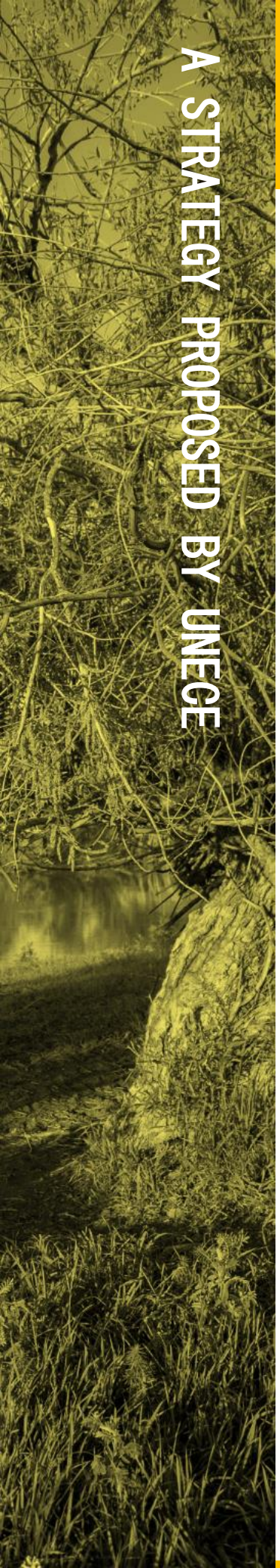
PROPOSAL FOR THE CONSIDERATION OF MEMBER STATES

# GREENING THE LANDSCAPES AND INFRASTRUCTURE OF CAUCASUS AND CENTRAL ASIA

## A STRATEGY PROPOSED BY UNECE AS A CONTRIBUTION TO THE CLIMATE ACTION SUMMIT




# GREENING THE LANDSCAPES AND INFRASTRUCTURE OF CAUCASUS AND CENTRAL ASIA

## INTRODUCTION

This is a contribution to the Climate Action Summit which seeks concrete proposals for climate related action, to put into practice the commitments made by world leaders. The Caucasus and Central Asia is a region of harsh climate and fragile ecosystems, going through a period of rapid social and economic transformation, which has not, so far, featured strongly in global discussions of climate change. The mostly landlocked region is rapidly improving its infrastructure, to become more integrated into the global economy but has several major environmental problems. There is an opportunity now to develop a strategy to green the landscapes and infrastructure of the Caucasus and Central Asia, to halt the damage and put the region on the path to sustainable landscapes. If implemented, this strategy should reduce GHG emissions, increase resilience to climate change, improve rural livelihoods and biodiversity, reduce pollution and put development on a more sustainable basis.

## WHY SHOULD WE GREEN THE LANDSCAPES AND INFRASTRUCTURE IN THE CAUCASUS AND CENTRAL ASIA?

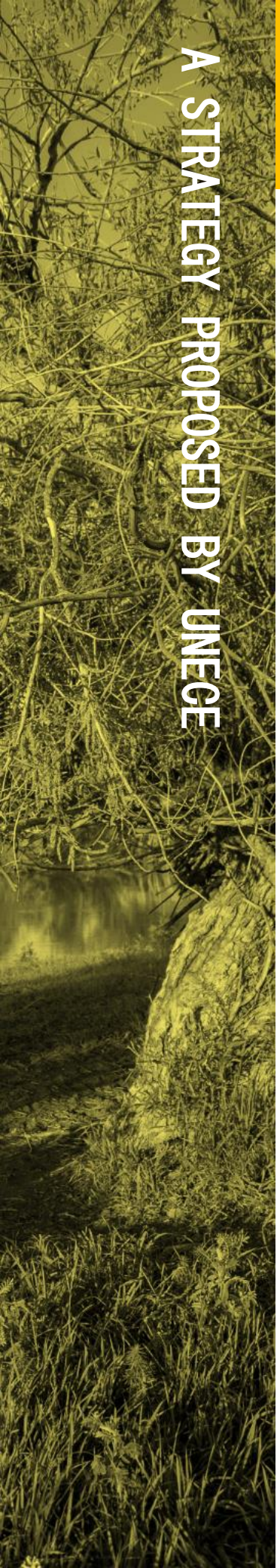
Over the centuries, already fragile landscapes and ecosystems have been degraded by human actions: overcutting of forests, overgrazing, excessive extraction and waste of water, unsustainable agricultural practices, pollution from mining and other sources, as well as climate change itself. This has led to desertification, notably drying of the Aral Sea, shrinking glaciers, water shortages, soil loss, erosion, and rural poverty. Extension of transport and other infrastructure could increase these pressures, unless preventive action is taken at the early stages.

