Caucasus Environment Outlook (CEO) 2002

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Artwork by Georgian artist Lali Lomtadze

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PREFACE

This first Caucasus Environment Outlook (CEO) is a regional report and the result of work by experts from four countries: Armenia, Azerbaijan, Georgia and Russia. The GRID-Tbilisi office conducted overall project management, under the coordination and overall guidance of UNEP's Division of Early Warning and Assessment (DEWA) - Europe office, and Regional Office for Europe (ROE).

The major objectives of the CEO are to report on the status of the Caucasus environment, identify ongoing socio-economic "driving forces" and offer an integrated look at regional economic and environmental trends and appropriate policy measures for the last 30-year period, in order to analyse changes which have occurred since the Stockholm Conference (1972) to date. An important part of the report is the analysis of human vulnerability and insecurity vis-à-vis environment, conflicts, poverty and other factors, as well as the environmental outlook over the next 30-year period, based on three different development scenarios.

One reason for initiating this report is that the Caucasus region has not received much international attention, compared with other sub-regions in Central and Eastern Europe. One of the major challenges in resolving environmental problems of the Caucasus region in the trans-boundary context is the lack of a regional framework for environmental cooperation. Due to the fact that during the Soviet era, the Caucasus was part of a single country, it is now difficult to find bi- or multi-lateral agreements between the new states. Before the Soviet Union as a whole participated in international legal agreements; now it is necessary to develop inter-state agreements. The perspective of joining the European Union is as yet too remote to act as a unifying factor.

Thus, it is hoped that this first CEO report will be only the beginning of a process which aims at improved and regular assessment and monitoring activities within the entire Caucasus region, as well as substantive measures being conceived and implemented for the overall region's environmental protection and rehabilitation.

A project team of Georgian experts and four national focal points from Armenia, Azerbaijan, Georgia and the Russian Federation was established and carried out the related work. These persons were as follows: Mariam Shotadze[1], MS. conducted overall project management. Doctor of Geographic Sciences, Professor Nikoloz Beruchashvili conducted the scientific edition of the report. These experts together with Dali Nickolaishvili and Valerie Melikidze, Candidates of Geographic Sciences, assistant professors drafted the report. Giorgi Zirakashvili (GRID-Tbilisi) collected baseline data and Manana Kurtubadze and Nino Megvinetukutsesi (GRID-Tbilisi) provided cartographic and graphic design[2]. Vierra Savelyeva (GRID-Moscow, Russia), Mzia Gvilava (Ministry of Environment/GRID-Tbilisi, Georgia) and Tatyana Danielyan (Ministry of Nature Protection, Armenia) played national focal point roles. From Azerbaijan, Fuad Akhunzade (Nature Protection Society) participated as an independent expert.

[1] Project manager during the initial phase of its implementation was Zurab Jincharadze, MS
[2] A set of geographic maps has been provided by David Beruchashvili

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Individual experts also provided helpful comments and contributions. Especially: late Gunter Beuchel (Delegation of European Commission in Georgia), Irina Bredneva (CIP, Moscow), Galina Gladkevich (Moscow State University), Teimuraz Gogishvili (State Statistical Department of Georgia), Matlab Hasanov (REC-Caucasus), David Kikodze (Dzelkva, Ltd, Georgia), Yuri Mazurov (Heritage Institute, Moscow), Tim Turner (Caspian Environmental Programme), etc.

The CEO report has been completed through financial assistance provided by UNEP (DEWA and ROE) and the Swiss Agency for Environment, Forests and Landscape (BUWAL).

Ron Witt, UNEP/DEWA/GRID-Geneva, conducted overall coordination of the project. Special thanks are offered to him for his editorial assistance, enabling the CEO team to prepare the final version of the report. Françoise Belmont of UNEP/ROE provided overall general support for and inputs to the project, and Merab Sharabidze of UNEP/ROE guiding political advice from the CEE and NIS countries' perspective.

Ultimately, this first edition of the CEO report and the material included therein are the responsibility of the CEO team under UNEP's supervision, and any factual errors or other mistakes should be reported to them.

INTRODUCTION

Location of the Caucasus. The Caucasus is a region where the oldest route connecting Europe to Asia is located.

For over 70 years the Caucasus region was part of the Soviet Union. After the break-up of the USSR, three independent countries were established within the South (or Trans-) Caucasus: Armenia, Azerbaijan and Georgia. The northern part of the Caucasus (the North Caucasus) has remained a part of the Russian Federation.

