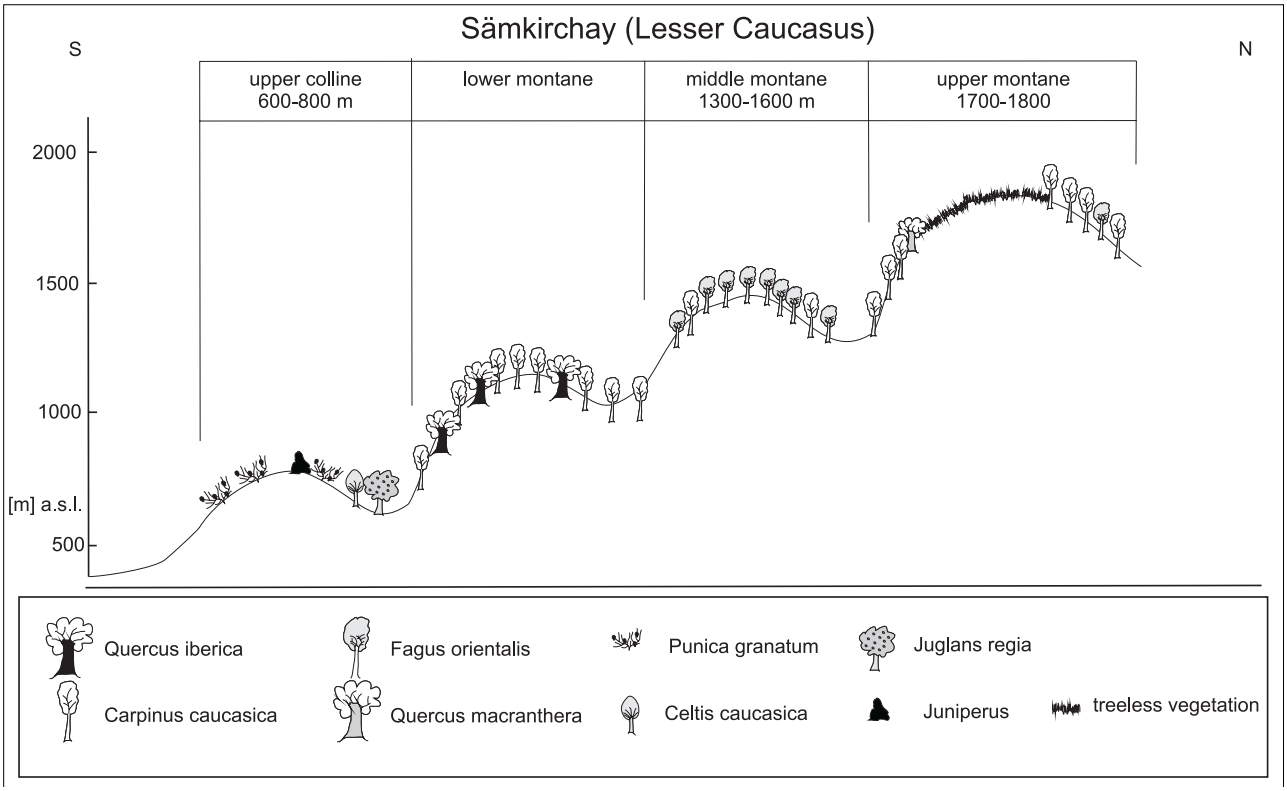


Fig 37: Cross section through Sämkirchay valley

the slopes, scrubland with pomegranate, Christ's Thorn and juniper can be found.

Dense beech and beech-hornbeam forests occur on the middle montane stage. On northern slopes, beech dominates on deep soils, whereas hornbeam dominates on shallow soils. On southern slopes Georgian Oak-hornbeam forests occur.

In level and slightly sloped areas, open pear-maple forests occur. In more intensively used areas, scrublands can be found with medlar, hawthorn, plum, apple and pear. The latter is a speciality of the used forests of the Lesser Caucasus. There are also wide areas with no forest vegetation at all.

On the upper montane stage, beech and hornbeam forests in natural condition, partially with Persian Oak, occur. In the Sämkirchay valley, there are still tall forests, whereas outside of it on the upper montane stage the forests have disappeared. The timberline is located at 1,800 to 1,900 m a.s.l. on northern slopes.

Birds: About 120 wild bird species have been recorded in the northern Lesser Caucasus region, 26 of them are listed in the annex I of the directive 79/409/EEC and 6 by the IUCN (3 NT, 1 VU, 1 EN, 1 DD). Ten species are included in the Azerbaijan Red Data Book and 41 are of special European conservation concern (4 x SPEC 1, 9 x SPEC 2, and 31 x SPEC 3). However, due to poor accessibility the general knowledge about the bird communities of the Lesser Caucasus is still insufficient.

The areas of remaining beech forest are inhabited by typical breeding bird communities of this habitat, including woodpeckers, tits, flycatchers, warblers, thrushes and finches. Also, several species of raptors breed here, among which Common Buzzard and Sparrowhawk are most abundant. Other species that could be observed include Honey Buzzard, Booted Eagle and Lesser Spotted Eagle.

Where the forest has been replaced by meadows, secondary steppe and shrubs, Red-backed Shrikes, Tree Pipits, Common Whitethroats, Lesser Whitethroats and Woodlarks are common, and Bee-eater, Cuckoo and Wryneck also occur here.

On the subalpine meadows, passerines such as Shore Lark, Water Pipit, Alpine Accentor and Northern Wheatear breed. Alpine Swifts and Crag Martins forage here and breed in steep cliffs. So do Caspian Snowcock, Peregrine Falcon, Golden Eagle and vultures. During investigations in September 2007 a high number of Griffon, Black (NT) and Bearded Vultures was recorded. As there are very high stocking rates of sheep in the region, they probably find enough carrion. Where

Table 10: Forest community characteristics along the Lesser Caucasus transect

Stage	Upper colline	Middle montane	Upper montane
Altitude in m	600-800	1,300-1,600	1,700-1,900
Dominating tree species	shrubs: pomegranate, Christ's Thorn, trees: walnut, hackberry, maple	beech, hornbeam, pear, maple	beech, hornbeam
Other tree species	juniper, maple, mulberry, fig tree	Georgian Oak, lime, wych elm, Bird Cherry, hawthorn, pear, apple	Persian Oak, maple, ash, Wych Elm
Forest types on northern slopes		Beech forest, beech-hornbeam forest	beech-hornbeam forest
Forest types on southern slopes		oak-hornbeam forest	hornbeam-beech-Persian Oak forest, no forest if intensively used
Forest types in special habitats	on skeleton-rich slopes pomegranate-Christ's Thorn scrubland or Juniperus scrubland forests on the bottom of the slope or gallery forests with walnut, hackberry & maple	park-like forest with pear and maple, pastures with fruit scrubland	
Felling	moderate to intensive	intensive, partially still moderate	very intensive
Pasturing	moderate to intensive	intensive, partially still moderate	very intensive
Consequences of use		closed forest areas are thinning out more and more	under intensive use, forest occurs only on northern slopes, mostly as coppice
Impact of use	high	moderate, in parts very high	very high
Regeneration potential		within the forest high, outside of forests very low	within the forest high, outside of forests very low
Threat	medium	very high	high

shrubs of willows and birches remain above the treeline, the rare Caucasian Black Grouse may still occur in small numbers.

Furtermore, the region is an important site for migrating raptors. In September 2007 many Lesser Kestrels (VU), Pallid Harriers (NT), Hobbies and Steppe Buzzard passed through.

Empty cartridges were found, and hunting probably concentrates on Chukars, Grey Partridges and Caspian Snowcocks. As a result of the high stocking rates, there is heavy overgrazing, which negatively influences the habitat quality for species of the subalpine meadows. The forest is subject to very heavy logging and intensive grazing, which leads to a decrease in forest species.

Within this study, no mammals could be recorded/ detected within the Sämkirchay valley and its surroundings. Also, no literature data was available for this particular region to the project team.

Amphibians and Reptiles: Four species of amphibians and twelve reptiles were recorded in the northern part of the Lesser Caucasus region. Four of them are listed annex IV of the directive 92/43/EEC.

The data about the herpetofauna of the Lesser Caucasus is rather poor. Among snakes only *Natrix natrix, N. tesselata* and *Coronella austriaca* are known to occur here. *Ophisaurus apodus* was found in shrubs and open forests of lower altitudes. Although not many species of reptiles occur here, the region is very interesting due to many different species and semi-species of lizards (*Lacerta* sp). *L. strigata* and *L. trilineata* are common and mainly live in shrubs. *L. derjugini* and *L. saxicola* are very widespread in all warm and rocky habitats. The phylogenetic situation of the *saxicola* species complex has not yet been resolved in detail. There are many different sub- or semi-species and small parthenogenetic populations. In the investigated area, *Lacerta rostombekovi*, *L. valentie*, *L. armeniaca* and *L. raddei* have been recorded, but others also occur in this region (*L. unisexualis, L. portschinskii, L. dahli*).

Photo 49: Lesser Caucasus River Valley (K.Gauger)

Human influence: The Sämkirchay valley is used for pasturing in the colline areas, albeit not intensively. On the montane stages, only recently pasturing and felling have intensified. The forests are still in good condition, but will severely suffer if usage continues at the same rate. The dense forests are already thinning out. Summer camps of cattle herdsmen also exist on the montane stages.

Additionally, the forests of the upper montane stage are increasingly influenced by livestock from the pastures at higher altitudes.

Significance & protection: Due to their intensive use over the past decades, the forests of the Lesser Caucasus in general were often converted into park-like landscapes with pear and maple, open scrublands or grasslands. The entire mountain chain has been under industrial exploitation for about 200 years. Copper mines and the processing of minerals led to a sharp decline of the forest as early as the 19th century. Due to the conflict with Armenia and the occupation of about 20% of Azerbaijan's territory, the land use pressure in the Lesser Caucasus again increased enormously over the last 20 year. Internally displaced persons, temporary resettled in the area, largely depend on the use of natural resources such as wood and pastureland. As to the state of the forest located in the occupied territory, no neutral information is available. However, the protection of remaining forests in the Lesser Caucasus is of urgent importance.

Compared to most of the other areas of the Lesser Caucasus with more intensive use and only poorly maintained forests, the Sämkirchay valley still appears to be the most promising place to solve utilisation conflicts and protect some of the rare mountain forests. A State Nature Sanctuary already exists, covering parts of the Sämkirchay valley. However, the designation of its borders does not seem appropriate nor is the protection regime sufficient. The entire valley with the remaining forest does hold the potential for further protection – especially as utilisation pressure is very high and the remaining forest is the last remnant of the formerly widespread forest cover in this region. Due to their mostly shallow soils and rapid soil erosion in deforested areas, the Sämkirchay mountain forests are very susceptible to overuse – regeneration will be almost impossible after degradation.

The extension of the existing State Nature Sanctuary and even conversion to a Strict Nature Reserve, with the forest line determining the borders, would be an important initiative. However, in order to be successful, alternative energy concepts for fuel need to be provided along with the extension of the protected area. Climatically suited as forest habitat, but depending on the soil quality, the Lesser Caucasus should become a focal area for reforestation and afforestation measures.

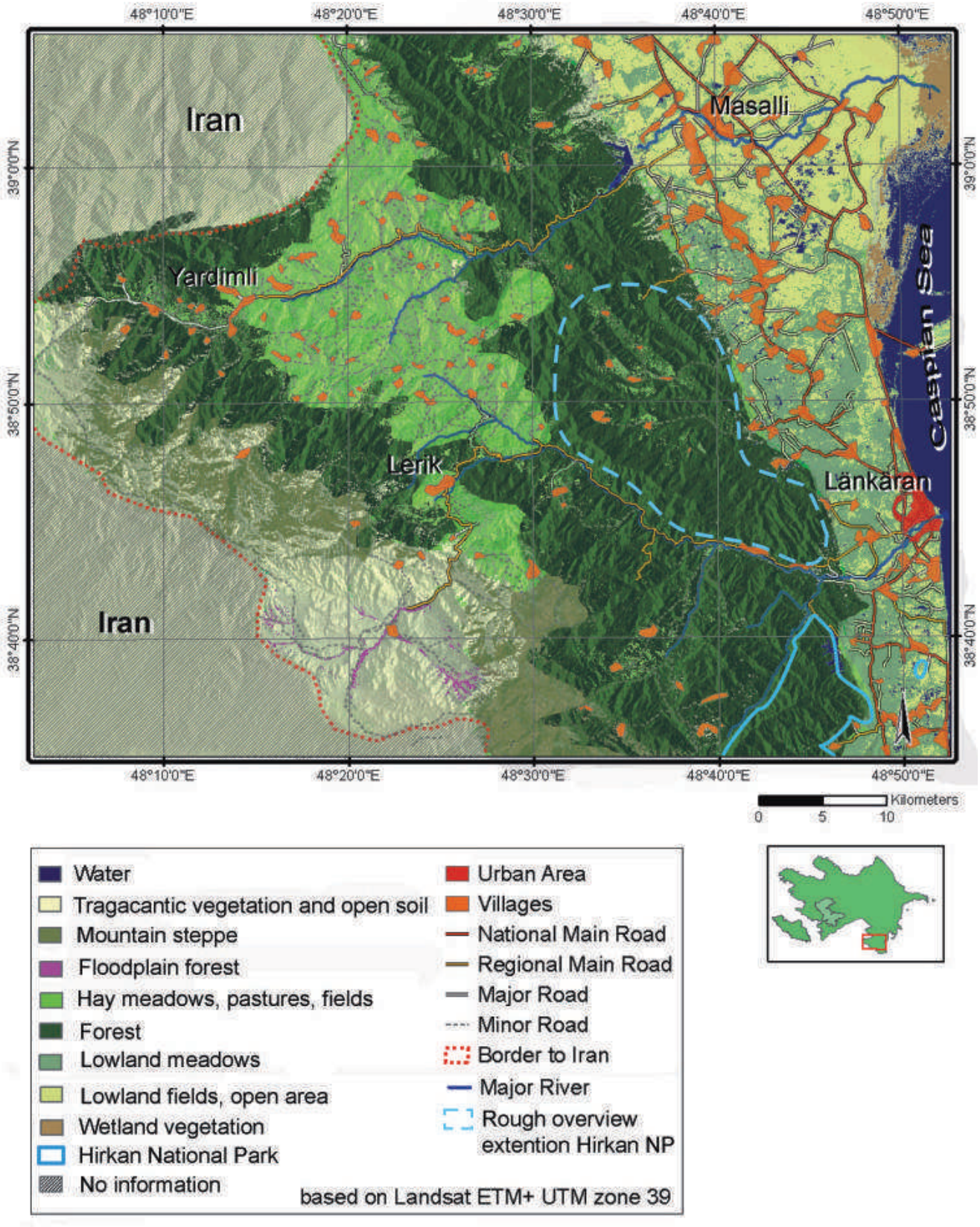
Hardly any information is available about the fauna of the Lesser Caucasus. In the accessible parts a monitoring of all groups is necessary to gain a clearer picture of the distribution and situation of the species. It is likely that Caucasian Red Deer, Bezoar Goat and Caucasian Black Grouse still occur in the Göy Göl region, but there is no recent information about these species in other parts of the Lesser Caucasus.

2.5.5. Talish Mountains

2.5.5.1. Hirkanian forest

Location: The Talish Mountains are located in southern Azerbaijan. The border to Iran to the west

and south, the Kura-Araz lowland to the north and the Caspian Sea to the east mark the boundaries of this area. The altitude ranges from -12 m in Lenkoran up to 2400 m a.s.l. at the Iranian border. Stretching across the land like a green band, the total extension of the Hirkanian forest is about 1.9 Mio ha in Iran and about 0.1 Mio ha in Azerbaijan. With an extension of 21,435 ha in 2007, and now an area of approximately 38,000



Map 28: Partly supervised satellite image classification of Hirkanian Forest as well as Zuvand upland close to the Iranian border suryev region. Based on Landsat 7 image.

ha, the Hirkan National Park (former Zapovednik) is embedded in the Talish Mountains and encompasses various stages of forest.

Landscape characteristic: The Talish Mountains were folded up primarily during Tertiary time. The relief was formed entirely by erosion processes without any signs of glaciation. The Lenkoran plain and the adjacent terraces are the result of the abrasive-accumulating activity of the Caspian Sea, due to past sea level changes. The landscape rises slightly over several lower ridges up to the high mountain region near the Iranian border. Numerous rivers run down to the Caspian Sea by crossing the folded structures and cutting deep, narrow valleys. River dynamics are characterized by two discharge peaks: one in autumn and one in spring, after snowmelt. The highest peak is Mt. Qizyurdu at 2455 m a.s.l.