Some of these developments, including soil loss, desertification and forest degradation have themselves increased emissions of greenhouse gases in the area, alongside emissions from the energy, industry and transport sectors. The projected change in the regional climate, with higher temperatures, and, in the southern part of the region, lower precipitations, will increase the pressures, making restoration more difficult.

Without concerted and forceful action, the situation will become worse, and the region will contribute to aggravating climate change at the global level, which in turn will aggravate the vulnerability of rural populations. It is therefore urgent to put in place ambitious measures to reverse the trend of recent decades.

## VISION OF THE PROPOSED STRATEGY

By 2030, the Caucasus and Central Asia are better connected to the rest of the world through much improved infrastructure, and this infrastructure has helped to make the landscapes of the region more sustainable and resilient, with better livelihoods for rural populations and more biodiversity, less pollution, erosion, soil loss and salinisation, more sustainable rural energy supply and grazing practices, and fewer GHG emissions. An integrated approach to landscape restoration has been put in place, enlisting the expertise of many sectors, including watershed management, forestry, agriculture and biodiversity conservation.




# GREENING THE LANDSCAPES AND INFRASTRUCTURE OF CAUCASUS AND CENTRAL ASIA

The broad lines of the Strategy would be as follows.

**First, protect what exists.**

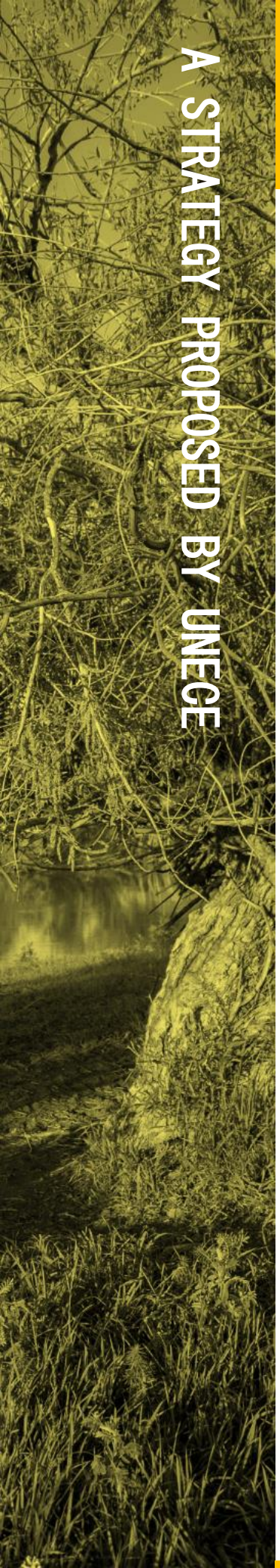
Halt deforestation and forest degradation, through providing alternative energy to rural communities, improving grazing regimes, controlling forest fires and strengthening the institutions of forest management, especially at the local level. Reduce water waste by rationalizing irrigation and reduce GHG emissions from agriculture by introducing sustainable agricultural practices.

**Second, ensure that all infrastructure investment maintains the highest standards of sustainability and resilience.**

All infrastructure construction should meet agreed standards with regard to GHG balances, adaptation to expected climate change, biodiversity, pollution, resource management, integrated land use etc.

**Third, restore millions of hectares of damaged and degraded landscapes.**

Establish trees and other vegetation on deserts and mountains, along river valleys and transport corridors, as well as shelterbelts around urban areas and farms. The restored landscapes should all be sustainable from an economic, social and environmental point of view, and fully integrated into the development strategies of the countries. Agriculture, forest management and infrastructure development should be integrated, with the dimension of sustainability fully respected from the beginning.