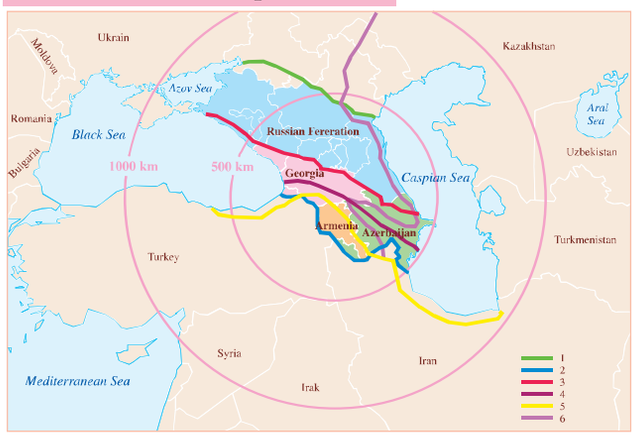
The Caucasus region is traditionally located between the Kuma-Manich depression to the north and the Turkey-Iran border to the south. On the west, the Caucasus is bounded by the Black and Azov Seas, and on the east by the Caspian Sea. In this respect, the Caucasus area comprises 440,000 km sq., and the population in 2000 was approximately 30.6 million persons.

The Caucasus

Boundaries of the Caucasus. The issue of the Caucasus frontiers is constantly under review and fervent debates are still held on this issue. The question of whether the Caucasus is located in Europe or Asia is one of interest to many, and the answer is closely connected to the problem of the border between Europe and Asia. There are several viewpoints on this issue (Beruchashvili, 1996):

1. The Europe-Asia border passes through the Kuma-Manich depression, which in geological times connected the Caspian and Black Seas. In this regard, the entire Caucasus belongs to Asia.
2. The Europe-Asia border passes along the border of South Caucasus countries with Iran and Turkey. In this case, the entire Caucasus is in Europe.
3. The borders pass along the Main Caucasian Range, which is the most important factor determining regional climate. In this respect, the northern part of the Caucasus is in Europe and the southern in Asia. However, from the geological viewpoint, the Caucasus is a single

Border Between Europe and Asia



Source: Beruchashvili N., 1998

entity, and overall geographically there is much in common between its southern and northern parts.

4. The rivers Rioni and Kura (Mtkvari) divide Europe and Asia. Herodotus, a Greek geographer of the 5th century B.C., shared this viewpoint. Nevertheless, neither the Rioni nor the Kura are difficult barriers to pass. Thus, the Colchian lowland (which is crossed by the river Rioni), Shida (Inner) Kartli plain and the Kura-Araks lowland (crossed by the river Kura) are a single entity from the geographical viewpoint.

5. The border between Europe and Asia passes along the landscape borders. In this case, it is connected with the landscapes typical to Europe and Asia and passes along the Javakheti-Armenian volcanic plateau with landscapes typical to Asia. At the same time, it penetrates the territory of Turkey and Iran, where humid sub-tropical arboreal landscapes are present in the Pontic Mountains and Elbrus. The authors of this report share this viewpoint, and hence single out the Caucasus as a separate eco-region among 200 eco-regions existing in the world. This opinion is considered to be the most substantiated from the geographical and environmental viewpoints.

However, both statistical and other information usually considers the Caucasus in terms of its political and administrative borders. In this respect, there are traditionally three South or Trans-Caucasus countries: Armenia, Azerbaijan and Georgia, and autonomous republics and krays (regions) of the North Caucasus: Krasnodar and Stavropol krays, and the republics: Adigeya, Karachaevo-Cherkessia, Kabardino-Balkaria, North Ossetia, Ingushetia, Chechnya and Dagestan, which are the parts of the Russian Federation. Thus, in the CEO report the Caucasus is treated from this viewpoint.

There are changes recently ongoing in subdividing the Caucasus into the "North Caucasus" and "Trans-Caucasus". For specialists from Russia and other northern neighbouring countries who study Caucasus issues, Armenia, Azerbaijan and Georgia are located beyond the Greater Caucasus. That is why the region was traditionally called "Trans Cau–casus". However, after the break-up of the Soviet Union, there appears to be another geographical understanding of the location of these three countries. That is why frequently scientific and political publications refer to the region as the "South Caucasus", involving the territory of three new independent states. The name "Trans-Caucasus" remains only in a physical-geographic sense, and its border is located at the Main Caucasus Range. In this respect, part of the Russian Federation (the Black Sea coastline) is in the Trans-Caucasus and the regions of North Georgia (upstream of the rivers Terek, Assa, Argun and Andian Koisy) and northeast Azerbaijan (the city of Kuba and adjacent to it Mukhtadir, Divichi, Siazan and Kusary regions) belong to the North Caucasus.