Climate: The mountain chain of the Talish Mountains represents a natural barrier for the incursion of northern and north-eastern air masses. Uprising humid air masses from the Caspian Sea favour cloud development. Annual precipitation exceeds 1500 mm, with a peak in autumn (September to November) and a dry phase in June and July. The mean annual temperature is warm-temperate and ranges between 12°C and 15°C. The summers are warm with average temperatures in the warmest month ranging between 24 and 26°C. Depending on altitude, average winter temperatures range between -2 and 3°C (Mühr 2005).

Soil: Soils of the Talish Mountain are very heterogeneous. The most important soils are yellow soils (Ferrasols), yellow brown soils and mountain brown forest soils (Cambisols), cinnamon-coloured forest soils (Chromic Cambisols), chestnut after forest alkali soils, humus carbonate soils (Rendzinas) as well as podzol, gley and alluvial soils (MENR 2004).

Vegetation: The Caspian forests belong to the Hirkanian floral province of the Oriental Turanian region (Meusel et al. 1965). Others have described it as Euxino-Hirkanian (sub-) province of the Euro-Siberian region (Zohary 1963, Schroeder 1998). Together with the Elbrus Mountains (Iran), the Talish is described as an autonomic area. The vegetation represents a relict of the arcto-tertiary forests and comprises, in comparison to other European deciduous forests, a very rich flora of woody and endemic species. Examples of endemic tree species are *Parrotia persica, Gleditsia caspica, Albizzia julibrissin* and *Quercus castaneifolia*. It is conspicuous that the flora almost entirely lacks coniferous trees. Only a few Yew trees (*Taxus baccata*) are noteworthy. Due to the high humidity, epiphytes (mainly cryptogams) are abundant; bryophytes sometimes completely cover the tree trunks. In total, the very high number of 90 tree species, 211 shrub and semi-shrub species and about 1,500 vascular plant species occur – an indication of the importance of this forest.

The lowland forest, which has almost entirely disappeared, and the forest of the colline belt (up to 400 m) are mainly characterised by Iron wood (*Parrotia persica*), Zelkovie (*Zelkova carpinifolia*), Date Plum (*Diospyros lotus*) and Chestnut-leaved Oak (*Quercus castaneifolia*). The latter occurs partly in combination with alder (*Alnus glutinosa* ssp. *barbata*), and along small creeks and riverbeds Caucasian Wing-nut predominates. In addition, the occurrence of *Albizzia julibrissin* growing wild in this altitudinal belt deserves special mention.

Farther uphill, the colline to montane belt is dominated by hornbeam (*Carpinus betulus*) and Chestnut-leaved Oak (*Quercus castaneifolia*), partly interspersed with Velvet Maple (*Acer velutinum*), *Parrotia persica, Zelkova carpinifolia*, Date Plum and *Gleditsia caspica*.

The montane belt, starting at about 800m a.s.l., is dominated by Oriental Beech (*Fagus orientalis*), which is accompanied by alder (*Alnus subcordata*) and maple (*Acer velutinum*), mainly on slopes with northern exposure. Several evergreen species such as *Buxus hyrcana, Ilex spingera, Ruscus hyrcanus, Danae racemosa* or *Hedera pastuchovii* are typical for these forests. Southerly exposed slopes in this altitudinal belt are also covered with hornbeam (*Carpinus betulus*) and Chestnut-leaved Oak.

Persian Oak forms the upper treeline as the natural result of increasing aridity above the altitudinal belt still influenced by uprising precipitation from the Caspian Sea. Anthropogenicly influenced, only fragments of these oak forests remain in the Talish Mountain. In most areas, hay meadows and low- quality pastures dominate the higher parts of the mountains.

Fauna: Similar to their flora, the Talish Mountains also boast an abundant fauna with 200 species of vertebrates and countless invertebrates, among them many Tertiary relicts and endemics.

Birds: To a large extent, the avifauna of the lower

Photo 50: Hirkanian Forest degrated by timber logging, forest pasture and constant fire wood collecting/cutting (S.Schmidt)

Talish Mountains resembles that of any European broad-leaved forest. About 83 species breed in the forest of Talish. Among them Caspian Tit, Black Stork, Lesser spotted eagle and Ring-necked Pheasant. Many species known from the Greater and Lesser Caucasus occur here, as well as additional local specialities. In areas with oldgrowth forests, Booted and Lesser Spotted Eagles, Goshawk, Hobby, Honey Buzzard and Black Kite occur. A brood of Shikra was re-discovered here. Where Caucasian Wingnut, ash and maple flank the sides of river valleys at lower altitudes, Black Storks could be recorded. Lesser Spotted Woodpecker is rather scarce and Black Woodpecker only occurs in old and undisturbed stands of beech and oak forests. These are also good sites for Stock Doves and Wood Pigeons as well as Tawny and Long-eared Owls. The Talish subspecies of the Pheasant has strongly declined due to poaching and is now very rare in dense thickets in the lower valleys. Most interesting among songbirds is the Sombre Tit, which is an uncommon breeder along forest edges and in woods heavily devastated by tree-cutting and grazing (e.g. along side roads of the main Länkäran-Lerik road). The lowland at coastal strip at the foohills of the Hirkanian forest is inhabitated by about 73 species of breeding birds. The entire species list is attached to the report.

Mammals: Mammalian diversity is mainly made up of small animals such as Caspian White-toothed Shrew, Lesser Horseshoe Bat or the endemic Hirkan Wood Mouse, which are all included in the IUCN or National Red Data Books. Common in the area are species such as Brown Bear, Lynx and Wildcat. The voices of Golden Jackal and Wolf can be heard all over the territory. While the Turanian Tiger became extinct only during the last century, a small number of Caucasian Leopards still inhabit the Hirkanian Forest. Threatened by poachers, the protection of this species is one of the most important conservation tasks in this region.

Amphibians & Reptiles: Amphibians are represented by nine species, five of which are listed in the Red Data Book. Among them, *Triturus cristatus* is listed in the Red Data Book as endangered in Azerbaijan. The herpetofauna of the Hirkan Forest is represented by 22

Photo 51 Pristine Hirkanian Forest (J.Etzold)

species, two of which - Mediterranean tortoise (T*estudo graeca*) and Aeskulapian snake (*Elaphe longissima*) are listed in the Red Data Book of Azerbaijan.

Human influence: About 20 years ago, the forestry conservation system and the agricultural system were organised in several collective farms. Following independence, large-scale tree plantations were left open and are now densely covered by bracken fern (*Pteridium aquilinum*). Due to their location and accessibility, the forests of the Talish Mountains are used to a large extent. The various forms of utilization (e.g. silvo-pasture, logging, fuel wood collection) lead to the formation of several typical degradation schemes in the region, depending on intensity and type of utilization. With a combination of the three forms of utilisation mentioned above, continuous growth and recovery of the forest can hardly be obtained. However, due to the lack of alternative income and a consequent subsistence economy, the population of the region often has no alternatives.

Only remote regions and inaccessible areas are spared from utilization. Furthermore, the Hirkan National Park within its boundaries of 2007 is largely unused. With the extension of the National Park in 2008, areas that were under heavy utilization or alteration as well as several villages became part of the park. The effect on the forest, particularly in those regions, is exemplarily illustrated at Fig 38.

Here, the forest extension declined significantly or has been transformed from natural forest to forest stages of lower value over the years. Furthermore, roads and paths have been extended, followed by negative impact on the forest condition along these roads.

As depicted in Fig. 39, the forest investigated (e.g., a patch of forest of approx. 26,300 ha around the village Gegiran) has been altered as follows[14] :

- the total amount of forest decreased by about 11% over seven years,
- over a 20-year period, about 9000 ha of forest disappeared,

14 forest degradation stage 1&2 represent natural and near natural conditions, forest degradation stage 3, 4 &5 increasing alteration up to severe degraded forest with little natural and unused trees remaining. For the overview and due to the difficult classification of the latter three stages these have been merged and are depicted together. For details see Annex I.5.

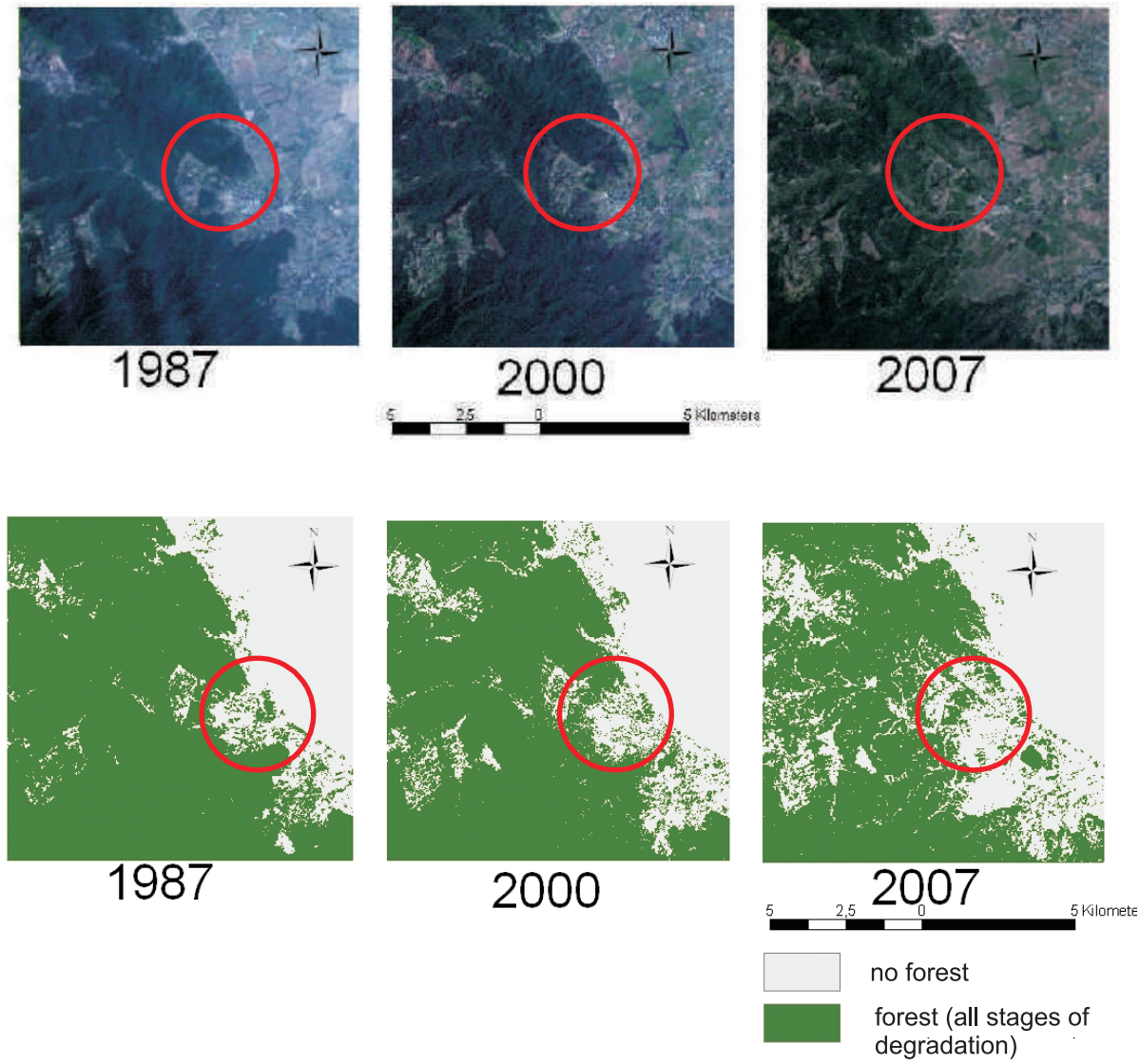


Fig. 38: comparison of forest extension between 1987, 2000 and 2007; Based on Landsat 7 imagery

- natural and "near-natural" forest has been reduced by 23%,
- the stages of devastated, scrub like and intensively used forest increased by approx. 15 %
- extension of meadows also increased

Based on this, the alteration of natural forest is obvious. However, it must be noted that despite the transformation from natural to intensively used forest, several ecosystem benefits can still be obtained.

Significance & protection: Due to its outstanding biodiversity, the conservation of the Hirkanian Forest is of great importance. Large parts of the Hirkanian forests are protected within Hirkan National Park. In 2008, parallel to the analysis of this survey and drawing from its report, the national park was extended and almost doubled in size. Now covering an area of about 38,000 ha, the national park extends much further to the north than before. A current map is not yet available. This fast action taken by the MENR is seen by the authors as quick response to the situation in the region. Now, under the new designation, major parts of the Hirkanian Forest are protected. Nevertheless, the challenges are still enormous as several villages are located within the park, especially in the new part, where they are of relevant size. Furthermore, the accessibility of the northern part of the national park is very good and protection measures must be taken urgently. In addition, capacity as well as alternative fuel and energy concepts need to be established for the villages within the park and its buffer zone. By neglecting this fact, a thorough protection of the forest will not be achieved in due time.

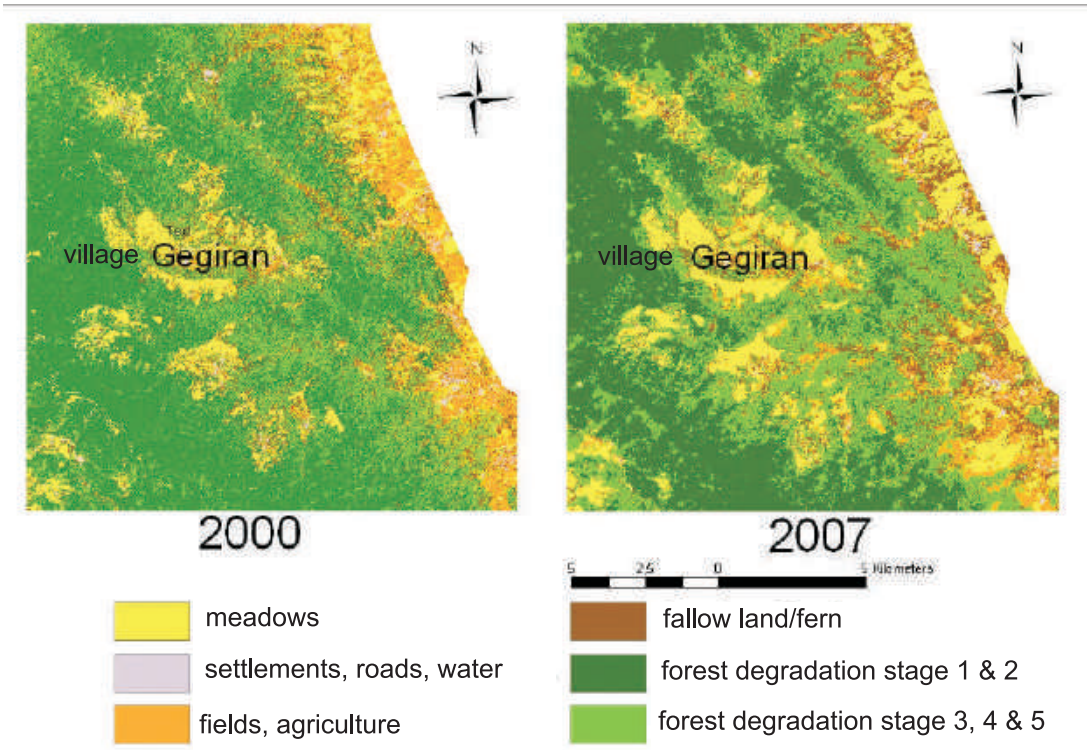


Fig. 39: Spatial alteration/deplition of forest surrounding the village Gegiran, located in the Talish mountains. Partly supervised classification, based on Landsat 7 imagery.

2.5.5.2. Xerophytic mountain region of Zuvand

Location: The Zuvand region is an intra-mountainuos depression in the Lesser Caucasus, extending along at the Iranian border close to the district town of Lerik. This so-called Diabar depression is geomorphologically, climatically and by species composition more similar to northern Iran and Nakhchivan than to the forested parts of the Talish Mountains. Almost closed off to the east by a high-rising mountain range, the Zuvand region extends in elevations between 1700 up to 2582 m a.s.l. and forms the sheltered highest region of Azerbaijan's Talish Mountains.

To the west and south-west it borders Iran, to the east and north-east the forest area of the Länkäran Mountains. There are two administrative regions in this sub-area: Lerik and Yardimli, both with good road connections to the Caspian lowland.