# GREENING THE LANDSCAPES AND INFRASTRUCTURE OF CAUCASUS AND CENTRAL ASIA

## A REGIONAL APPROACH IS NECESSARY

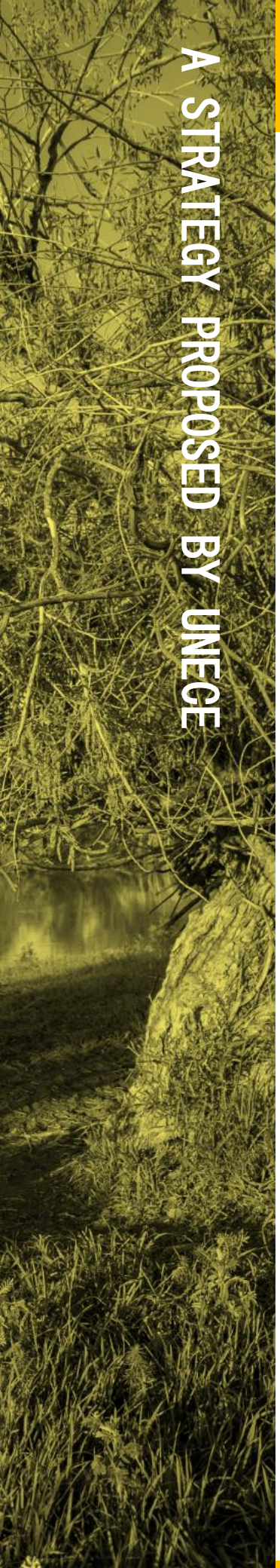
Although much of the activity will take place at a local or landscape level, a regional approach to a Strategy for greening of landscapes and infrastructure is necessary because some of the largest infrastructure projects, aiming at improved connectivity, are strongly international in nature, as are the watersheds and ecosystems affected. Ambitious, large scale and well designed landscape restoration in most parts of the region would have positive consequences also for neighbouring countries. The Aral Sea is an excellent example of a major environmental challenge which has regional causes, and thus needs regional solutions based on a river basin approach, not only from the two countries bordering the Sea, but also from upstream countries.

## BUILD ON COMMITMENTS ALREADY MADE AND PARTNERSHIPS ALREADY IN PLACE

There are many activities and commitments already in place to improve the environment and landscapes of the Caucasus and Central Asia, although, so far, they have not reversed the negative trends, partly through insufficient resources. The proposed Strategy should work with and learn from these experiences, and include their stakeholders in the preparation of the Strategy. Here are some examples.

At the Ministerial Roundtable on Forest Landscape Restoration and the Bonn Challenge in the Caucasus and Central Asia, held at Astana, now Nur-Sultan, in June 2018, participating countries committed to forest landscape restoration on 2.6 million ha. Since then, the area committed has grown, to nearly 3 million ha, with the possibility to restore a larger area if more funding is available. Therefore, implementation of forest landscape restoration could be rapid, as governments are already evaluating approaches and constraints. Furthermore, if more funding were available, and initial results have been positive, it would probably be uncontroversial to extend the scope of the activity, by applying the same principles to a wider area.

The Multi-Partner Human Security Trust Fund for the Aral Sea region (MPHSTF), under the aegis of the UN, has been established to “serve as a single platform for uniting international donor community’s efforts and resources within an integrated human security response framework for the Aral Sea region. Based on the characteristics of the region, the MPHSTF Strategy will focus on ensuring environmental, economic, food, social and health security for affected communities, with the aim to reduce poverty, enhance resilience, and achieve sustainable development across the SDGs”. (quoted from briefing note for address by the Secretary general, November 2018)




# WHAT WOULD BE THE ACTIONS UNDER THE STRATEGY?

The main activities could include establishment of trees and other vegetation in desert and mountain areas, sustainable management of existing and future forests, to supply a wide range of services and goods, integrated water resource management over all the watersheds of the region, with transboundary cooperation when necessary, improved agricultural practices, strengthened institutions, with improved skills and training of the workforces. The specific actions to implement the strategy would have to be adapted to the circumstances of each landscape or local challenge. Top-down standardised solutions are not appropriate for these cases.

In fact, there are many governmental and non-governmental organisations active in Central Asia, as well as major actors of the development community, so at an early stage, it would be appropriate to convene a conference where activities are mapped, and ideas could be shared and priorities established.

However, there are many possible actions which might contribute to achieving this vision. Possibilities would include:

### Protection of what exists

- Improve policy and legal frameworks for sustainable management of natural resources
- Involvement of local population in the management of natural resources and provide them with necessary incentives for sustainable management of forest and water resource management
- Use of salt-tolerant trees and vegetation (e.g. saxaul) to fix sand in desert areas, including the Aral Sea.
- Supply of renewable energies or gas to rural population, reducing pressure on fuelwood supply.