Administrative map of the Caucasus

The Russian Federation is now consists of seven federal districts (okrugs). Krays and republics of the North Caucasus are within the South Federal District. Rostov, Astrakhan and Volgograd regions (oblasts) and also the Republic of Kalmykia are included in it. If the entire South Federal District of the Russian Federation belonged to the Caucasus, its border would move sharply to the north and the territories added to the Caucasus would have nothing in common with the Caucasus itself, in a physical-geographical and environmental sense.

The North Caucasus involves two completely different parts. The first is represented mainly by pre-Caucasian plains, and in the majority of cases is settled by Russians. There are two krays (regions) of the Russian Federation: Krasnodar and Stavropol. It is one of the richest regions of the Russian Federation, and is characterised by relative political stability.

The other part is connected with the North Caucasus autonomies (Adigeya, Karachaevo-Cherkessia, Kabardino-Balkaria, North Ossetia, Ingushetia, Chechnya and Dagestan), mostly located in the mountains and foothills of the Greater Caucasus. They have diverse ecological and geographic conditions, with their population consisting of local ethnic groups and the regions differing in terms of political stability.

A "backbone" of the Caucasus is the Main Caucasus Range, which extends from the Taman peninsula on the Black Sea, to Absheron peninsula on the Caspian Sea. This range has a direction from north-west to south-east and is 1,500 km. in length. Its highest peak is located in the central part (Mt. Elbrus). Unlike the Alps, the Main Caucasus Range does not have easily accessible passes. The Jvari (Cross) pass is an only motorway laid[3] in the high mountainous part of the Central Greater Caucasus, and thus the Main Caucasus Range remains a difficult barrier to cross.

It is noteworthy that there are many commonalities in the economic and socio-cultural aspects

Basic data on the Caucasus

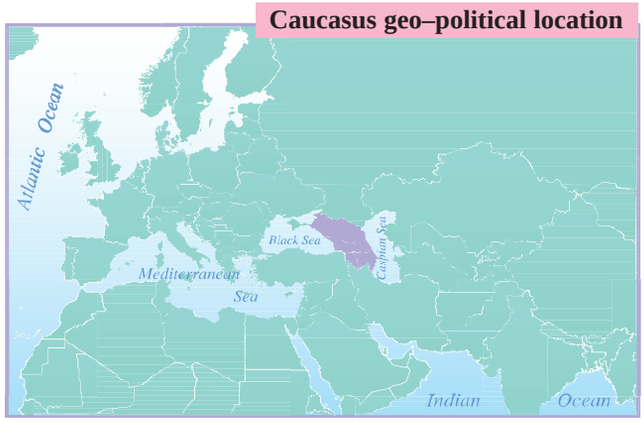
Country		Area thousand km^2	Population	Population density person/km^2
Total Caucasus		440.4	30 583	69
Armenia		29.8	3 803	128
Azerbaijan		86.6	8 016	93
Georgia		69.7	5 445	78
Russia *(N. Caucasus)*	Krays	164.2	7 758	47
	Autonomies	90.1	5 561	61

Source: State Statistical Services of Armenia, Azerbaijan and Georgia, Year Books-2000. State Committee for Statistics of the Russian Federation, "Regions of the Russian Federation", 2000

of its northern and southern slopes. Hence, the Greater Caucasus is often considered a single geographic region.

Geo-political Location and Ethnic Composition. On the west, the Caucasus is washed by the Black and Azov Seas. The northern border passes the Kuma-Manich depression. Therefore, the North Caucasus joins the rest of the Russian Federation[4]. To the east, there is the Caspian Sea, on the eastern coast of which Kazakhstan and Turkmenistan are located and on the southern coast Iran. On the southern border of the Caucasus lie Iran and Turkey.