Landscape characteristics: A semi-desert-like vegetation with xerophytic sub-shrubs and large areas of open soil defines the character of the upper Talish Mountains. The ecosystem of this semi-arid habitat encompasses mountain steppes, phrygana (garrigue), pseudomacchia, plant formations on rocks and a few floodplain formations or even mires. Due to the peculiar climatic condition, typical rich subalpine and alpine meadows do not occur in Zuvand, and the subnival and nival belts are also not reached. Those meadows that do occur represent a steppe to grass-steppe character rather than true meadow character. Green valleys with cottonwood forests, clear brooks and settlements contrast very sharply with the dry surrounding landscape. Along the tributaries of the Konjavuchay brook in the Lerik Rayon, a couple of villages are scattered in the valleys. Houses and stables are built on the upper terrace, surrounded by vegetable gardens and orchards with apricot, cherry and apple trees. Orchards frequently extend between the villages and are irrigated by small feeders. They are surrounded by rows of planted *Populus nigra* var. *italica* with narrow crowns, which are planted along the edge of feeders to stabilise their walls. Feeders originate from small, simple dams upwards of the plantations. Several creeks originate in the Zuvand region and form an intensive network, and there is a high density of little springs.

Climate: The climatic conditions of this area are similar to the climate of Northern Iran and differ sharply from the climate of the Talish Mountain forest zone. The area is part of the climatic region of Azerbaijan characterized by dry semi-deserts and dry steppes with hot summers and cold winters. Compared to the lower altitudes, there is a sharp differentiation,

and continental climatic effects prevail. Under certain weather conditions, humid air masses and moisture from the Caspian Sea pass the rock escarpments surrounding the highland and cause atmospheric precipitation. The hottest month is July, the coldest are December and January, when the temperature is below 0°C. Annual precipitation lies between 450 to 650 mm. It mostly rains in autumn and winter, thus little water is available for the vegetation period.

Soil: The substrate of the Zuvand region is in large parts of volcanogenic sedimentation origin. On the steep slopes and along the numerous rocky outcrops where tragacanthic vegetation occurs, soil is poorly developed. The light and initial soil formations have a rich skeleton and are subject to intensive erosion. Chestnut coloured and light chestnut coloured mountainous soil and mountain meadow soil occur in flat area. Especially the meadow soils are rather productive and partly used for hay-making. The humus content is rather poor due to the climatic conditions.

Vegetation: Because of the low rainfall during the vegetation period, Zuvand's vegetation differs markedly from that of the rest of the Talish. Many of its plants have special peculiarities to withstand long periods of drought. Most species of milk vetch (*Astragalus*) and prickly thrift (*Acantholimon*) form compact, spiky cushions, while others grow only during the short, moist spring, e.g., bulbous plants. On the slopes and rocky areas the typical Mediterranean—Anatolian and the Levant xerophytic expression of vegetation can be found. Pseudomacchia/Shiblyak (ref. to Atamov et al. 2006) dominates the areas around the villages and forms an intermediate stage between forests with *Fagus orientalis* and *Quercus macrantera* and frigana vegetation. The latter, with its low-growing thorny, cushionlike bushes, is prevalent in higher, even dryer reaches of Zuvand.

Frigana vegetation/dry slopes: The frigana vegetation type covers large parts of the mountainous, rocky zone at elevations between 1500 and 1800m a.s.l. and dominates on southern/south-eastern slopes. This vegetation type is characterised by three groups of plants that all form thorny cushions. The dominating group among them are tragacanth bushes, predominantly *Astragalus meyerii, A, persicus, A. pycnophyllus,* and *A. aureus*. The second group of plants that form cushion-like formations is the *Acantholymon* group, with *Acantholimon hohenackeri* resembling a spiny tragacanth. The third group is the *Onobrychus* group, with *Onobrychus cornuta* being the dominant species. Although occurring naturally under certain conditions, the frigana formations are supported by intensive land use and often form a secondary formation, particularly in response to heavy grazing. *Rosa ibericus, Jasmin fruticans,* and *Berberis vulgaris* are often associates with the various *Astragalus* communities. Frigana formations are peculiar for the area but form transitional stages between forested shiblyak formations with *Ilex hyrcana, Cotoneaster multiflora, Berberis denisflora*, and various *Prunus* sp. and *Rosa* sp., and highland steppes.

Steppe vegetation: Various species of *Artemisia* and *Allium* (18 species) as well as *Thymus trautvetteri*, *Carex humilis*, *Phleum phleoides Stipa capillata* and *Festuca valesiaca* (along with an abundance of other grasses) are typical for these meadows and sites with favourable condition close to the Iranian border. At elevations between 1600 and 2500 m a.s.l. these formations, rich in geophytes, are prevalent.

Floodplain, creeks: Along the numerous small creeks and villages in the highlands of Zuvand, park-like stands of wild *Populus nigra* and *Salix alba* are in good condition and offer shade to species-rich wet meadows. Other

Photo 52: *Acantholimon* spec. cushions at Zuvand (S.Schmidt)

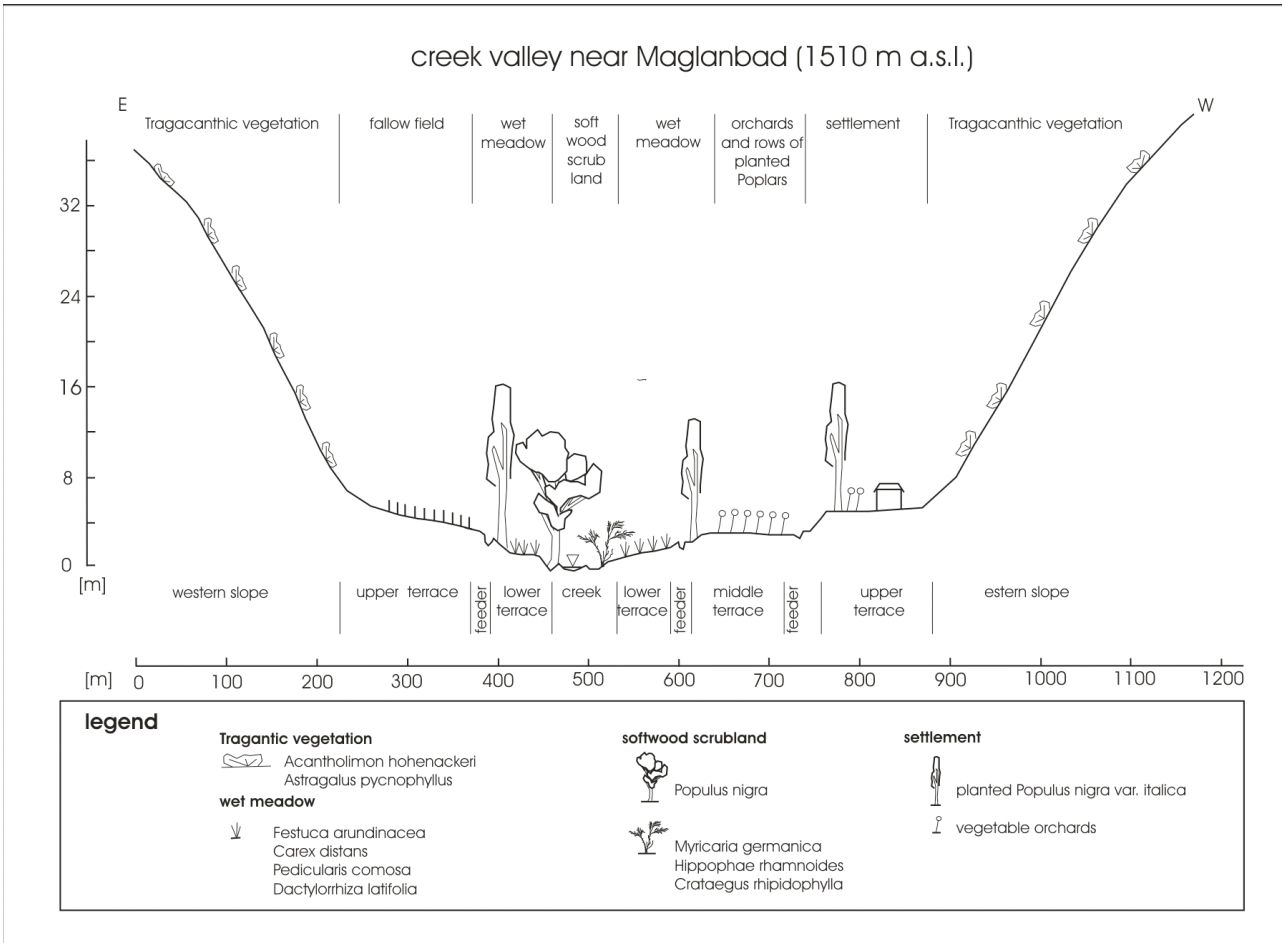


Fig: 40: Cross section through Zuvand creek valley

willow species (*Salix purpurea, S. x rubens; S. caprea*), *Hippophae rhamnoides* and some *Crataegus rhipidophylla* also grow on the floodplains. They are associated with other riparian plant species such as *Myricaria germanica, Calamagrostis pseudophragmites* and *Epilobium hirsutum*. Wet meadows at the edge of the floodplains sometimes grow on up to 10 cm thick peat layers over loamy sands. They can be characterised as initial surface flow mires, because water seeps out at the footslopes and flows down through the meadows. Sedges (*Carex distans, C. panicea, C. nigra*), *Festuca arundinacea* and *Eleocharis uniglumis* are the species with the highest abundance.

Mires: Due to the limited availability of water as well as the limited water retention potential of the landscape, mires are not at all common in the Zuvand region. A spring mire at the foot of Mt. Kürakend (38,77040° N; 48,27134° E), located at an altitude of 2090 m a.s.l.; was investigated. The mire is located in the upper part of a smooth, north-west inclining valley. Open rock formations of volcanogenic stone (Mamedaliev 1963) occur at the slopes, while the valley itself is filled with denuded clays and loams. Due to the regional climate, xerophytic tragacanthic *Astragalus* species cover the catchment of the mire. A wet meadow with an extension of approximately five hectares lies at the bottom of the valley. *Festuca rubra, Vicia cracca, Anthriscus nemorosa* and *Papaver orientalis* are the most dominant plants of this meadow community. The mire is situated in the middle of the meadow, has an extension of about 40 x 50 m and is divided into three small terraces. Groundwater reaches the top of the surface, which bulges 50 cm above its surroundings, but the steep edges consist of dry and degraded peat. Coring of the spring dome showed a maximum thickness of the peat layer of about 90 cm. A soil profile at the centre of the dome revealed a 50 cm thick peat layer free of carbonates. In the upper 5 cm, the peat is dark black and consists of brown mosses and sedge roots that are strongly decomposed. The lower horizon has a homogenous structure and is made up of brown, slightly decomposed radicell peat. Species occurring at the centre of the spring mire are, among others, *Carex nigra, Poa palustris, Veronica anagallis-aquatica, Catabrosa acquatica, Blysmus compressus,* and *Agrostis stolonifera.* Plants at the edge of the mire included *Stellaria graminea, Rumex crispus, Bupleurum boissieri, Nepeta teucriifolia, Silene talyschensis, Alopecurus*

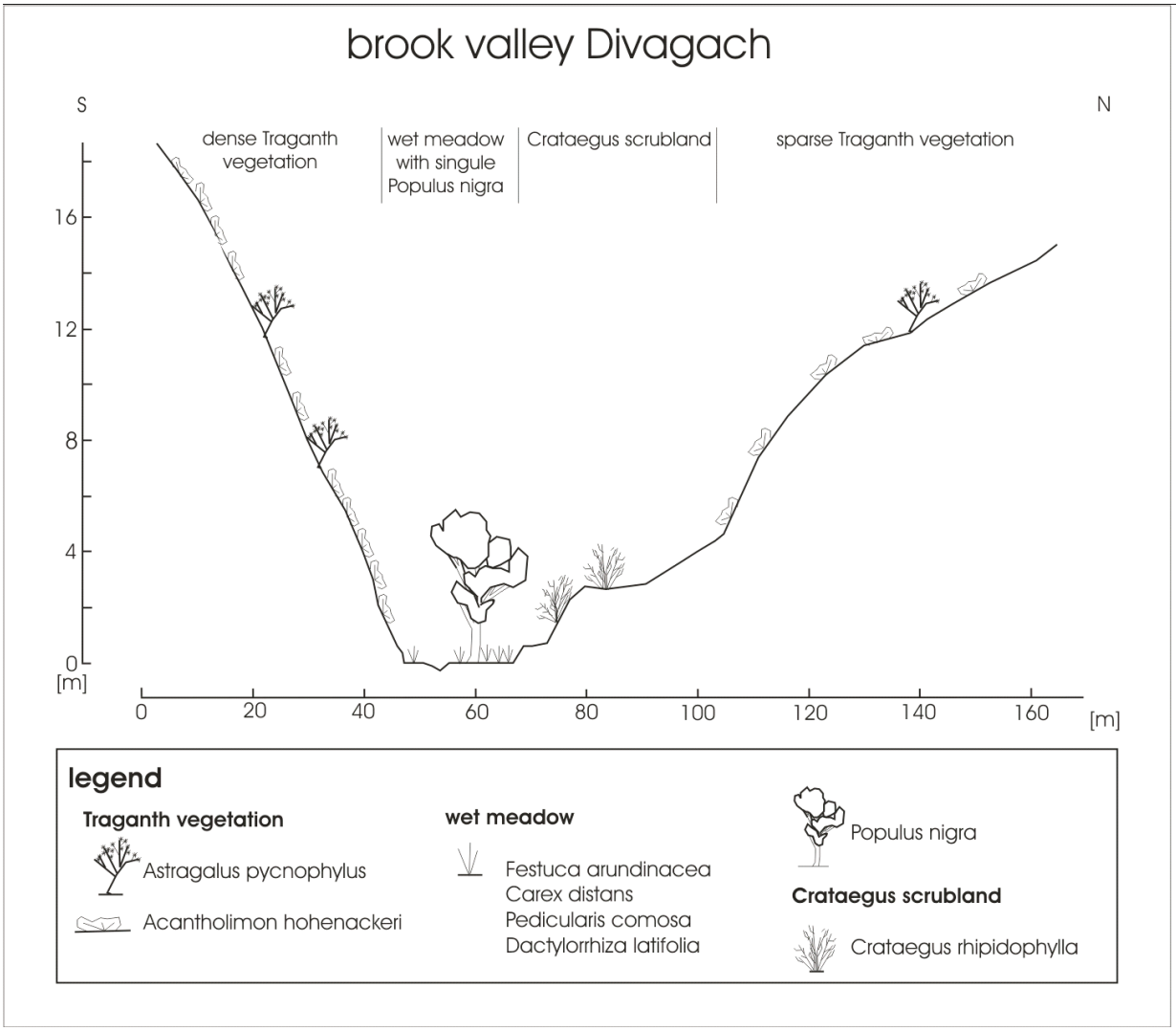


Fig 41: Cross section through creek valley of Zuvand

pratense, and *Thalictrum minus*.

Birds: About 150 wild bird species have been recorded in the Zuvand region, 34 of them are listed in the annex I of the directive 79/409/EEC and seven by the IUCN (4 NT, 1 VU, 2 EN). Nine species are included in the Azerbaijan Red Data Book and 56 are of special European conservation concern (4 x SPEC 1, 14x SPEC 2, and 40 x SPEC 3).

The montane region of Zuvand hosts several passerine species that do not occur anywhere else in Azerbaijan (except in Nakhchivan). These are Bimaculated Lark, Pale Rock Sparrow, Grey-necked Bunting, White-throated Robin, Trumpeter Finch and Upcher's Warbler. Therefore it is of high regional importance.

Several different habitat types can be found, among them rocky slopes, mountain semi-desert and narrow strips of floodplains the most dominant. The rocks are inhabited by Chukar, Finsch´s Wheatear, Eastern Rock Nuthatch, Grey-necked Bunting, Rock Thrush and Blue Rock Thrush. In the canyon south of Lerik, Golden Eagles have been found nesting on a steep cliff. Based on several breeding-season observations, Peregrine Falcons and Egyptian Vultures (EN) are also assumed to be nesting here.

In the semi-desert areas, Bimaculated Lark, Shore Lark, Woodlark and Tawny Pipit are the typical breeding bird species. Grey Partridges are rather rare in this open terrain.

Compared with the dry surrounding the floodplains, gardens and orchards along the small rivers are much richer in birdlife and attractive to many species. Typical breeding birds are Syrian and Green Woodpecker, Scops Owl, Golden Oriole, Lesser Grey Shrike and several warblers and tits. During migration, high numbers of passerines of many species rest and feed in these oases. Most numerous are Red-breasted Flycatchers and *Sylvia*,

Phylloscopus and *Acrocephalus* warblers.