### Creation of sustainable and resilient infrastructure

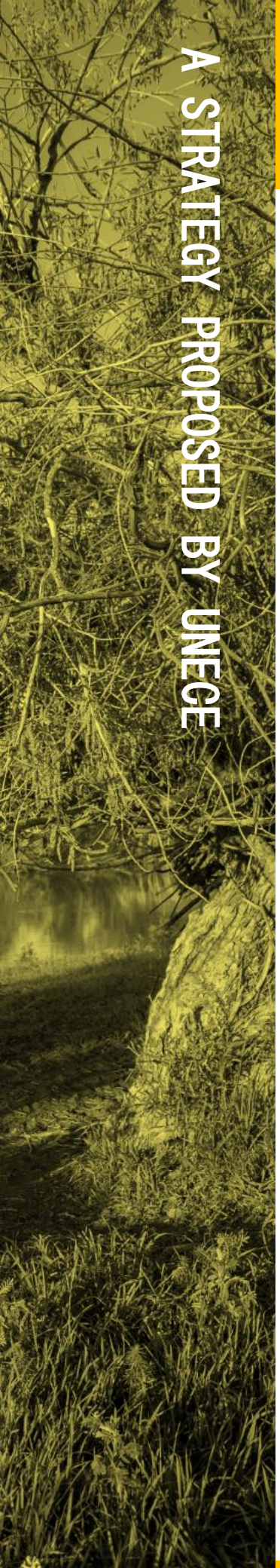
- Rehabilitation of water pipelines and canals
- Protection of vulnerable transport infrastructure from floods and landslides, including by protective forests
- Introduce resource efficient technologies in agriculture and industry, by reducing leakage and evaporation, using the best irrigation techniques
- Water storage for reliable water supply in dry years, possibly combined with tree plantation around reservoirs.
- Development and widespread use of sustainability standards, for infrastructure construction and use , for forest management and for integrated water resource management, to guide practitioners, and demonstrate to Governments, donors and the general public that the restored landscapes are in fact sustainable and contributing to climate change mitigation and adaptation

### Restoration of damaged and degraded landscapes

- Widespread plantation of shelterbelts around agricultural operations to improve microclimates and protect against wind and dust.
- Rehabilitation of degraded pastures and croplands
- Restoration and sustainable management of the fruit and nut forests (apple, walnut, pistachio etc.), for rural livelihoods, exports, biodiversity and responsible eco-tourism.
- Creation of an ambitious integrated, possibly transboundary, network of ecological corridors and reserves.
- Restoration of the tugai (floodplain) forests along the rivers of the region, for soil protection and biodiversity

### Governance and institutions

- Application of strategic environmental assessment for regional landscape restoration programme and environmental impact assessment for specific local level projects
- Commitment of governments in the region to multilateral environment conventions, for instance the Espoo Convention.
- Capacity building in all the areas covered by the Strategy




# GREENING THE LANDSCAPES AND INFRASTRUCTURE OF CAUCASUS AND CENTRAL ASIA

## THE NECESSITY OF ENVIRONMENTAL IMPACT ASSESSMENT

The major infrastructure investments planned for the region, including two corridors of the Belt and Road Initiative (BRI) through Central Asia, have the potential of improving the prosperity of the region as a whole, but also of further damaging its environment, and adding to the region's GHG emissions. It is essential to ensure that large scale infrastructure investment (for instance in roads, railways, ports, mines and other facilities) is based on environmental impact assessment, not only for the immediate neighbourhood of the facility but also over the whole landscape, including, in many cases, other countries. Countries in the region have acceded to several multilateral environmental agreements including to the Espoo Convention on Environmental Impact Assessment in a Transboundary Context , and as such have an obligation to consult with countries and stakeholders which might be affected by infrastructure investment. UNECE, the custodian of the Espoo Convention, as well as of other conventions, is ready to provide support in this area.