Caucasus geo–political location



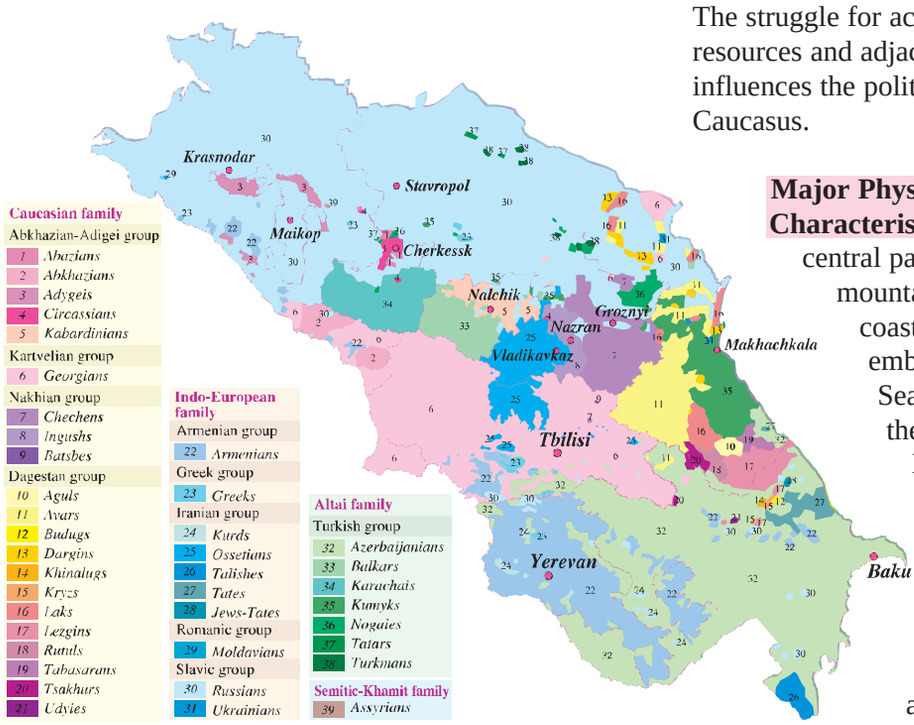
The national and religious composition of the neighbouring countries has a great influence on the geo-political situation of the Caucasus.

Along with Georgians, the Caucasian language family involves Abkhazs, Chechens, Circassians, Kabardins, and the major ethnic groups of Dagestan.

[3]A tunnel runs under Rocki Pass, connecting Russia and Georgia

[4]A part of Rostov region and the Republic of Kalmykia lie to the south of the Kuma-Manich depression. As they occupy only a very small area, they are not discussed in the present work.

Caucasus ethnic composition



Source: Beruchashvili N., Radvanie J., 1996, 1998. Georgian Soviet Thesaurus

The Caucasus environment is much influenced by existing and planned oil and gas pipelines. The struggle for access to the region's natural resources and adjacent territories considerably influences the political situation in the Caucasus.

Major Physical-Geographic Characteristics. The Caucasus is in the central part of the Alpine-Himalayas mountain chains, starting on the coast of the Atlantic Ocean, embracing the Mediterranean Sea and Middle East, and via the Caucasus leading to the Himalayas.

In terms of climate, the Caucasus is at the junction of sub-tropical and moderate zones. The border between them passes along the Main Caucasus Range.

The Indo-European language family involves Slavs (Russians, Ukrainians, Bulgarians), ethnic Iranian groups (along with Persians, there are Kurds and Ossetians) and Armenians.

The Turkish language group (the majority of population of Turkey, Azerbaijan, Central Asian republics and some minorities of the North Caucasus: Karachais and Balkars) belongs to vast Altai language family.

The Caucasus is located in the geo-political region where Christian and Moslem worlds are closely inter-related. Religion has a great influence on ongoing political processes in the Caucasus and its surroundings.

Key transport corridors are located in the Caucasus, with the shortest route from Middle and Central Asia to Europe passing through the Caucasus.

The transport lines connecting Russia with Turkey and Iran also pass via the Caucasus, and are of great importance as well. Nevertheless, use of the favourable geographical position of the Caucasus for transport is complicated by political and ethnic conflicts. Due to this, many routes traversing the Caucasus remain blocked.

Among six floristic worlds globally, the largest area is the *Holarctic*, embracing a greater part of the entire Northern Hemisphere; the Caucasus is located in its southern part. In terms of its vegetation cover as well, the Caucasus is at the junction of the sub-tropical and temperate zones.

In terms of its fauna, the Caucasus belongs to the *Arctoge*, which coincides with the *Holarctic* world with some exceptions.

There are eight physical-geographical regions in the Caucasus. The Pre-Caucasus (or North Caucasus plain) is fully located within the Russian Federation and consists of lowlands and lower elevations. The Greater Caucasus is represented by high, difficult to pass mountains. The highest among them Mt. Elbrus reaches 5,642 m. The Trans-Caucasian depression represented by the humid sub-tropical Colchida and relatively arid East Trans-Caucasus is located to the south. The moderately elevated Likhy (Suram) Range serves a natural divide and is important as a climatic determinant. The Lesser Caucasus consists of relief of medium elevation and generally encloses the arid Armenian Highlands. There are two small, but very specific physical-geographic regions: the North

Main physical-geographical regions in the Caucasus

Black Sea (with features of Mediterranean Climate) and Hircan (with humid sub-tropical climate and extremely distinct Hyrcan flora) at the northwest and southeast frontiers.

The Place of the Caucasus in the World.
Table below presents some important characteristics of the Caucasus. For comparative purposes, average world data and deviations of the Caucasus region from these are given. Analysis of this table enables one to estimate the Caucasus contribution to global processes.