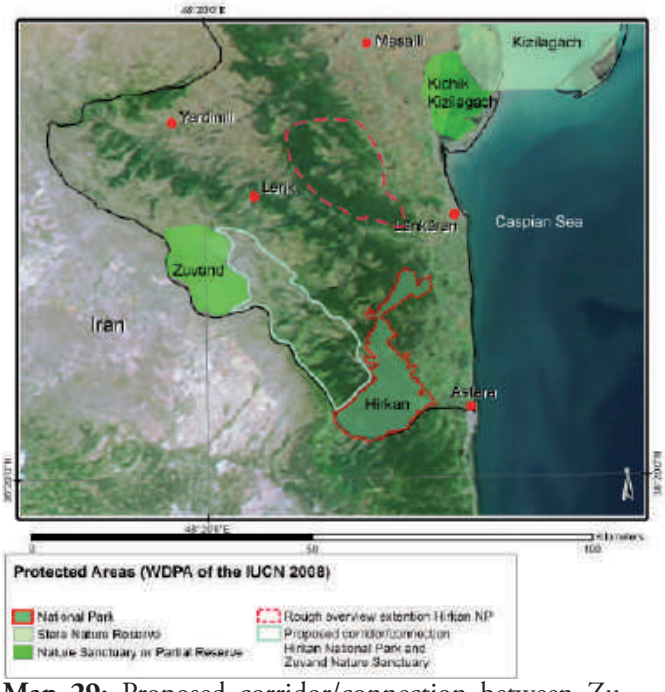
During four days in September 2007 high numbers of birds were observed passing through. Among them were more than 50 Lesser Kestrels (VU), 20 Pallid Harriers (NT), several Steppe Eagles as well as Sparrowhawks, Honey Buzzards, and others. The endangered Saker Falcon (EN) has also been recorded here.

Several times, empty cartridges were found, and the locals probably hunt for Chukars and Grey Partridges.

Mammals: 45 species of mammals have been recorded in the Zuvand area, five of which are listed in annex II and eleven in the annex IV of the directive 92/43/EEC. The Azerbaijan Red Book lists four species and the IUCN list two (1 NT, 1VU).

Several bat species can be found in Zuvand, among them the vulnerable *Barbastella barbastellus*. The region is rich in rodents and also in large carnivores. According to reports by local scientists, the Striped Hyena has been observed several times in the last decade. It appears that this region is the only refuge for this species in the country, apart from the Mingächevir area in north-western Azerbaijan. Along the edges of the Zuvand region, Brown Bears, Wolves and Lynx occur from the forest zone down, while Red Fox, Golden Jackal and Badger are widespread all over the area.

Amphibians and Reptiles: two species of amphibians and 18 species of reptiles have been recorded in Zuvand. One of them is listed in annex II and seven



Map 29: Proposed corridor/connection between Zuvand Zakaznik and Hirkani National Park

Photo 53: Rock Sparrow (*Petronia petronia*) (H. Müller)

are listed annex IV of the directive 92/43/EEC. The Azerbaijan Red Book includes three species and the IUCN list one.

The rocky slopes and the semi-deserts are inhabited by several lizards, such as *Eremias arguta, E. strauchi* and *Ophisops elegans*, the agama species *Agama ruderata* and *Stellio caucasica,* and several snakes. Of special interest is the population of *Testudo graeca* (VU).

Along the rivers and in ponds in the entire region, *Rana ridibunda* and *Bufo viridis* are abundant, and *Natrix natrix* and *N. tesselata* can also be found.

Human influence: The human population of Zuvand is not large and there are no more than 20 settlements, mainly placed along canyons on riverbanks. Animal husbandry is the main occupation of the locals. No protective measures are in place, and hunting is common. The area was designated as a Zakaznik, specifically to serve as a game reserve. The entire highland is used to some extent for grazing; cultivation and sustainable use of trees is typical for this region. However, contrary to practices in settlements of the forest belt at lower altitudes, the land use does appear much less intensive and sustainable.

Significance & protection: Due to its uniqueness among Azerbaijan's landscape complexes, and with its particular species composition, the entire region of the Zuvand uplands has a very high protection value.

Furthermore, the Zuvand lies on an important bird migration route for raptors. Many birds of prey use the canyon south of Lerik to pass the barrier of the Talish Mountain range. Among them are several species of international conservation concern.

If nothing else, at least its regional importance for many bird and reptile species that do not occur anywhere else in Azerbaijan makes this area worthy of protection. The current status, however, is somewhat contradictory to a protection regime, as the existing Zakaznik (covering 15,000 ha) was established as a game reserve.

The entire habitat has closer links to the Iranian highlands than to any other ecosystem in Azerbaijan, rendering the conservation of this natural heritage especially important. Tragacanthic vegetation also occurs in the Greater Caucasus and other regions of Azerbaijan. However, there it is often of secondary character and far less diverse. The extension and condition of *Acantholimon* is unique in the country, as is the geological background with its volcanic sediments.

Yet, additional research is still necessary to fully assess the regional biodiversity, in particular the floristic diversity. In addition, general awareness for the natural singularity of this region needs to be raised among the inhabitants, especially when taking into account that the region might still hold a remnant population of Striped Hyena.

A principal connection between the xerophytic habitats of Zuvand and the deciduous forest of the Hirkan National Park is strongly advised. A potential reserve could be close to the Iranian border. Land use conflicts can be expected to be negligible. The existing State Nature Sanctuary (IUCN IV) needs to be upgraded to a higher level of protection. However, as there is land use in the area and small settlements regularly occur, an establishment of a Zapovednik (IUSN cat. I) does not seem appropriate. As a solution, an extension of the Hirkan National Park is advisable. Certain areas of Zuvand should become a separate core zone, and a development zone should provide buffer functions and could harbour these small settlements.

PART THREE

Environmental policy and legislative background in Azerbaijan

3.1. Azerbaijan – ready for the participation of Europe's protected area network?

3.1.1. State organization and structure

In 2002, after about ten years of independence, Azerbaijan continued to describe itself as "a nation in transition to democracy." This process is still going on today. The basic political and legal parameters for the institutionalisation of democracy have been established and are being refined and enacted. This process involves dismantling institutions, revising laws and defining new ones to bolster an open, market-oriented society.

While the environment is protected by law and pollution is controlled by regulations, in reality concern for the environment has been secondary to economic development. It is therefore important that environmental legislation and management should be given a higher priority to meet the future needs of Azerbaijan.

There are clear signs that priorities are changing and more attention is given to the environment: Radical institutional change has brought about the MENR, which - despite serious obstacles - has been able to take the lead and push the environment higher on the list of national priorities for action. It is very important for the MENR as well as for Azerbaijan's environment not to lose that momentum. Of course, Azerbaijan's ambitions will be kept within the limits of its political and financial possibilities; yet these possibilities have to be reassessed and they will most likely grow over time.

When implementing the recommendations given below, the MENR should use the potential of international organisations that have prepared many international sound studies and background analyses applicable to Azerbaijan as well. Also, the potential of cooperation under the "Environment for Europe" and other processes is not fully utilised.

Azerbaijan has been active in formulating policies for the environment, for sustainable development, and for fighting poverty and supporting economic development. Within the first two years of its establishment, the MENR prepared four national programmes, two of which were approved by Presidential Decree in February 2003, and their implementation has been discussed with other ministries. The other two programmes have been submitted to the Cabinet of Ministers. However, the relationship among these programmes and their relative priority is not always clear, and there is not yet a plan for their monitoring, review and revision. In addition, the Ministry of Ecology and Natural Resources is the main body that initiates environment-related activities. This is, however, impossible without good coordination among all government institutions, integration of the environment into other sectoral policies, and plans and provision of adequate funding. The environmental planning process would benefit from a more consolidated and rationalized framework that also bears implementation.

3.1.2. Policy Start, Conception and Development[15]

Between 1995 and 1998 the government of Azerbaijan made an early initial attempt to formulate an

15 with the following we refer and quote intensively to/from the UN ECE Environmental performance review Azerbaijan. Series No.19, 2004. For an in depth analysis it is recommend to check on this publication (attached).

environmental policy. At that time this was a positive approach, since in Azerbaijan priority is usually given to the exploitation of the country's oil and gas deposits,and to a much lesser extent to the discussion of the ecological consequences.

Right after the inception of the National Environmental Action Plan (NEAP) of Azerbaijan, the first task was to describe the ecological situation. Thereafter it became apparent that the most urgent objectives were to overcome a whole range of technical disasters and chemical pollution concerning both the population and the biosphere. A closer look at the action plan shows that ecological fields of political interest were stressed very clearly in many cases:

- Loss of fertile agricultural land through erosion, salinisation, pollution with heavy metals and chemicals, and deteriorating irrigation systems,
- Threats to protected areas leading to a loss of biodiversity,
- Loss of forest cover, mainly in war-affected areas.

The NEAP puts forward a list of environmental priorities, setting 32 objectives grouped in five categories, including "forestry, land and biodiversity".
Some of the NEAP policy elements have been achieved, particularly with regard to new legislation, but many of the implementing regulations and by-laws are still lacking. The main reasons are financial problems and the lack of clearly defined priorities.
The first NEAP of Azerbaijan had a very positive effect on the development of environmental and natural resource protection, thus proving the value of NEAP as a policy instrument.[16]
Following this first political approach, a steady and consequent national and international "policy development" in Azerbaijan has become apparent.

3.1.2.1. National progresses

The national progress in implementing nature conservation declined over the last two to three years. The implementation and adaptation of results, gained in several workshops and seminars (in Azerbaijan as well as in Germany), supported by BMU, BfN, NATO, international NGOs as well as different Universities did not take place on considerable scale and therefore has not proven sustainability.

A "State Programme on Poverty Reduction and Economic Development for 2003-2005" was developed and put in effect, which is based on the assumption that "economic development that upsets the environmental balance cannot be sustainable". It obliges the government to promote balanced growth and to bring about improvements in some of the key economic sectors: to improve the investment climate, to increase access to credit among businesses and entrepreneurs, to develop the infrastructure, to encourage small and medium enterprises, to develop the regions and agriculture, to improve the environment, to reform energy generation and distribution, and to promote tourism.

The list is large and ambitious. Although it closely approaches NEAP in the fine-tuning of actions and in its language, it mentions the natural environment rather briefly and in general terms ("Improving the management of the country's natural resources").
The programme has been sharply criticised by the assessing units: "The Programme, however, fails to set priorities, nor does it provide an assessment of costs and benefits."[17]
Parallel to the above-mentioned programme, in 2002 the MENR prepared the "National Programme on Environmentally Sustainable Socio-economic Development". It was approved within the "National Programmes on Ecology" (18 February 2003).
The programme covers the environmental aspects of the country's overall development strategy. It determines the main areas of sustainable development and includes a plan of action for 2003-2010 "to address the initial phase of the resolution of the current problems". The programme is meant for a set of sustainable development issues, including, for instance, the environment, industry, agriculture and tourism, and education, science and culture. "The programme should have been a good strategic document on the national level and a clear guide for the Ministry for these seven years"[18]

16 as above: UN ECE Report Environmental performance review Azerbaijan. Most of the text taken and substantially shortened.

17 UN ECE Report Environmental performance review Azerbaijan

18 ref. to UN ECE Report Environmental performance review Azerbaijan with a slight critical note as far as cost estimations

Furthermore, a "National Programme for the Restoration and Expansion of Forests" was developed in 2003. Along with the "National Programme on Environmentally Sustainable Socio-economic Development", presidential decree 1152, "Approving the National Programmes on Ecology", also endorsed the "National Programme for the Restoration and Expansion of Forests". It lists activities in ten subsectors, along with indicative data on implementation, responsible institutions, financial sources and performance indicators. This programme represents one of the few examples of a reasonably descriptive sector plan in Azerbaijan.

More recently, two important policy papers deserve special mention among other policy announcements during the past few years: the "National Capacity Self Assessment for Global Environment Management in Azerbaijan (Baku 2005)" and "The National Action Plan on Strengthening Capacity to Respond to Challenges of Biodiversity Conservation, Climate Change and Desertification/ Land Degradation (2006 – 2015)"

All papers are open, clear, and stringent, and were developed with specific objectives in mind. "Self Assessment" has the goal of examining the capacity question under the auspices of individual, institutional and systematic capacity in environmental management. The "National Action Plan" obviously refers to the diction of the above-mentioned assessment paper and determines in a rather concrete way the political priorities in the years ahead. As far as the action plan itself is concerned, it refers to the projects specifically and allocates the respective financial means. The "National Action Plan" places its priorities very decisively on the two broad fields of public information and forest management, whereas other activities are covered rather broadly and, as a result, not concrete enough. No clear measures are mentioned concerning the implementation of the action plan and the review of its results .

3.1.2.2. International progresses

The most formal start of Azerbaijan's intention to become an international player is its Partnership and Cooperation Agreement (PCA) with the European Communities (1999).

and measures for financing are concerned.

The agreement proclaims the wish of the involved parties to establish "close cooperation in the area of environmental protection, taking into account the interdependence existing between the parties in this field". The stated objectives are consistent with both the NEAP and the "National Programme on Environmentally Sustainable Socio-economic Development" (see above).
More importantly, paragraph 3 mentions, among others, two strategic objectives, namely:

- Improving laws to European Community standards;
- Developing strategies, particularly with regard to global and climatic issues and to sustainable development.

The first of these two defines the harmonisation of Azerbaijani environmental legislation with that of the European Union. If enforced properly, this clause will result in a far-reaching overhaul of the whole system of environmental protection in Azerbaijan — a long-term objective.[19] This clause is dealt with in detail in the following chapters.

The second remarkable landmark for an "international role" of Azerbaijan was not a big political event, but the starting point of a Caucasian view on the common ecology: the "Biodiverstiy of the Caucasus Ecoregion, An Analysis of Biodiversity and Current Threats and Initial Investment Portfolio (2001)".[20] There is no doubt that this cooperation of specialists from Armenia, Azerbaijan, Georgia and the Russian Federation – under leadership of the WWF – has led to a new way of ecological thinking and the high-ranked results of this cooperation can now be seen in the whole Caucasus region. This statement applies especially to the area-oriented approach of this study. All attempts to structure biodiversity and put nature protection into a regional and then sub-regional approach have their starting point here.

In principle, it can be said that Azerbaijan and the MENR were very active in fulfilling international requirements,

19 UN ECE Report Environmental performance review Azerbaijan. Later, when we talk about a kind of concrete law harmonisation between the EU and Azerbaijan we will see how important the political binding attempt of both sides in 1999 was.
20 Editors: Krever et all. 2001

documentations, and strategic planning in the first years of the ministry's existence. Unfortunately, the pace of international cooperation has slowed down within the last 3 years, although the MENR seems still very active. However, recent tendencies show back stepping in regard to international relations (apart from economic), which more or less (by incident) occured with the opening of the BTC pipeline in 2006. Contradictionary, while MENR expressed the self-capacity of Azerbaijan to finance nature conservation but the need for international methodological support and knowledge transfer, these last two points seem either a) not requested, b) not accepted or at the end are not sustainable.

For example, the Caspian Environmental Programme is by far reaching the optimum output, MENR still does not participate actively in the Caucasus Protected Area Trust Fund, the establishment of Samur-Yalama National Park under the Caucasus Initiaitve still did not take place and two CIM experts left the MENR after three/two years without their resources being used sustainable.

Today, the environmental policy, emphasis and direction - its ranking and decision making process is hard to follow from the outside. Support from international development projects, initiatives or bilateral agreements is hardly asked for by MENR.

3.1.3. Administrative law in Azerbaijan

No law and no administrative action can be handled substantively, correctly and democratically without binding rules for the processes, first during the administrative phase and later in court.

In the course of 2008, two laws were supposed to be enacted in Azerbaijan that will comprehensively alter the administrative law of this country and establish a new basis for the relationship between the state and its citizens:

- „The Law on Administrative Procedure"

  This law lays down the principles and the course of the administrative process by establishing concrete rules on the obligations of the state — represented by its administrative authorities — and the citizens' rights.

- "The Law on Court Proceedings in Administrative Matters"

  This law lays out the conditions for and the content of court proceedings against administrative measures.[21] This field of law will be crucial for the development of the Republic of Azerbaijan into a democratic country governed by the rule of law.[22]

Currently, the procedural rules of the administrative authorities are laid down only fragmentarily in different provisions of various laws and in numerous normative legal acts. Since a uniform code does not exist, the provisions applied by the administrative authorities vary substantially.

Up to now, each government body independently defines the rules applicable to its relationship with the citizens. In most cases, these provisions do not deal with the obligations of these bodies, but rather those of the citizens. In addition, the rules are often changed. The instructions, decrees and other documents that set out these rules are hardly ever published, meaning that citizens cannot inform themselves about them. It is usually impossible for a citizen to obtain application forms or answers to questions on the telephone or by other means of communication. Rather, he must go to the administrative authority in person and hope that one of the employees is able and willing to answer his questions. These conditions contradict the principles of a state governed by the rule of law as laid down in the Constitution of Azerbaijan (See the preamble and Article 7 of the Constitution of Azerbaijan)[23]

To this end, the new administrative law first lays down the state's obligations towards its citizens and their rights against the state. It mirrors the principles set up in the Constitution and specifies them, thereby facilitating

21 In their publication "Introduction to the new administrative law of Azerbaijan" by Herrmann & Hye-Knudsen, Baku 2006 (in Azeri, German and English) the authors spoke of a formal decision by the Parliament to be taken in 2007. By the time of writing this report, the two bills were nevertheless still pending, whilst being discussed in Parliament.

22 The provisions of the Law on Administrative Procedure are discussed in detail in a commentary in the Azeri language written by Karimov and Valiyeva (published by GTZ and CILC). The publication of a commentary on the Law on Court Proceedings in Administrative Matters is planned for 2007.

23 Herrmann & Hye-Knudsen 2006

their practical application. For example, Article 25 of the Constitution of Azerbaijan lays down the principle of equal treatment in general terms, whereas Article 12 of the "Law on Administrative Procedure" sets out in detail the meaning of equal treatment, i.e., that administrative authorities must treat identical cases identically and different cases differently.

The new administrative laws (both the "Law on Administrative Procedure" and the "Law on Court Proceedings in Administrative Matters") have a direct relationship to the law of environment and especially to the law of nature protection. A whole slew of activities such as the licensing process, potential for protesting, requesting information, and suing the government must put on a transparent and lawful basis.[24]

In the immediate future, however, it is crucial that Azerbaijan introduces substantive laws in the different areas of administration, for example construction and police laws, which set out specifically the rights and duties of the state and the citizens. The "Law on Administrative Procedure" merely regulates the formal conditions for an administrative process that is in accordance with rule of law principles. The law can, however, only be effective in connection with substantive provisions in the many areas in which administrative measures affect the citizens' lives. Otherwise, the provisions of the "Law on Administrative Procedure" will remain an empty shell without any practical benefit. The same holds true for the "Law on Court Proceedings in Administrative Matters", for judicial review of administrative actions only makes sense, if a substantive law is available to the judges as the legal standard that must be applied[25].

3.1.4. Environmental law in Azerbaijan

Nature protection in Azerbaijan received a substantial basis in the law only after the reforms of 1992. Under the authority of the Soviet Union there was only a State Committee responsible for questions of ecology, nature and natural resources. This Committee was replaced by the Ministry of Ecology and Natural Resources.
The weak degree of organisation during the Soviet era illustrates the political rank of the policy-segment nature protection. This also applies for the norms in this field. Nature protection in a broader sense was only brought to norms in and for Azerbaijan towards the 1990s. It is remarkable for this period - but also typical for most of the former members of the Soviet Union – that substantive, systematic but also mostly very general questions were addressed in the law.
As in other countries in transformation a higher degree of detail can only be found when looking at decrees and other norms of carrying out the regulations. This still holds true for many existing regulations in Azerbaijan.

There are a great number of norms (and laws) in Azerbaijan, most of them available on the MENR homepage by now. Others are very difficult to find and access.
In particular, the national legislation on the conservation of natural habitats and of wild flora and fauna consists of several laws, such as[26]:

- Law on the Protection of the Environment,
- Law on Animal World,
- Law on Specially Protected Natural Areas and Sites,
- Law on Phytosanitary Control
- The Forestry Code

There are also a number of secondary legislative acts putting in concrete terms the general rules laid down in the above-mentioned laws, for instance:

- "Resolutions of the Cabinet of Ministers on the statute of the Red Book",
- "List of wild animals permitting natural and legal persons to keep and breed them in unfree or semifree conditions and the requirements of their keeping, conservation and exploitation",
- "Decree of the President of Republic of Azerbaijan on Approval of the General Statute of the State Natural and Biosphere Preserves of Republic of Azerbaijan" or the,
- "General Statute of National Parks of the Republic of Azerbaijan".

By analysing all available laws with relevance to ecology and nature conservation, the following conclusion can be drawn:

24 For further information on (e.g.) the principles, the administrative processes, the administrative acts, the appeal and court proceedings see Herrmann& Hye-Knudsen (2006), page 106 ff

25 Herrmann & Hye-Knudsen (2006), page 29

26 Compare list of laws attached to this report

- Azerbaijan has steadily improved its system of environmental protection. The policy, legal and institutional framework that was inherited from the former Soviet Union was not designed to operate within a market economy.
- There is a high concentration of environmental laws at the first normative level in Azerbaijan. Much progress has been made, particularly in updating the environmental legal framework.
- The Azerbaijani norms very often have a high degree of generality; they are programmatic regulations rather than guidelines for action. In the context the Constitution a couple of rules show deficits.
- Other institutional reforms are on their way. In this regard, particular attention needs to be given to the organization and effectiveness of the implementation, especially within the inspecting authorities.
- Finally, a number of good policies for the environment, poverty prevention and sustainable development have been developed, but their relationship remains to be clarified.

Very often, the level of decrees gives the impression that individual cases are often only decided by the President's Office or the Council of Ministers.

Remarkably, especially in the field of the environment there is no planning by law. We did not find binding, superior planning or even landscape planning in the existing law.
Despite missing many practical components, the environmental law contains an environmental impact assessment; it forces applicants and officials to do substantial research and report all facts in the course of issuing permits to enterprises with an environmental impact.

Based on constitutional principles, such as:

- damage to the environment is forbidden, since the future of generations to come must be saved,
- everyone has the right to live in a healthy environment,
- the country owns all natural resources (e.g. oil, gas)

we find the following legal structure in Azerbaijan:

- Parliamentary legislation that establishes the state regulation of strictly protected natural areas, and the protection and use of the environment and of nature/biodiversity;
- Presidential decrees and orders and the resolutions of the Cabinet of Ministers that ensure the implementation of the major provisions of the Laws;
- By-laws of the executive authorities (ministries and committees) that specify the activities to implement the laws;
- International agreements and conventions in the field of nature and biodiversity, to which the Republic is a signatory[27].

3.1.5. Environmental Impact Assessment (EIA)

It is of central importance how far the protection status for a new protected area extends and what the consequences are. There are a number of instruments for managing conflicts for Europe. For the past couple of years they have been part of the FFH Guideline. Therefore, the FFH Guideline demands an impact assessment in this context.

The Scoreboard Report includes a brief remark on this important element of legislation: "The Azeri environmental legislation does not stipulate for the … requirements of plan and project assessment, in particular of the implications for the area in view of the area's conservation objectives".

An analysis of the existing legal environmental impact assessment procedures of Azerbaijan revealed the following regulations:

The Law on Environmental Protection of Azerbaijan defines ecological expertise as "the identification of conformity of the environmental conditions with qualitative standards and ecological requirements in order to identify, prevent and forecast the possible negative impact of an economic activity on the environment and

27 Country Study on Biodiversity and First National Report of the Republic of Azerbaijan, Chapter 6, under 61

related consequences".
The State Ecological Expertise (SEE) applies to a very broad range of products and services, and even to their import (art. 52). The scope of SEE (art. 54) covers seven different applications. Of these, only three are fully consistent with the general concept of EIA. They are:

- Documentation relating to the development of new equipment, technologies, materials and substances, including those imported from abroad;
- Feasibility studies (calculations), construction projects (reconstruction, expansion, new technical equipment) and closing down of structures and facilities, environmental impact assessment (EIA) documentation;
- The evolution of environmental conditions as a result of economic activity or emergencies.

Neither this law nor any other legal document gives any threshold values for activities that would require (or be exempt from) SEE. The MENR is the responsible authority for SEE.

EIA, as a part of SEE, is in fact only required for development activities. However, the EIA legislation does not provide specific screening project categories. Consequently, all development proposals submitted to the relevant authorities for approval are subject to an EIA.
The regional departments of the MENR receive applications and ensure that adequate information has been provided. Where an EIA is required, documentation is sent to the head office of the MENR for processing due to a lack of capacity in local offices. For projects requiring a full EIA, the MENR organizes and chairs a special scoping meeting of representatives of the applicant, invited experts and invited members of the public. There are no firm requirements on group composition; the MENR has access to a pool of experts and composes each commission based on case-specific considerations.
The MENR is responsible for verifying the accuracy and reliability of a proponent's monitoring results. If disagreement persists, the proponent has the option of taking the matter to the courts. Enforcement and compliance are the responsibility of the general inspection system.

In general, the EIA is established and works in Azerbaijan. However, the lack of screening categories and fixed scoping requirements is a problem.

There are also other problems. Azerbaijani legislation requires project documents and EIA studies to be coordinated with other relevant institutions, but does not specify the form, purpose and time frame of this coordination. In evaluating alternatives, only technological alternatives need to be considered.
The general public and non-governmental organizations have the right to organize public ecological reviews for proposed projects. So far, this right has not been used by any NGOs, possibly due to time and other resource constraints. Public participation is required for all stages of EIA and SEE.

As noted in the section on SEE and EIA, article 54 of the Law on Environmental Protection effectively calls for Strategic Environmental Assessment (SEA) without mentioning it explicitly. SEA has been formally adopted in few countries in the region, and it is even more rarely mandatory. In this regard, Azerbaijani legislation seems quite progressive, but the reality is less optimistic. The SEA requirement of the Law on Environmental Protection is not supported by any sub-normative acts defining the procedures for its application or mechanisms for close cooperation between the Ministry of Ecology and Natural Resources and other State planning institutions. Not surprisingly, there have been no SEA applications.

3.2. Europe and Azerbaijan - the environmental policy relation

In order to gain and maintain the EU's support Azerbaijan needs to integrate European values. The country has begun the process of establishing democratic freedoms. The European Union is concerned over the lack of respect for democratic values, the rule of law and fundamental rights in the country. The EU, through the consultative bodies established under the PCA, has attached particular importance to holding free and fair elections, the pluralism of political parties, and freedom of the media. Addressing these three areas under the

PCA may be the key for Azerbaijan to strengthen not only its democracy but also its legislative framework, its legal institutions and the degree of compliance by those in power with the law.[28]

In Azerbaijan, the Technical Assistance to the Commonwealth of Independent States (TACIS) in the period 2002-2006 focused on continued support for institutional, legal and administrative reforms as well as on support in addressing the social consequences of transition. TACIS also provided essential assistance to the implementation of Azerbaijan's Poverty Reduction Strategy launched in 2003. The new Country Strategy Paper (CSP) 2007-2013 covers EC financial assistance to Azerbaijan under the new European Neighbourhood and Partnership Instrument (ENPI). It is accompanied by a new ENPI National Indicative Programme (NIP) for 2007-2010 whose main priorities are: (1) Democratisation, rule of law and fundamental freedoms; (2) Socio-economic reforms and legal approximation to the EU; (3) Energy and transport. Azerbaijan also participates in different regional and thematic programmes under the ENPI, such as the European Instrument for Democracy and Human Rights.
There is a strong impression that environmental issues entered into the entire process of approximation only at a very late stage. Nevertheless, nature protection and more specifically protected areas are covered by the agreement.

3.2.1. The Partnership and Cooperation Agreement (PCA)

It is evident that the Republic of Azerbaijan is in a close relationship with Europe. In this context it is not essential how the cooperation between two entities is organised: as informal neighbours or a formal membership in the European Union (EU).
To strengthen the bond between the EU and Azerbaijan, the two countries signed a formal Partnership and Cooperation Agreement (PCA) in April 1996, which took effect at the beginning of July 1999.
As far as environment and nature as policy elements are concerned, the PCA sets the following policy: "The Republic of Azerbaijan should endeavour to ensure that its legislation will be gradually made compatible with that of the Community" (Art. 43 PCA).
The intended process is called approximation and expresses – up to a certain degree – the clear tendency towards more than a neighbourly relationship. It is to be decided by the contract parties (EU and Azerbaijan) what kind of relationship they are striving for in the future, after the implementation of the PCA. The PCA formed the basis for Azerbaijan becoming a member of the European Neighbourhood Policy.

28 C.P.M. Waters (editor), The State of Law in the South Caucasus, 2005

3.2.2. European Neighbourhood Policy: Azerbaijan

After the European countries had tremendous internal problems with the formal opening of EU membership to Turkey, and other former members of the Soviet Union in Eastern Europe (following Bulgaria and Romania), the EU instituted a New Policy concerning the Eastern European countries.

In June 2004 and based on the PCA, Azerbaijan (together with Armenia and Georgia) was included in the European Neighborhood Policy at its request and following a recommendation made by the European Commission. The Commission was invited to report on progress made by each country with regard to political and economic reforms.
As a consequence the European Commission recommended a significant intensification of relations with Azerbaijan through the development of an Action Plan under the European Neighborhood Policy (ENP).

This recommendation is based on the Commission's published Country Report, which provides a comprehensive overview of the political and economic situation in Azerbaijan and the state of its bilateral relations with the European Union. The ENP goes beyond the existing Partnership and Cooperation Agreement to offer the prospect of an increasingly close relationship with the EU, involving a significant degree of economic integration and a deepening of political cooperation.

Key objectives for the action plan include, among others:

- Implementation of effective reforms in the field of rule of law (judiciary, law enforcement agencies)

- Progress in poverty reduction, sustainable development and environmental protection
- Progress in conflict resolution and enhanced regional cooperation.

With regard to the first issue, which features most prominently in the action plan, a team of specialists produced a "Draft National Plan of Legal Approximation".
In that context a Scoreboard Report on "Environment, Exploitation and Utilization of Natural Resources" was prepared. Both reports have been published [29].

3.2.2.1. The Scoreboard Report

Article 43 of the PCA points out: "The Republic of Azerbaijan should endeavor to ensure that its legislation will be gradually made compatible with that of the Community". The approximation extends - among other areas - to the environment and exploration and utilisation of natural recourses.

Protection of the environment is one of the major challenges facing Europe. Therefore, the main objectives of the EU Policy within the fields of environment and exploitation and utilisation of natural resources are:

- Preserving, protecting and improving the quality of the environment,
- Protecting human health,
- Prudent and rational utilisation of natural resources,
- Promoting measures at an international level to deal with regional or worldwide environmental problems.

The scoreboard report takes this European Policy into account and tries to compare it to the status quo in Azerbaijan. The paper was prepared by two experts with in-depth knowledge of the European legislation. In essence the report shows a list of deficits of the Azerbaijani legislation – in general and in detail.

As far as the general legislation is concerned, the Scoreboard Report has three main concerns

- the Law on Obtaining of Environmental Information,
- the Law on Protecting the Environment,
- (legislation on Integrated Pollution Prevention and Control)[30]

The argumentation on specific legislation is concentrated on:

- air pollution,
- waste management,
- chemical, industrial risks and biotechnology,
- nature protection and
- noise management.

3.2.2.2. Nature Protection within the Scoreboard Report

Within the findings of the Scoreboard Report, the authors qualified the legal work on nature in Azerbaijan as "low level of approximation" to the European legislation. Nevertheless, this level is actually "higher" than for most of the other described environmental fields, as most of these are either "not approximated" or only show a "very low level of approximation". However, no detailed comparison of both norm complexes was conducted and was obviously not intended within this first analysis.

Nevertheless, the report presents a very good basic paper with suitable recommendations; the detailed work of comparing specific norms "law by law" and "paragraph by paragraph" has still to be done.

Azerbaijan has adopted several laws, decrees and resolutions in the field of environmental protection and exploitation and the utilisation of natural resources. Their analysis shows that in some cases the provisions are not in compliance with the relevant international and European rules. Moreover, some basic rules of environmental protection laid down by the European

29 1. Draft National Programme of Legal Approximation, Legislation with EU acqis, funded by the EU, implemented by SOFREGO, 2006- 2009,Baku, 2006.

2. Mammadov & Apruzzi : Environment, Exploitation and Utilization of NaturalResources, Scoreboard Paper on Approximation of Azerbaijani Legislation to EU Law, Baku 2004

30 The Integrated Pollution Prevention and Control is meant for the overall environment of Azerbaijan. Especially for the rather technical environment it is of the greatest importance. For our study – in most of the cases – technical items have nevertheless no specific attraction.

Union are not represented in the Azerbaijani legislation at all.[31]

Particularly, the low level of approximation of the relevant Azerbaijani legislation to the Council Directives 79/409/EEC[32] and 92/43/EEC[33] must be emphasized. It does not provide for some specific protection requirements provided for in these Directives, for instance, criteria for selecting sites eligible for identification as sites of national importance and designation as special areas of conservation, the prohibition of the disturbance of certain species, requirements of plan and project assessment, in particular of their implications for the area in view of the area's conservation objectives, etc.