Within the scale of the entire planet, the Caucasus is a medium-sized region. Its total area makes up less than half a percent of the land area of the Northern Hemisphere.

Although the Caucasus is considered a highland region, its average height is 268 m less than the global average. However, if only the Greater and Lesser Caucasus geographical regions are considered, these are 638 m higher than the global average.

In terms of thermal conditions, on average, it is colder in the Caucasus than in other regions of the same latitude. It is as if the Caucasus was actually located several degrees of latitude further northward. It is colder by 4.5^{0}C in January and by 2.8^{0}C in July in the Caucasus. Only in Colchida are the January temperatures close to mid-latitude ones. In the remaining regions, it is relatively colder, with the cooling influence of the powerful Siberian anti-cyclone and results of penetration of cold arctic masses into the Caucasus.
In summer, the temperature of the Caucasus overall is close to mid-latitude values, and in the regions with a relatively continental climate (East Trans-Caucasus), it is 3-5^{0}C higher. The average annual temperature in the Caucasus is 3-5^{0}C lower than that in the same latitudes.

On average, it is drier in the Caucasus than across the globe, with the difference in precipitation reaching nearly 400 mm. If one compares the Caucasus values with mid-latitude precipitation, the Caucasus varies from the global average value by nearly 200mm.

Usually, there is higher humidity in landscapes of Colchida and the Greater and Lesser Caucasus than that in other mid-latitude regions. At the same time, in other Caucasus regions, it is 1.5-2 times more arid.

Some of the major physical-geographical values for the Caucasus and Globe

Index	Global Value	Value for the Caucasus	Difference
Total area (thousand km^2)	510 200	440	0.086%
Total dryland area (thousand km^2)	148 100	440	0.30%
Average altitude (m)	870	602	-268 m
Average air temperature in 40^0 latitude			
January	5.7	-2.8	-8.5^0
July	23.2	21.3	-1.9^0
Year	14	9.3	-4.7^0
Average air temperature in 43^0 latitude			
January	1.7	-2.8	-4.5^0
July	21.2	21.3	0.1^0
Average annual amount of precipitation (mm)	1 030	651	-379 mm
in 40^0 latitude	*850*	*651*	*-199 mm*
Radiation and thermal balance in 40^0-45^0 latitudes (kcal/cm^2 year)			kcal/cm^2 year
Total radiation	124	119	-5
Radiation balance	49	46	-3
Heat for evaporation	24	24	0
Turbulent heat exchange	25	22	-3
Annual Water balance in 40^0-45^0 latitude (mm)			
Evaporation	400	399	-1 mm
Water flow	510	259	-251 mm
Biogeocycle (Dryland, t/ha, data of Wetekker,1980)			
Phytomass	123	63	-60 t/ha
Productivity	7.7	7.1	-0.6 t/ha
Mortmass	7.5	1.6	-5.9 t/ha
Zoomass	0.07		

In terms of thermal and water regimes, the Caucasus overall lags behind average world values, and therefore is like an island of cold and of relative (but not absolute) dryness on our planet.

The Caucasus receives less solar radiation than other mid-latitude regions. However, the difference in this index is less notable than those for thermal and moisture indices. It is noteworthy that lower temperatures compensate for the insufficient amount of precipitation and thus, in the light of the difference in radiation balance, average values of heat for evaporation for the Caucasus and other mid-latitude regions are practically equal to each other.

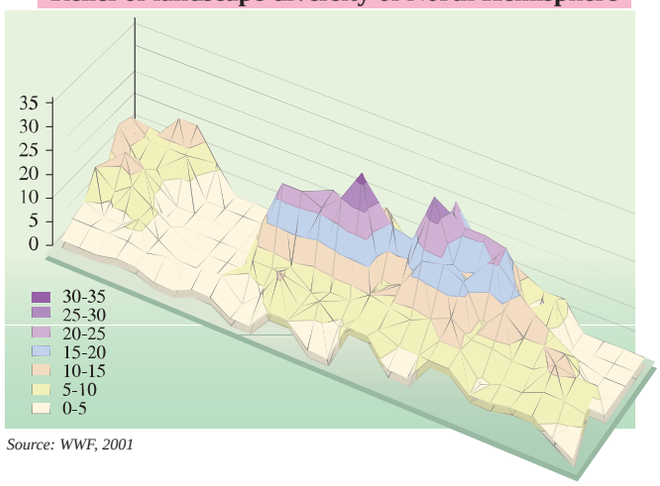
In terms of radiation balance, only Colchida may be considered a sub-tropical region with landscapes characteristic of such regions (the radiation balance is more than 50 kcal/sm2). East Trans-Caucasus and part of the Armenian Highlands are characterized by landscapes ranging from temperate to subtropical.