Due to this, the recommendations of the Scoreboard Report read as follows[34]:

The recommendations below are provided with a view towards fostering the approximation process with the EC rules on the environmental protection and exploitation and utilisation of natural resources. The closest possible approximation to relevant EC rules is an indispensable and important condition for strengthening the economic links with the European Union, as stipulated in Article 43 of the PCA.

General legislation: Amending the Law on the Protection of Environment and adopting relevant secondary legislation concerning the assessment of the impact and effects of certain public and private projects on the environment, whose main goal is to ensure that the authority giving the primary consent for a particular project makes its decisions with an awareness of any likely significant effects on the environment. The amending provisions should lay out a procedure that must be followed for certain types of projects before they can receive approval. This procedure, known as Environmental Impact Assessment (EIA), is a means of drawing together, in a systematic way, an assessment of a project's expected significant environmental effects. This helps to ensure that the importance of the predicted effects, and the scope for reducing them, are properly understood by the public and the responsible authorities before a decision is made. Lists of project types that always require an EIA and project types that should require an EIA whenever they are likely to have significant effects on the environment need to be drawn up. All EIA procedure stages should be determined and specified as required. During the preparation of the above-mentioned amendments the requirements of Directive 85/337/EEC35 should be taken into account.

Nature protection legislation: It is recommended to take the following measures in this field:

- To adopt the appropriate mandatory rule on the conservation of wild birds. In general, this rule should provide for the protection, management and regulation of all bird species naturally living in the wild within the territory of Azerbaijan, including the eggs of these birds, their nests and their habitats. Moreover, it should regulate the exploitation of these species. Special measures for the protection of habitats should be adopted for certain bird species and migratory species of birds. The rule has to regulate the specific measures for the protection of all bird species. The preparation of this rule should be guided by the requirements of Directive 79/409/EEC[36].
- To amend the legislation on the conservation of natural habitats and of wild flora and fauna. As to the requirement of establishing special areas of conservation, it should define the criteria for selecting sites eligible for identification as sites of national importance and designation as special areas of conservation. In regard to the general system of protection of certain species of flora and fauna, the Azerbaijani environmental legislation should stipulate the prohibition of disturbance of these species, requirements of plan and project assessment, in particular of their implications for the area in view of the area's conservation objectives. Moreover, the protection of animal species by

31 Mammadov & Apruzzi 2004

32 Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.

33 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.

34 The following paragraphs are quoted from: Mammadov & Apruzzi 2004

35 Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment.

36 Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds.

Table 11: Comparison of EU directive 79/409/EEC with Azerbaijan law, taken from the Scoreboard report

EU-Directive	Azerbaijan Law comparable to EU directive	Comments
Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds	Law of Republic of Azerbaijan on the Protection of Environment 678-IQ, dated 08.06.1999 Law of Republic of Azerbaijan on Animal Kingdom 675-IQ, dated 04.06.1999 Resolution of the Cabinet of Ministers of Republic of Azerbaijan on Approval of some Legal Acts connected with the Animal World 117 of 13.07.2000 Resolution of the Cabinet of Ministers of Republic of Azerbaijan on Approval of the Statute of Red Book of Republic of Azerbaijan 125 of 15.07.2000 Resolution of the Cabinet of Ministers of Republic of Azerbaijan on Approval of the List of Wild Animals Permitting Natural and Legal Persons to Keep and Breed them in Unfree or Semifree Conditions and of the Requirements of their Keeping, Conservation and Exploitation 86, dated 01.05.2001 Resolution of the Cabinet of Ministers of Republic of Azerbaijan on Approval of the Rules on Conservation and Exploitation of the Animals Entered in a List of Species of the Specially Preserved Animals and of the Rules on Importation in and Removal over the Borders of Republic of Azerbaijan of the Objects of Animal World 100, dated 27.07.2004 Law of Republic of Azerbaijan on Specially Protected Natural Areas and Sites 840-IQ, dated 24.03.2000 Decree of the President of Republic of Azerbaijan on Approval of the General Statute of the State Natural and Biosphere Preserves of Republic of Azerbaijan and of the General Statute of National Parks of Republic of Azerbaijan 531, dated 04.07.2001 Law of Republic of Azerbaijan on Hunting 637-IIQ of 20.04.2004 Resolution of the Cabinet of Ministers of Republic of Azerbaijan on Approval of some Legal Acts connected with the Hunting 147, dated 30.09.2004	This Directive as well as its amending acts seeks to protect, manage and regulate all bird species naturally living in the wild within the European territory of the Member States, including the eggs of these birds, their nests and their habitats, as well as to regulate the exploitation of these species. According to it, the Member States are required to preserve, maintain and re-establish the habitats of the sad birds as such, because of their ecological value. These obligations exist even before any reduction is observed in the number of birds or any risk of a protected species becoming extinct has materialized. The Azerbaijani law concerning animal conservation regulates protection of wild birds in a very general manner. It does not provide for some specific protection requirements laid down in the Directive 79/409/EEC, which are important for effective preservation of the wild birds. According to Azerbaijani legislation only those bird species gain special level of protection which are included into the Red Book, i.e. species in danger of extinction and species considered rare. It does not fully correspond to the requirements of the Directive in connection with European Court of Justice's Case C-335/90 (Commission of the European Communities v. Kingdom of Spain) Thus, for more effective bird protection it is recommended to adopt separate mandatory rule on conservation of wild birds taking into account the requirements of the abovementioned EC Directive concerning protection, management and regulation of all bird species naturally living in the wild, including the eggs of these birds, their nests and their habitats, exploitation of these species, special measures for the protection of habitats for certain bird species and migratory species of birds and specific measures for the protection of all bird species.

Table 12: Comparison of EU directive 92/43/EEC with Azerbaijan law, taken from the Scoreboard report

EU-Directive	Azerbaijan Law comparable to EU directive	Comments
Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora	Law of Republic of Azerbaijan on Animal World 675-IQ, dated 04.06.1999 Resolution of the Cabinet of Ministers of Republic of Azerbaijan on Approval of some Legal Acts connected with the Animal World 117, dated 13.07.2000 Resolution of the Cabinet of Ministers of Republic of Azerbaijan on Approval of the Statute of Red Book of Republic of Azerbaijan 125, dated 15.07.2000 Resolution of the Cabinet of Ministers of Republic of Azerbaijan on Approval of the Rules on Conservation and Exploitation of the Animals Entered in a List of Species of the Specially Preserved Animals and of the Rules on Importation in and Removal over the Borders of Republic of Azerbaijan of the Objects of Animal World 100, dated 27.07.2004 Law of Republic of Azerbaijan Phytosanitary Control 102-IIIQ, dated 12.05.2006 Law of Republic of Azerbaijan on Specially Protected Natural Areas and Sites 840-IQ, dated 24.03.2000 Decree of the President of Republic of Azerbaijan on Approval of the General Statute of the State Natural and Biosphere Preserves of Republic of Azerbaijan and of the General Statute of National Parks of Republic of Azerbaijan 531, dated 04.07.2001 Law of Republic of Azerbaijan on Hunting 637-IIQ, dated 20.04.2004 Resolution of the Cabinet of Ministers of Republic of Azerbaijan on Approval of some Legal Acts connected with the Hunting 147, dated 30.09.2004	The Directive establishes a European ecological network comprising special areas of conservation in accordance with the provisions of the Directive, and special protection areas classified pursuant to Directive 79/409/EEC on the conservation of wild birds. It provides with the lists of natural habitat types of Community interest, animal and plant species of Community interest, animal and plant species in need of particularly strict protection etc. It provides for the general system of protection for certain species of flora and fauna. Despite being of wide range, Azerbaijani legislation does not comply fully with the requirements of the Directive. As to the requirement of establishing of the special areas of conservation, it does not define the criteria for selecting sites eligible for identification as sites of national importance and designation as special areas of conservation. As regards the general system of protection of certain species of flora and fauna, the Azerbaijani environmental legislation does not stipulate for the prohibition of the disturbance of the certain species, requirements of plan and project assessment, in particular of their implications for the area in view of the area's conservation objectives. Moreover, the protection of animal species by Azerbaijani environmental law is far from being in line with the relevant requirements of the Directive. Therefore, it is recommended to amend relevant legislative acts taking into account provisions of the Directive 92/43/EEC concerning special areas of conservation, in particular, the criteria for selecting sites eligible for identification as sites of national importance and designation as special areas of conservation, prohibition of the disturbance of the certain species, plan and project assessment, in particular their implications for the area in view of the area's conservation objectives etc.

Azerbaijani environmental law should be brought in line with the relevant requirements of Directive 92/43/EEC[37]. A stricter system of protection of plants should be established.

The preparation of these amendments should be guided by the requirements of the above-mentioned directive.

3.2.3. European nature protection networks for Azerbaijan

A first step and yet a very practical approach to an approximation to European nature conservation standards and their implementation as well as the implementation of the respective legislation is participation in exiting nature protection networks. Several networks are suitable, although their usefulness for the European part is somewhat questionable. However, participation at least raises the topic of approximation and may eventually lead to the most important nature network in Europe, the NATURA 2000 network.

3.2.3.1. Emerald Network

Similar to the engagement of the EU in the Caucasus, the Council of Europe - with a substantial tradition in nature protection (and often in time- and money-consuming concurrence with the EU) - is working on the environmental cooperation between its member countries. The legal basis for cooperation within the Council of Europe is the 'Convention on the Conservation of European Wildlife and Natural Habitats', which came into effect on June 1st, 1982 (Bern Convention).

On the basis of this convention, the Emerald Network of Areas of Special Conservation Interest (ASCIs) was launched in 1999. The network aims to harmonise the policy in protected areas and to help accession states to adapt ecological networks to EU requirements. It is to be set up in each contracting state or observer state according to the Bern Convention. Besides the EU, this means a number of other European countries as well as countries in Northern Africa. Until now, 21 pilot projects for the implementation of the Emerald Network have been organized in European and African countries. With regard to the Caucasus Region, pilot projects were set up for Georgia, Armenia, Azerbaijan, Turkey and Russia.

In Azerbaijan, a pilot project was started in 2005. Within the project, Azerbaijan and the Council of Europe established a 'Group of Experts for the setting up of the Emerald Network of Areas of Special Conservation Interest'. This group issued a report in February 2006. The report was produced by a team of representatives of the Ministry of Ecology and Natural Resources, scientists from WWF Azerbaijan and the National Academy of Sciences. Unfortunately, the results are on a rather broad scale and do not evaluate the natural potential for the establishment of a PA network in great detail.

The denomination of ASCIs has to follow a certain procedure and conform with the framework of biogeografic regions adopted by the Standing Committee to the Bern Convention in 1997. This framework applies for the Emerald Network and the Natura 2000 Network as well. In Azerbaijan, the 'Expert Group for setting up the Emerald Network in Azerbaijan" identified the Alpine and the Steppic region (Expert Group 2006). However, this concentration on only two habitat types is seen as the major shortcoming of this approach.

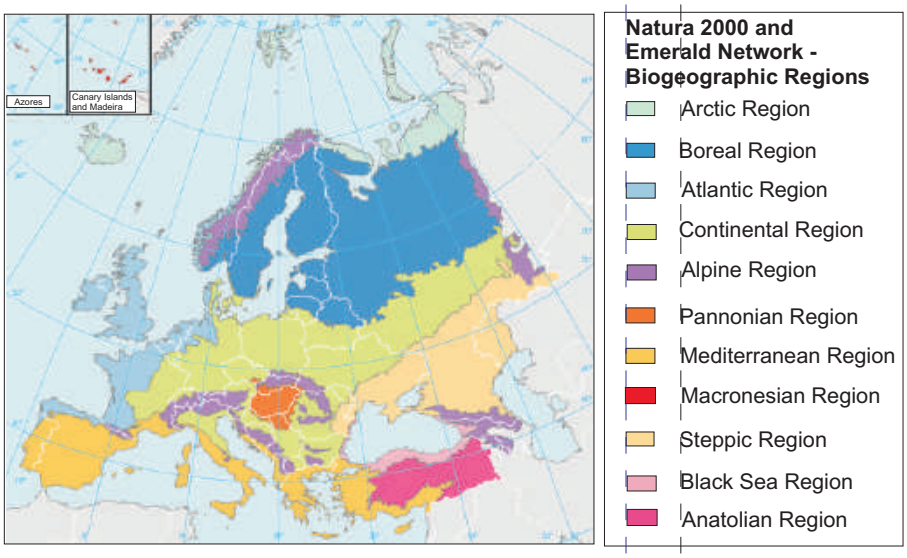
The expert group located five areas on the map of Azerbaijan that correspond to the requirements of the Emerald Network. The findings explicitly built on the national legislative framework and identify 21 types of endangered natural habitats besides the potential Emerald Network areas. Unfortunately, the latter are not described in detail and are not linked spatially to the priority conservation areas. The chosen sites are roughly described in the report and species lists (albeit incomplete) are given.

Possible Emerald Network Areas:

- Zangezur-Daridag - Alpine Region
- Mingächevir-Turyanchay - Steppic Region
- Zakatala-Ilisu - Alpine Region
- Shahdag - Alpine Region
- Hirkan - Alpine Region

In Georgia, Azerbaijans eastern neighbour, a Pilot Project has been launched in 2002 (Expert Group 2008) in order to start the implementation of the Emerald Network under the responsibility of the Ministry of Environment

37 Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora.



Map 30: Biogeographic regions of Natura 2000 and the Emerald Network, source: EEA (2008)

and in cooperation with the Noah's Ark Center for the Recovery of Endangered Species (NACRES). A second-phase pilot project started in 2004.

Georgia is divided into three biogeographical regions: Alpine, Black Sea and Continental. The national authorities have proposed to add an Anatolian region. The process of identifying the species and habitats for the designation of ASCIs in Georgia revealed a lack of information and the need to obtain more recent and credible data.

In Armenia, a pilot project on the implementation of the Emerald Network was launched in 2007 (Expert Group 2008). Further funding under the framework of the European Neighborhood Policy may be possible.

3.2.3.2. The Pan-European Ecological Network (PEEN)

Another initiative of the Council of Europe is the Pan-European Ecological Network, which aims at the linking of core areas for protection through the restoration or preservation of corridors.

In 1995, the 3rd Ministerial Conference 'Environment for Europe' endorsed the Pan-European Biological and Landscape Diversity Strategy (PEBLDS) and its main proposal - the setting up of the Pan-European Ecological Network. This decision resulted from the adoption of the United Nations 'Convention on Biological Diversity' on the Rio Earth Summit. The principal aim of the strategy is to find a consistent response to the decline of biological and landscape diversity in Europe and to ensure the sustainability of the natural environment. Altogether, 55 countries endorsed the Pan-European Biological and Landscape Diversity Strategy in 1996. In 2003, the 5th Ministerial Conference 'Environment for Europe' agreed to halt the loss of biodiversity at all levels by 2010.

The PEEN seeks to conserve ecosystems, habitats, species, their genetic diversity and landscapes of European importance.

It also represents a tool for conciliation of socio-economic activities and the preservation of biological and landscape diversity. In this context, it intends to integrate biodiversity conservation and sustainability into the activities of all sectors, to improve the information on and awareness of biodiversity, to increase the public participation in conservation actions, and to assure adequate funding to implement the strategy.

The main targets of the action plan for the PEEN are:

- to involve the conventions and international instruments in the establishment of the PEEN (NATURA 2000, Bern Convention Emerald Network, Ramsar Convention, Bonn Convention, World Heritage Convention, European Diploma sites, etc.)
- to ensure that by 2008 the PEEN will give guidance to major national, regional and international land use and planning policies
- to identify and reflect all the constitutive elements of PEEN, and also show them on maps by 2006
- to conserve all core areas by 2008

At present there are no indications, neither from the European side nor from the Azerbaijani side, to contribute to this network. The authors agree that this action does not necessarily have priority.

PART FOUR

Conclusions and Recommendations

4.1. Gap-analyses for the extension of the protected area system

Nature in Azerbaijan faces a significant threat. This is due to the continuing construction boom, the absence of norms and in part a situation that allows open access. Independent of the extension of the protected area network, the conservation system needs to be strengthened. To reach this goal, an increase of environmental and in particular conservation awareness is urgently needed.
As a consequence, in the authors's view the most important challenge in the near future is to build a long-term and successful communications network and programme - dedicated to raising the national awareness of biodiversity, nature conservation and the environment.

Furthermore, of current need is an re-assessment of the cooperation between Azerbaijan (as far as the authors overview) the German support for nature conservation in Azerbaijan. The present stagnation urgently needs to be broken up as preserving nature in this hotspot of biodiversity is of utterly importance. Therefore, the political dialog between Azerbaijan and Germany should be intensified again and an active cooperation re-initated. This political and diplomacy investment has severe priority.