With values similar to mid-latitude values for evaporation, water flow in the Caucasus is nearly two times lower than average latitude values. Consequently, the heat and water balance is maintained mostly through evaporation, which is close to average latitude indices. Lower values of radiation balance are compensated for by low turbulent heat exchange values. A reduction of water flow, rather than a reduction of evaporation compensate for lower precipitation.

Specific Features and Key Problems. One of the major peculiarities of the Caucasus is high landscape diversity of the region. By this index, the Caucasus occupies one of the highest ranks in the world. A broad spectrum of landscapes is found in the region, starting from humid to arid, from sub-tropical to glacial-nival and from low- to highlands. Based on rough calculations, over 40% of landscape types are existent in the Caucasus, which occupies only 0.5% of the global land area. The Caucasus is thus truly a "landscape laboratory" of the world.

Figure "Relief of landscapes diversity of the Northern Hemisphere", or landscape diversity calculated by a ten-degree latitude-longitude grid, shows the relief of diversity in the form of a volumetric diagram. On its X and Y axes, latitudes and longitudes of the Northern Hemisphere are plotted respectively. The height of separate cells corresponds to their landscape diversity, the diversity peaks being easily visible. As it is clear from the figure, the highest level of diversity is characteristic of the Caucasus, the Black Sea region and the north-eastern part of the Himalayas. These regions greatly surpass other parts of the world in terms of landscape diversity, and thus represent "peaks" of landscape diversity globally.

Relief of landscape diversity of North Hemisphere

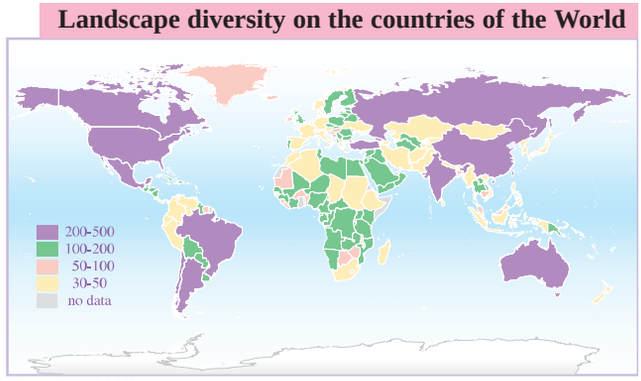


Source: WWF, 2001

Similarly, the world map of the number of landscapes on a 10 degree-step grid shows that the Caucasus falls into the category of regions with the highest landscape diversity, Georgia being within the group of the first ten countries. By the number of landscapes per unit of area (10,000 km sq.), Georgia appears in first place, far ahead of all other countries.

In terms of biological diversity, the Caucasus lags behind tropical countries, but occupies first place among other regions of the same latitude. The Caucasus is characterised by a high level of endemism: nearly one-fourth of all species are

Landscape diversity on the countries of the World



Source: WWF, 2002

endemics. The Caucasus flora and fauna include many relict species, which have been preserved and inherited from warmer and more humid periods.

The high biological diversity of the Caucasus is determined by the region being situated at the junction of temperate and sub-tropical zones, and being affected by both mild Atlantic air masses and the dry continental air of Eurasia. Because of this and its unique natural history, the Caucasus represents a remarkable sub-region in terms of biodiversity.

One further major peculiarity of the Caucasus is the existence of a comparatively large amount of intact ecosystems and even virgin landscapes. Such landscapes occupy nearly one-tenth of the Caucasian land area.

Overall, the Caucasus is a region, with a relatively clean environment and few environmental "hot spots".

Finally, one of the specific features of the Caucasus is the high ethno-cultural mosaic of its territory. Many ethnic groups live in the Caucasus, which profess different religions and have quite specific ethno-cultural traditions. In Dagestan alone, in an area of less than 50,000 sq. km., there are more than 40 ethnic groups speaking different languages. Very often villages located in neighbouring river gorges do not understand one another, and their populations can only communicate in Russian, which is a state language there.

Among key issues existing in the Caucasus, economic and social ones, connected with the transitional period from a planned to a market economy need to be mentioned. In all the countries of the Caucasus, a general economic decline took place after the collapse of the USSR. Reduced GDP brought about economic and social problems and a "free-fall" in the standard of living. This itself had a two-fold impact on the environment. On the one hand, due to the general economic decline, aggregated pressures from economic sectors (industry, power, agriculture and transport) were reduced. On the other hand, pressures on local environments from both urban and rural communities increased. However, despite the overall reduction in environmental pressures from major economic sectors, per unit pollution increased relative to the 1970s and 1980s, due to the obsolescence or absence of pollution control technologies and the existence of poor compliance monitoring and control systems.

Specific Features

- High landscape diversity;
- High biological diversity within moderate climate zone;
- Ethnic-religious and cultural diversity;
- Relatively high percent of intact ecosystems and high overall environmental quality with few existing environmental hotspots;

Problems

- Economic and social problems specific to countries in transition (overall decline of economic activities, severe budget constraints, high domestic and foreign indebted ness, low GDP growth rate, institutional weakness, etc);
- Geopolitical instability (ethnic wars, political upheavals, etc) and their impact on environment;
- Unequal distribution of water resources;
- Deforestation problems;
- Soil degradation and desertification;
- High occurrence of natural disasters;

Emerging Issues

- Oil spill and biodiversity fragmentation problems related to existing and planned oil and gas pipeline projects;
- Problems with environmental pollution and transit of dangerous goods in TRACECA corridor.

A very important problem for the Caucasus remains armed conflicts. Among them should be mentioned those in Karabakh, Chechnya and Abkhazia. Overall, the Caucasus is characterised by a certain level of geo-political instability. Along with recognized territorial units, there are unrecognised units, often calling themselves "independent states".

Political conflicts have serious economic, health and environmental implications for the region. On the one hand, military actions themselves cause high casualties, destruction of amenities and environmental degradation in conflict areas. On the other hand, the conflicts create local "hot spots" in terms of refugee camps, where people live under poor sanitary/hygienic conditions and over-exploit nearby natural resources in order to sustain themselves.

Despite relative environmental health, there are nevertheless a number of environmental problems connected with land degradation and soil erosion, desertification, deforestation, unequal distribution of water resources and existence of local pollution "hot spots".

An important problem for the Caucasus is the result of activities related to geodynamic processes. In 1988, the Spitak earthquake

resulted in about 25,000 deaths. Considerable economic damage was brought about by the Sachkhere earthquake of 1991 and environmental disasters (landslides, mudflows, floods and avalanches) in 1987 and 1989. The Caucasus has always been a region of ongoing major geodynamic processes, which seem to have intensified recently, the earthquake of 25 April, 2000 in Tbilisi being only one example.

In the light of current and future economic trends, the Caucasus may also face the following environmental issues: pollution with oil products and destruction of ecosystems as a result of construction and operation of new oil and gas pipelines; increase in pollution along the transport corridor Europe-Caucasus-Asia (known as TRACECA).

LIMITATIONS

There were several limitations which hindered the CEO report preparation, the majority of these being related to the data problem. Although statistical services in different regions of the Caucasus work with similar methods (at least until the disintegration of the Soviet Union), their data differ in terms of completeness and compatibility. While more-or-less complete historical data exist for Russia, part of these archives is classified.

For the South Caucasus countries, data for the last ten-year period are often lacking or entirely absent, especially for Georgia, where environmental data collection has diminished the most dramatically. Another major issue is the ***quality*** of data, with the current system of quality assurance/quality control (QA/QC) malfunctioning.

A final limitation is related to the short time available for the CEO report's preparation and delivery. Within one year, it was necessary to collect data from all four countries, and combine and analyse the same in a coherent way ~ an extremely challenging task.

SOME METHODOLOGICAL CLARIFICATIONS

In this report data are examined for the Caucasus as a whole and individually for all three South Caucasus states (Armenia, Azerbaijan, Georgia) and the North Caucasus. In general, output data were generated by summarising or averaging raw data for the South Caucasus states and autonomous republics (Adigeya, Karachaevo-Cherkessia, Kabardino-Balkaria, North Ossetia, Ingushetia, Chechnya and Dagestan), and provinces or 'krays' (Krasnodar and Stavropol) of the North Caucasus.

Some specific difficulties were experienced while working with data for Chechnya and Ingushetia. The problem is that during the Soviet period, they formed a single autonomous republic which only broke up in the early 1990s. In addition, during the last ten years Chechnya has been engulfed by conflict, and thus current statistical data on Chechnya either do not exist, or are very insufficient.

The data for South Caucasian autonomies are even more incomplete. For those autonomies, currently or previously engaged in military conflicts (e.g. Abkhazia and Karabakh), data are practically absent.