Beforehand this clarifiction and the political re-commitment of both sides towards jointly cooperation financial investment is not recommended at present. Azerbaijan is still behind schedule in fulfiling the joint programmes it was commited to, e.g. the CPAF and the Caucasus Initiative.

Independent of this, the survey revealed that there still exists a good potential for the establishments of protected areas in Azerbaijan and for the extension of the existing PA network.

The authors consider the greater Gobustan region as one of the most important areas without any spatial protection at present that would be worthy of protection in the future. The complexity and variance of different natural features in this area warrants special protection. Geological peculiarities – among them most impressively the mud volcanoes, the Goitred Gazelle, several threatened bird species such as the Sociable Lapwing and plants such as *Ophrys caucasica* - contribute to the widespread value of this area. Furthermore, the landscape gradient and a traditional land use system are additional reasons for recommending the area as a biosphere reserve.

A highly recommended and worthwhile project would be the bridging of the existing gap between Hirkan National Park and the existing Zuvand Zakaznik by connecting those two areas. At the same time the status of Zuvand Zakaznik should be upgraded. Since this region is unlike any other area in the country, it is particularly worthy of protection. Linking the highly diverse Hirkanian forest with the semi-arid habitats in its neighbourhood is seen as a necessary approach to the protection of this ecosystem.

Currently, the existing PAs are often limited to one single ecological habitat type. For example, Shirvan National Park, located on the Caspian Sea, does not include any costal strip. Ilisu Zapovednik, protecting the mountain forest of the Greater Caucasus, is not linked

to the lowland forest of the alluvial gravel fans or even to the floodplain forest of the Alazan River - although this approach would follow the ecological succession and would include a much greater amount of biodiversity. The inclusion of the ecological gradient in the protection regime would thus protect the natural habitat gradients and therewith important ecologial corridors.

From an ecological point of view, the authors recommend the following prioritisation to increase protective measures:

- Establishment of Gobustan Biosphere Reserve
- Upgrading Zuvand Zakaznik and connection to Hirkan National Park
- Protecting one of the alluvial gravel fans with its river dynamics and the specific forest community (Gakh or Oguz)
- Uniting several existing protected areas around Mingächevir Reservoir into one protected area and filling the gaps in between, in particular including the floodplain forests of Alazan, Iori and the Kura mouth in the reserve. Establishment of one central administration and strengthening of protective measures.
- Establishment of a coastal reserve, including the Kura River mouth on the Caspian Sea, the coastal waters and several islands

Although Göy Göl National Park has recently been established on the basis of Göy Göl Zapovednik, the protection regime in the Lesser Caucasus needs to be strengthened immediately. Apart from the occupied territories, where an assessment of the ecological conditions has not been possible, the Sämkirchay Zakaznik is one of the last strongholds of the once widely occurring forest in the region. However, this remaining part needs to be strictly protected and extended.

In general, the existing system of Zakazniks forms a good basis for the extension or upgrading of protected areas. However, many of these areas need to be re-assessed since they do not always represent an adequate protection status. Some even carry the status of a Zakaznik because they were designated as hunting reserves, e.g. Zuvand Zakaznik.

Slightly different priorities need to be set if human pressure on the ecosystem is seen as the driving factor behind the extension/establishment of further PAs. In particular the coastal region, the most intensely used and densly populated area in Azerbaijan, is under severe pressure due to the current construction boom. All coastal regions investigated in this study (Däväshi, Kura Delta, Islands of the Caspian) should be given high priority and attention. In addition, the proposed Samur Yalama National Park (an area that was not investigated during this project) should be established as soon as possible since human impact on this last remaining coastal forest is steadily increasing.

The existing categories for protected areas should be extended to include the Biosphere approach. A historic land use system with livestock raising as the dominant part of the agrarian sector and with seasonal movements between summer and winter pastures strongly depends on the availability and accessibility of land. At present, however, the grazing system in particular is not at all sustainable and overgrazing is a serious threat to the country's environment. An integrated Biosphere concept, especially for the greater Gobustan region, might be a solution to achieve conservation as well as sustainable land use.

The project also showed that there is an urgent need for a scientifically based update of the information on many species, their occurrence and abundance. During the surveys, about 15 species of birds could be recorded for the very first time in the country. Also, despite month-long field surveys by an experienced team, several important species such as the Striped Hyena could not be recorded at all, indicating that these species have become extremely scarce or have disappeared altogether.

From the faunistic point of view, the project only used mammals, amphibians and reptiles as well as birds as indicator species. Unfortunately, expert knowledge on any other group of species is practically unavailable in the country, and pure species inventories are rarely financed internationally.

However, as the latest species surveys date back to the 80th and the national scientific body is largely under-staffed and under-equipped - the available data is to large extend out of date, species systematics has not been updated and connected to international state of science for various decades. As a consequence, an investment into the scientific capacity in Azerbaijan is of urgent need. A young generation of scientists need to be educated, trained and developed. If this matter will not be in focus within the next ten years the already existing gap between available but already very old scientists and a missing successor generation will open even more dramatically.

Independent of the establishment of further protected areas, there is a strong need for the enhancement of the protection regime in Azerbaijan. Shortcomings in biodiversity conservation that need to be addressed immediately include among others[38]:

- very poor environmental public awareness of biodiversity conservation issues;
- a shortage of manuals, facilities and programmes to raise wider public awareness of biodiversity conservation in the educational system;
- a lack of regular national and regional workshops and training measures in this area;
- failure to systematically involve stakeholders in regionally and internationally organized training measures aimed at the exchange of experience;
- poor exchange of experience and information at all levels;
- poorly organised use and development of the database on biodiversity conservation at relevant institutions;
- limited opportunities for the assessment of the dynamics of change and the scale of biodiversity due to the failure of state environmental statistics to fully cover the biodiversity area;
- poor general coordination of activities in this area despite the fact that various areas of biodiversity conservation are covered by relevant state and national programmes adopted in the country;
- insufficient attention to social aspects of biodiversity conservation such as health, demographic trends, migration, etc. in programmes that are in preparation;
- making little use of findings for biodiversity conservation provided by research which has been financially and technically weak in recent years;
- reluctant implementation of pilot projects among practical and scientific laboratories, impeding the practical application of scientific findings;
- limited activity of NGOs in the field of biodiversity protection.

38 According to the National Action Plan on Strengthening Capacity to Respond to Challenges of Biodiversity Conservation, Climate Change and Desertification / Land Degradation (2006-2015), Baku 2005

4.2. NATURA 2000 – at present feasible in Azerbaijan?

At some point in the near future a decision has to be made whether Azerbaijan will participate in the European NATURA 2000 network. The formal bilateral cooperation between the EU and Azerbaijan does exist and initial instruments are available. The process of legal approximation does indicate the direction.

Natura 2000 sites are also intended to contribute significantly to the coherence of the protected area network and to the biodiversity in the biogeographic regions within the European Union. For animal species ranging over wide areas, sites of Community Importance correspond to the areas within the natural range of such species that present the necessary physical and biological factors essential to their survival and reproduction.

At least in part Azerbaijan belongs to the NATURA 2000/ Emerald Network biogeographic regions (see Map 30). However, this distinction focuses on the European part of Azerbaijan. In addition, many habitats in Azerbaijan also show Mediterranean and Anatolian influences, yet an in-depth comparison is still lacking. Nevertheless, the authors conclude that there is a partially high similarity with FFH habitat types and do not dismiss the approach entirely.

For a spatial approximation and eventual connection to the existing SPAs, pSCIs, SCIs and SAC of the European member states, much commitment is still required and the necessary preparatory work offers a continuing challenge. Nevertheless, as depicted in Map 31 Natura 2000 sites in Europe, the existing NATURA 2000 sites already extend to the Black Sea and cover biomes that occur in Azerbaijan as well. A consequent extension is highly advisable and might even be forwarded without full membership ambitions.

Independent of any European legislation and programmes, it is fully understandable for a young nation and a country still in transition to develop its own principles, standards and guidelines. Azerbaijan has repeatedly declared its ambition to become a reliable partner to Europe and to use as a guideline or adopt European legislation[39]. The country itself defines its position as a bridge between Europe and Asia, and a

39 Stated by Ilham Aliyev at a personal meeting between MSF and the president of Azerbaijan, 15.02 2007 in Berlin, Germany

tendency towards International/European institutions such as the EU, NATO, OSZE, etc. is visible. The TACIS Indicative Programme for Azerbaijan (2004- 2006)[40] enhances the support of the MENR and mentions "Approximation of legislation with EU standards and principles" as an indicator for the programme's success. The objective of „Priority Area 3 (Support for legislative and economic reforms in the transport, energy and environment sectors)" and in particular sub-priority No. 3 (Environment) of the European Neighbourhood Partnership Instrument 2007-2015 (NIP) is the improvement of the country's legislative and administrative management of environmental challenges – with regard to the EU's best practice and experience. Here, the approximation of AZE environmental standards to EU standards is again an indicator.

Despite the brief existence of the MENR, Azerbaijan has gained valuable experience in selecting and creating protected areas. Nevertheless, there exists a huge difference between creating and managing protected areas, specifically national parks. The general weakness in executing, implementing and managing specific areas is a visible handicap for good governance and - as a consequence – for matching the conditions of the most important contract partner, the EU. Nevertheless, in certain areas of public law (Environmental Impact Assessment, Freedom of Information, etc.) the country already has a basis. This means that even potentially weak instruments can be renewed and do not necessarily have to be compared directly with the EU standards. In the context of the EU's Neighbourhood Policy and the possible "anticipation" of environmental law and – more specificly – the main FFH-Guideline of the EU, Azerbaijan's basis can be used.

It is up to the Azerbaijani Government and the EU to further organise (and finance) an in-depth study or individual smaller studies with the aim to compare norms and to prepare Azerbaijan in detail for a possible "identity" of perspectives.

At the present, NATURA 2000 is not feasible. Despite the fact that legal approximation (including environment) is in progress in general, a tremendous amount of work remains to be done in other related fields as well (with e.g. law enforcement beeing one specific issue among others). However, the pre-feasibility study revealed and created good pre-conditions for the implementation of this process with the mid-term target to participate in the NATURA 2000 network.

Some valuable aspects and already fulfilled pre-conditions that should enable the country to overcome any approximation process easily include:

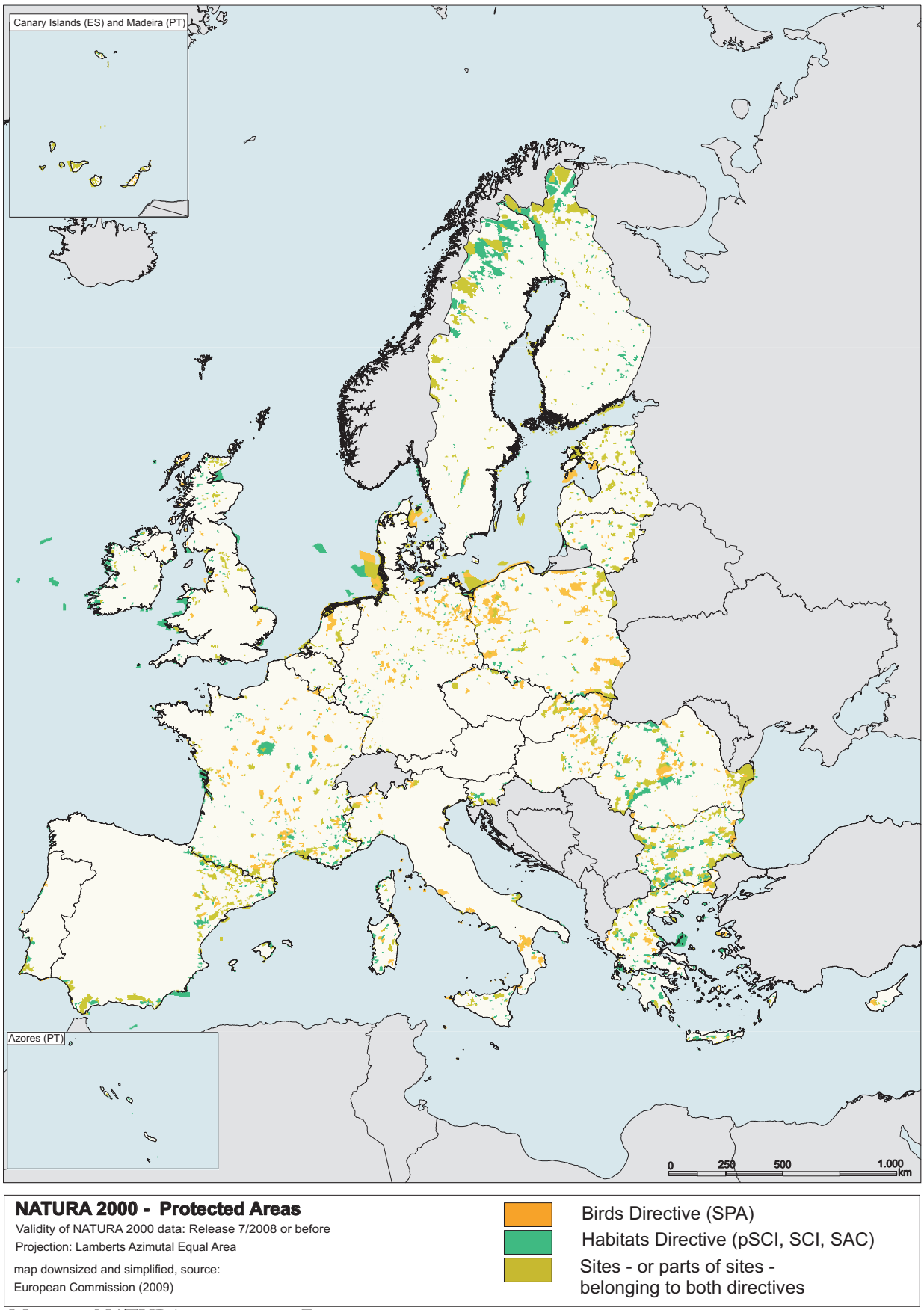
- Azerbaijan is member of the European Council,
- Azerbaijan is member of the European Neighbourhood Programme,
- Geographically, Azerbaijan belongs at least partly to Europe,
- Azerbaijan is a strategic partner for Europe,
- The scoreboard report analysed the current status of legal approximation, gaps were identified and recommendations given, and priorities were set for approximation,
- Within the PCA, Twinning instruments are available to support Azerbaijan in the process (Until the end of 2006 the TACIS Program was also the supporting program for twinning projects. Since 2007 responsibility has switched to the newly created ENPI. Currently, Azerbaijan is running two twinning projects on economic matters with the BMWi),
- The EU is a respected soft power in the Caucasus[41],
- There is a biogeographical link to European habitats and the species composition shows partial similarities,
- Azerbaijan signed the RAMSAR and BERN Conventions,
- Azerbaijan hosts natural habitats which are of Community Importance (pSCIs) for inclusion in the EU's NATURA 2000 network,
- This report provides a basic comparison of Azerbaijan's habitats and species with the relevant FFH and other EU-document annexes.

On the other hand, aspects that challenge an approximation process at present include:

- Full comparison of habitats is still missing and

40 adopted by the EU on 22 May 2003

41 see: Ahmadova 2006



Map 31: NATURA 2000 sites in Europe

their implementation is very complex and time-consuming;

- There are still significant differences between the environmental legislation in Azerbaijan and that of the EU;
- There is a biogeographical link to Central Asian habitats as well as to European habitats, and the species composition in part shows a great Central Asian and Turanian influence. Due to this an amendment, modification or update of the FFH habitat list presents a great challenge.
- Azerbaijan's interest and commitment to participate in European nature conservation approaches is not always clear.

A pragmatic and logical sequence of continuation of the approximation would be the following, with an approximated timeline of about 15 years:

a) A clear commitment of Azerbaijan's responsible authorities to support the approximation of AZ principles, legal basis and implementation with regard to EU standards and best practise examples.
b) Active participation in EU nature conservation related Twinning projects and bilateral cooperation.
c) Continuation to establish close ties with the Emerald network. This first step will lead to familiarisation of Azerbaijan with EU conservation standards and implementation as it develops guidelines for respective habitat protection.
d) Since the Council of Europe has a rather weak mandate for a general EU-Azerbaijan approximation and few instruments available compared to Emerald, a large-scale Twinning project should be implemented with main aspects such as:
   - Revision of species lists, including a Red List update
   - Establish a scientific working group of EU and Azerbaijani experts to map, assess and compare all AZE habitats with Annex I types of the FFH guideline, and develop recommendations for the respective update. Selection and assessment of SACs/pSCIs (Stage 1) (In Stage 1, each member state is required to submit a list of sites (proposed sites of Community importance or pSCIs) that meet the objectives and criteria set out in the Habitats Directive (Article 4 (1)). Suitable sites must be proposed for all natural habitat types listed in Annex I and for the species listed in Annex II.).
   - Establish a working group of environmental law experts and focus on the relevant laws and directives for nature, habitats, and protected areas.