During the Soviet period, republics, autonomies and provinces ("kray") were divided into administrative districts ("raion"). In 1989, there were 390 administrative districts in the Caucasus. Currently, administrative districts still exist in all states except Armenia. Instead of 29 districts, regions have been formed ("oblast"). As to Georgian districts ("raion"), they are further united into bigger provinces ("mkhare" or "kray"). In some cases, data are given by administrative districts and cities.
A specific feature of this report is the so-called "landscape approach". The main idea is that there are as many as 20 distinct landscape types (for a western audience, a more familiar term would be "ecosystem" instead of "landscape") in the Caucasus, as well as 40 sub-types and 152 genera. By using a GIS analytic method, an attempt has been made to compute and design features closely related to natural and social differentiation of an area for these landscape units (population density, number of

urban and rural population, area of arable lands, wooded areas, etc.). The reason for using a "landscape approach" is that first of all, the Caucasus has extremely distinct and clearly-defined landscape components that make the idea of using administrative units for spatial allocation of some geographical or environmental features very irrational. Secondly, the same landscapes in different Caucasus countries are characterised by similar sets of environmental and geographical features and processes. Thirdly, pollution or other environmental processes do not recognize administrative boundaries and are limited only by natural borders. Finally, what is probably most important, the uniqueness of the Caucasus may only be understood through this natural-ecological mosaic and landscape differentiation.

So-called "hot spots" play a very important role in understanding the mechanisms of pollution and the state of the environment of specific territories, as they have polygonal, linear and point features. Therefore, this study gives much attention to description and analysis of pollution distribution.

However, neither a landscape approach, nor the analysis of smaller administrative districts and hot spots' distribution meets regional requirements, but only covers local features instead. Therefore in this report, the reader will find only maps showing local characteristics and trends for environmental changes in the Caucasus, as description and analysis of these maps and local features would require much time and space.

At the same time, it is perfectly understood that in terms of making real sense the further ideology of the CEO process should focus to the local levels more closely. Or saying in other way, it is necessary to keep moving from Global to Regional, then from Regional to Sub-Regional and finally to Local levels. Only after such in-depth analysis of environmental conditions it is reasonable to move backward up the chain of synthesis at regional and global levels. Temporal analysis is also very important for the global study. Only such spatial-temporal interpretation of modern processes can address new requirements of forecasting changes in the global environment in our planet. It is hoped this first CEO report will represent a major step in doing so for the Caucasus region.

BACKGROUND ANALYSIS OF REGIONAL SOCIO-ECONOMIC AND HISTORICAL-POLITICAL EVENTS FROM 1972-2002

An analysis of regional environmental and socio-economic trends is impossible without analysing major historical and political changes which have taken place in the world during the last 30 years.

Why does the Caucasus Environmental Outlook (CEO) report focus on the period from 1972 to 2000? In 1972, the first global environmental conference was held in Stockholm. From that time onward, the world community began to pay more attention to environmental issues. During this period, the Caucasus was a part of the Soviet Union, and its industry, agriculture and transport were developed at accelerated rates, increasing pressures on the environment. At the end of the 1970s, some economic contraction occurred, when the rate of industrial growth declined.

Nevertheless, industrial growth continued to increase, though at lower rates, reaching its peak in the late 1980s, and accompanied by greater environmental pollution.

In 1985, Michael Gorbachev and his team of reformers began their rule of the Soviet Union. Their initial intentions were noble, being to improve the situation in the country and initiate the full-scale reform known as "Perestroika". However, the measures were not planned appropriately and were carried out arbitrarily. As a result, the environmental situation became even worse. A series of ethnic conflicts broke out in Karabakh, Abkhazia and other regions of the Caucasus. The overall situation was aggravated by a series of natural disasters in 1987-1991. The Spitak and Sachkhere earthquakes, and avalanches, landslides and mudflows in Svaneti and Ajara, not only cost thousands of lives, but also resulted in billions of dollars of economic losses. However, industrial and agricultural production nevertheless remained significant.

1991 was a year of a drastic change in the situation of the Caucasus. During this period, the Soviet Union broke up, and three independent states - Armenia, Azerbaijan and Georgia - were established in the South Caucasus.

The late 1980s and early 1990s were marked by a series of political conflicts (Abkhazia, Chechnya, Karabakh, and Former South Ossetia) that significantly worsened the situation in the Caucasus. Traditional economic ties were broken and countries began the transition from planned to market economies, however haltingly. All these factors contributed to the dramatic decline of the Caucasus economy. This was also followed by a decline in population growth, and in some cases even decline in absolute population size in some of the countries and regions of the Caucasus. Consequently, environmental pressures were reduced and the state of the environment improved in terms of some aspects. Since the late 1990s, some signs of stabilization could be observed, with modest economic growth at the end of the 1990s and beginning of the 21st century. However, the level of growth of the 1980s has not yet been achieved by many economic sectors.

At present, there are four countries (three South Caucasus states and the Russian Federation, represented by the North Caucasus) with transitional economies in the Caucasus, whose major common objective is to build on the current level of democracy and overcome existing economic difficulties.