A respective project in Turkey revealed the necessity for both sides, the EU as well as its partner, to invest great efforts into the harmonisation of all aspects if an approximation to NATURA 2000 is envisioned. Not only would Azerbaijan have to adapt to EU standards, the EU would also have to adapt its current directives and species and habitat lists, etc. (Hauke 2008).

In the end, it is largely up to Azerbaijan how fast and how seriously the process of approximation will develop. At any rate, a good basis is available, and methods and approaches have been established. The European Union reached out its hand, and various options exist. Now Azerbaijan has the opportunity – if it is interested in a close and tight cooperation with the EU – to take this chance. Although the expected duration of the entire process will be in the mid-term range, lasting about 15-20 years, it surely makes great sense from an ecological, from habitat protection and nature conservation point of view.

* * *

Literature

AHMADOVA, N. (2006): Die Rolle Aserbaidschans in der Kaukasus- und Zentralasienpolitik der Europäischen Union. Dissertation im Fachbereich I/ Politikwissenschaft. Universität Siegen.

ALLWORTH (1971). Nationalities of the Soviet East: Publications and Writing Systems - A Bibliographical directory and transliteration tables for Iranian and Turkic language publications. Publications and Writing Systems. New York.

ATAMOV, V.V., CABBAROV, M., & GURBANOV, E. (2006): The Pytosociological Characteristics of Ecosystems of Mountain of Talish Region of Azerbaijan. Asian Journal of Plant Science. 5(5). 899-904.

BEKTASHI, L., CHERP, A. (2002), „EIA in Azerbaijan, evolution and current state of Environmental Assessment in Azerbaijan", Impact Assessment and Project Appraisal, Vol. 20 No.4, pp.31-42.

BIRDLIFE INTERNATIONAL (2007): IUCN Red List of Threatened Species. <www.iucnredlist.org>. Downloaded on 26 March 2008.

BMZ (2006). BUNDESMINISTERIUM FÜR WIRTSCHAFTLICHE ZUSAMMENARBEIT UND ENTWICKLUNG. Referat 'Entwicklungspolitische Informations- und Bildungsarbeit' (Ed.) BMZ Materialien 155 Naturschutz im Kaukasus. Mai 2006.

CASPIAN ENVIRONMENTAL PROGRAMME (2007): Regional action plan for protection of Caspian habitats. http://enrin.grida.no/caspian/additional_info/habitat.pdf (accessed 16/01/07).

CASPIAN ENVIRONMENT PROGRAMME (2008): http://www.caspianenvironment.org (accessed 20/02/2008).

CHEREPANOV S. K. (1995): Sosydistye rastenija Rossii i sopredelnich gosydarstv. Sankt Petersburg: "Mir i Semja – 95."

CIA THE WORLD FACTBOOK (2008): https://www.cia.gov/library/publications/the-world-factbook/geos/aj.html (accessed 04/02/2009).

COUNCIL OF THE EUROPEAN COMMUNITIES 1992. Council Directive 92/43/EEC (21 May 1992) on the conservation of natural habitats and of wild fauna and flora . Official Journal 206: 7-50.

CPAF (2008): http://www.caucasus-naturefund.org/ (accessed 17/12/2008).

C.P.M. WATERS (editor) (2005): The State of Law in the South Caucasus, Euro-Asian Studies. Palgrave Macmillan.

DUMONT, H.J., 1998. The Caspian Lake: History, biota, structure, and function. Limnol. Oceanogr. 43.

EEA (EuropeanEnvironmentalAgency) (2008): http://dataservice.eea.europa.eu/atlas/viewdata/viewpub.asp?id=221 (accessed 17/12/2008)

ELLIOTT, M. (2004). Azerbaijan. Trailblazer Publications.

EMBASSY OF THE REPUBLIC OF AZERBAIJAN (2009): http://www.azembassy.nl/?options=content&id=26&pid=2&PHPSESSID=b99f7bb1f3ec07c2bdeeeb521d0bf57d (accessed 07/02/2009).

ENVIRONMENTAL MOVEMENT IN AZERBAIJAN (2008): http://azenviron.aznet.org/int_conv/conventions.htm accessed (22/10/2008).

EUROPEAN COMMISSION (2009): http://ec.europa.eu/environment/nature/natura2000/db_gis/pdf/EU27SPASCI_908.pdf (accessed 04/02/09).

EXPERT GROUP (Group of Experts for the setting up of the Emerald Network of Areas of Special Conservation Interest) (2006): Emerald Network Pilot Project in Azerbaijan. Report. 25 p.

EXPERT GROUP (Group of Experts for the setting up of the Emerald Network of Areas of Special Conservation Interest) (2008): http://www.coe.int/t/dg4/cultureheritage/Regional/EcoNetworks/Documents/2008/tpvsem3_2008_en.pdf (accessed 15/12/2008).

GALLOWAY, W.E., (1975): Process framework for describing the morphologic and stratigraphic evolution of deltaic depositional systems. In: Broussard, M.L. (Ed.), Deltas, Models of exploration. Houston Geological Society.

GAUGER, K. (2007): Occurence, Ecology and Conservation of wintering Little Bustards (Tetrax tetrax) in Azerbaijan. in: Archives of Nature Conservation and Landscape Research, Vol. 46, Nr. 2, p. 5-28.

GEODEZIJA KOMITET (1992): Azärbayzhanyn Bitki Äruzhu Khäritasi. (Soil Map of Azerbaijan) 1: 600.000. Baku. (in Azerbaijan).

GOSKOMGEODESIYA (1993): Agroklimaticheskiy Atlas Aserbaydshanskoy Respubliki (Agroclimatological Atlas of the Republic of Azerbaijan). Gosudarstvenniy Komitet Azerbaydschanskoy Respubliki po Geodesii i Kartografii. Baku.

GROSSHEIM, A. A. (1936). Analis Flori Kavkasa. Baku, Aserbaidschanskogo filiala akademii nauk SSSR.

GULIYEV, F. (2009): Oil wealth, patrimonialism and the failure of democracy in Azerbaijan. Caucasus Analytical Digest No2. 2009.

HAUKE, DR. U. (2008). BfN: oral communication (08/12/2008).

HENNING, I. (1972). Die dreidimensionale Vegetationsanordnung in Kaukasien. Erdwissenschaftliche Forschung 4: 182-204.

HERRMANN, T. & HYE-KNUDSEN, R. (2006): "Introduction to the new administrative law of Azerbaijan" (in Azeri, German & English) available from: http://www.gtz-legalproject.az/eng/

HOOGENDOORN, R.M., BOELS, J.F., KROONENBERG, S.B., SIMMONS, M.D., ALIYEVA, E, BABAZADEH, A.D., HUSEYNOV, D. (2005): Developent of the Kura delta, Azerbaijan; a record of Holocene Caspian sea-level changes. Marine Geology.

IGNATOV, E.I., SOLOVIEVA, G.D. (2000): Geomorphology of Southern Azerbaijan and Coastal Response to Caspian Transgression, in Dynamic Earth Environments, Remote Sensing Observations from Shuttle-Mir Missions, edited by K.P. Lulla & L.V. Dessinov, 268 p, John Wiley & Sons Inc: New York, Chichester, Weinheim, Brisbane, Singapore, Toronto.

INAN, S., YALCIN, M.N., GULIEV, I.S., KULIEV, K., FEIZULLAYEV, A.A., (1997): Deep petroleum occurrences in the Lower Kura depression, South Caspian Basin, Azerbaijan: anorganic chemical and basin modelling study. Mar. Pet. Geol. 14.

IUCN (2007): IUCN Red List of Threatened Species. http://www.redlist.org (accessed 12/02/07.

KARIMOV, S. & VALIYEVA G. (2006): Law on Administrative Procedure. Published by GTZ and CILC. available from: http://www.gtz-legalproject.az/eng/

KHANALIBAYLI, E. (2008): http://www.fig.net/commission7/verona_fao_2008/papers/10_sept/5_2_khanalibayli.pdf (accessed 04/12/08.

KRAUSE, W. (1997): Charales (Charophyceae), Süsswasserflora von Mitteleuropa. Bd. 18, G.: Jena Stuttgart,Lübeck, Ulm: Fischer.

KREVER V. et al. (Eds.) (2001): Biodiversity of the Caucasus Ecoregion : an analysis of biodiversity and current threats and initial investment portfolio, Signar and WWF, Moskva.

MAMEDALIEV, JU. G. (1963). Atlas Azerbaijanskoy SSR. Baku - Moskau: Gosudarstwyennogo Geologitcheskogo Komiteta SSSR.

MAMMADOV, R. & APRUZZI, F. : Environment, Exploitation and Utilization of Natural Resources, Scoreboard Paper on Approximation of Azerbaijani Legislation to EU Law, Baku 2004 available from: http://pca.az/index.php/legal-approximation.

MARCINEK, J. & ROSENKRANZ, E. (1996): Das Wasser der Erde: eine geographische Meeres- und Gewässerkunde. Gotha: Perthes.

MEKHTIEV, N.N. (1966): Dynamics and morphology of the Western Coast of the southern Caspian, Baku, Azerbaijan, Academy of Sciences of Azerbaijan, SSR.

MEUSEL, H., JÄGER, E., WEINERT, E. (1965): Vergleichende Chorologie der zentraleuropäischen Flora. Fischer Verlag – Jena.

MIKHAILOV, V.N., KRAVTSOVA, V.I., MAGRITSKII, D.V., (2003): Hydrological and morphological processes in the Kura River delta. Water Res. 30 (5).

MINISTRY OF ECOLOGY AND NATURAL RESOURCES OF THE AZERBAIJAN REPUBLIC (MENR) (2004): Nomination of the "Hirkan forests" of Azerbaijan as UNESCO World Nature Heritage Site, unpublished draft as of March 30, 2004.

MINISTRY OF ECOLOGY AND NATURAL RESOURCES OF THE AZERBAIJAN REPUBLIC (MENR) (2006): National Action Plan on Strengthening Capacity to Respond to Challenges of Biodiversity Conservation, Climate Change and Desertification / Land Degradation (2006-2015), Baku 2005.

MINISTRY OF ECOLOGY AND NATURAL RESOURCES OF THE AZERBAIJAN REPUBLIC (MENR) (2006): Azerbaijan Capacity Development and Sustainable Land Management Program Summary of Project Proposal, MENR/UNDP/GEF.

MITCHELL, J., WESTAWAY, R., (1999): Chronology of Neogene and Quaternary uplift and magmatism in the Caucasus: constraint from K–Ar dating of volcanism in Armenia. Tectonophysics 304.

MÜHR, B. (2005): Klimadiagramme weltweit. Available from: www.klimadiagramme.de.

NASA Worldwind: http://worldwind.arc.nasa.gov/

OGAR, N. (2001): Costal plants, in: Caspian Environment Programme (CEP). http://enrin.grida.no/caspian/additional_info/habitat.pdf (accessed 16/01/2007).

PATRIKEEV, M. P., WILSON, M. (2000): Azerbaijan, in: HEATH, M. F.,EVANS, M. I., (2000): Important

Bird Areas in Europe: Priority sites for conservation. Vol 2. Cambridge, (BirdLife Conservation Series No. 8).

PATRIKEEV, M. P. (2004): The Birds of Azerbaijan. Sofia-Moscow (Pensoft).

PATRIKEYEV M.V. (1991): To spring-summer avifauna of Southeast Shirvan and adjacent areas, Materials of scientific-practical conference "Fauna, population and ecology of North Caucasian Birds", Stavropol, (in Russian).

PLANTS GENETIC RESOURCES IN CENTRAL ASIA AND THE CAUCASUS. http://www.cac-biodiversity.org/aze/aze_climate.htm (accessed 13/01/ 2009).

PRILIPKO, L. I. (1954). Lessnaya Rastitelnost Azerbaijana. Baku: Isdatelstwo Akademi Nauk Azerbaijanskoy SSR.

PRILIPKO, L. I. (1970): Rastitelny Pokrov Aserbaidschana (Vegetation of Azerbaijan). Baku (Elm).

RED BOOK OF AZERBAIJAN (1989). Senior editor Adygezalov B.M., State Comity of Nature Conservation of Azerbaijan Republic SSR and Azerbaijan Academy of Science.

RUZGAR (2008) environmental organisation in Azerbaijan http://ruzgar.aznet.org/ruzgar/1-main_problems.htm (accessed 15/10/2008).

SANDWITH T., SHINE C., HAMILTON L. AND SHEPPARD D. (2001): Transboundary Protected Areas for Peace and Co-operation. IUCN, Gland, Switzerland and Cambridge

SCHMIDT, P. (2004): Bäume und Sträucher Kaukasiens. Teil III: Laubgehölze der Familien Ebenaceae (Ebenholzgewächse) bis Frankeniaceae (Frankeniengewächse). Mitt. Dtsch. Dendrol. Ges. 89, pp. 49-71.

SCHMIDT, S., GAUGER, K, AGAYEVA, N. (2008): Birdwatching in Azerbaijan, a Guide to Nature and Landscape. Greifswald, Germany. Michael Succow Foundation.

SCHROEDER, F.-G. (1998): Lehrbuch der Pflanzengeographie. Wiesbaden: Quelle and Meyer.

SHELTON, N. (2001): Where to watch birds in Azerbaijan. Baku (Halal Print).

SILVEIRA, M.P., (2004): Environmental Performance Review # 19: Azerbaijan. UNITED NATIONS PUBLICATION.

SKWORZOV, G. A. (1978): Topographical map 1:100 000 K-39-99 Saisan. (General staff of the Sowjet military).

SSC (2009) – State Statistical Committee of the Republic of Azerbaijan: http://azstat.org (accessed 31/01/09).

STRAUSS, A. (2005): Terrestrial vegetation and soil conditions of Ag-Gel National Park in Azerbaijan as a basis for a possible reintroduction of the Goitered Gazelle (Gazella subguttutosa), Archive of Nature Conservation and Landscape Research.

SVANTE, E., CORNELL, S., STARR, F. (2006): The Caucasus: A Challenge for Europe, Silk Road Paper, Central Asia-Caucasus Institute and Silk Road Studies Program, Washington, D.C.

THIELE, A., SCHLÖFFEL M., ETZOLD, J., PEPER, J., SUCCOW, M. (2009). Mires and Peatlands of Azerbaijan. 7 p. Telma.

THIELE, A., SCHMIDT, S., GAUGER, K. (2008): Biodiversity and Protection Value of Coastal Ecosystems of Azerbaijan. Project Report. Michael Succow Foundation.

VOLOBUEV, V. R. (1953): Pochvy Azerbaidzhanskoy SSR (Soils of Azerbaijan): Baku (in Russian).

ZOHARY M. (1963): Bulletin of the research council of Israel, section D Botany. Supplement on the Geobotanical structure of Iran.

Digital Maps:

http://maps.grida.no/go/graphic/protected-areas-priority-conservation-areas-and-wildlife-corridors-in-the-caucausus

http://maps.grida.no/go/graphic/pasture-land-in-thecaucausus-ecoregion

http://maps.grida.no/go/graphic/sheep-andgoats-in-the-caucasus-ecoregion

http://maps.grida.no/go/graphic/climate-zones-of-the-caucasus-ecoregion

UNEP (2009): Maps & Graphics, http://maps.grida.no/go/graphic/variations-in-sea-level-for-the-caspian-sea-1840-2004

Further Internet resources:

AZERBAIJAN OFFICIAL WEBSITE (2007): http://www.azerbaijan.az (accessed 23/06/07).

ENVIRONMENTAL NEWS SERVICE:http:// www.ens-newswire.com (accessed 20/02/08).
(accessed 20/01/2009).

UNEP (2008): http://www.unep.org (accessed 20/02/08).

WHO COUNTRY COOPERATION STRATEGY (2006) accessed at: http://www.who.int/countryfocus/cooperation_strategy/ccsbrief_aze_en.pdf.

WORLD CLIMATE INDEX MAP (2009): http://www.climate-charts.com (accessed 15/01/ 2009).

http://www.eurasianet.org/departments/insightb/articles/eav061709.shtml accessed 21/07/2009

http://www.eurasianet.org/departments/insightb/articles/eav061709.shtml

http://ol.azerbaijan.googlepages.com/EUStatement23July2009.pdf accessed 22/07/2009

http://www.forbes.com/2008/02/26/pollution-baku-oil-biz-logistics-cx_tl_0226dirtycities.html

http://www.eco.gov.az/en/

http://www.internetworldstats.com/asia/az.htm).

List of Maps

List of Figures

List of Photos

List of Tables