## MAIN BENEFITS TO BE EXPECTED FROM THE STRATEGY

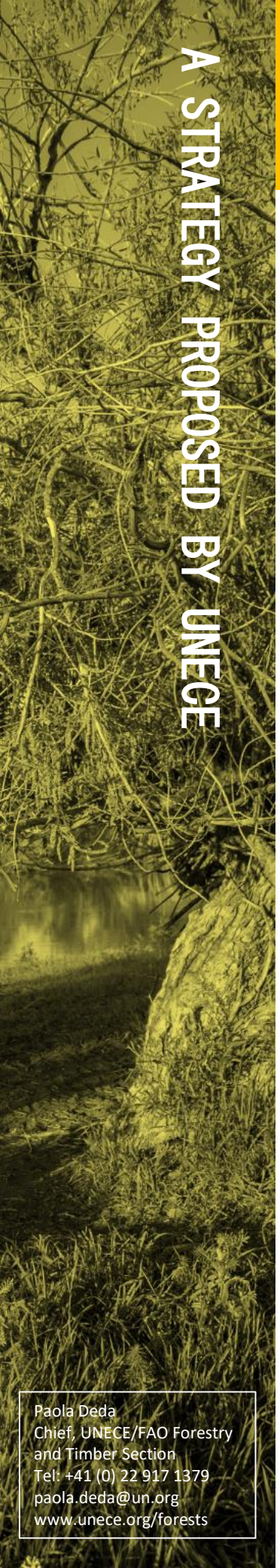
The main benefits – for the region and, indirectly for the world - to be expected if the Strategy is developed, financed and implemented, would be:

- A more stable and resilient environment for the region;
- Improved infrastructure with minimum increase in GHG emissions
- Improved rural livelihoods
- Less loss of biodiversity
- Much reduced desertification, deforestation/forest degradation and erosion
- Sustainable management of forests and watersheds
- Sustainable agriculture with less wastage of water
- Cooler, more humid microclimates in many areas
- Improved cooperation and partnerships between countries and stakeholders in the region, along with increased transparency
- Improved institutional capacity in the fields of agriculture, environment, forestry, integrated water management and rural development

Quantified targets and objectives should be developed as the Strategy is drawn up, and will depend to a great extent on the funding available, but a few orders of magnitude are suggested as a basis for discussion:

- Restoration of 6 million hectares of degraded land (double the area already committed at Astana)
- Sustainable forest management on 27 million hectares (all forest and other wooded land)
- Improved livelihoods and a more resilient environment for 40 million rural people (roughly the whole rural population)
- Reduction of loss of irrigation water by 50%.
- All countries in the region have signed and ratified the Espoo Convention and its protocols as appropriate, and are consulting with neighbouring countries on environmental impact assessment as required by the Convention.
- All new infrastructure is demonstrably sustainable and resilient.

The Strategy would make a significant contribution to achieving the Sustainable Development Goals in the region. See annex 1 for a list of the SDG targets relevant to areas addressed by the Strategy.



A STRATEGY PROPOSED BY UNECE

# GREENING THE LANDSCAPES AND INFRASTRUCTURE OF CAUCASUS AND CENTRAL ASIA

## NEXT STEPS

The Caucasus and Central Asia are facing a number of major environmental challenges, which will be exacerbated by the likely consequences of climate change in the region. The situation is not getting better, despite the efforts of governments and donors, partly because of the failure to develop and implement a truly ambitious strategy for greening infrastructure and landscapes. The UN Climate Action Summit in September 2019, along with ongoing ambitious plans for infrastructure development, offer a unique opportunity to reassess the challenges, to develop a strategy and to assemble the necessary funds for a fundamental transformation of the environment of the region and the lives of its inhabitants.

## THE FOLLOWING NEXT STEPS ARE PLANNED

1. UNECE will consult with governments in the region and with potential donors and partners, on the basis of this preliminary brief, to assess the strength of support for developing a Strategy for greening the landscapes and infrastructure of the Caucasus and Central Asia (July-August 2019).
2. If the response is positive, a revised and more detailed proposal, incorporating comments and suggestions made, will be drawn up and submitted to the Climate Action Summit. (September 2019).
3. If agreed, a formal process will be launched to prepare and implement the Strategy (from October 2019).



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# GREENING THE INFRASTRUCTURE AND LANDSCAPES OF THE CAUCASUS AND CENTRAL ASIA: WHAT CONTRIBUTION TO THE SDGS?

The Strategy outlined in this brief would contribute to the following SDG targets (slightly edited, to ease reading, for instance by omitting deadlines for achieving targets):

1.1 Eradicate extreme poverty for all people everywhere

6.5 Implement integrated water resources management at all levels, including through transboundary cooperation as appropriate

6.6 Protect and restore water related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes

9.1 Develop quality, reliable, sustainable and resilient infrastructure,

9.4 Upgrade infrastructure and retrofit industries to make them sustainable, with increased resource use efficiency and greater adoption of clean and environmentally sound technologies and industrial processes

9.a Facilitate sustainable and resilient infrastructure development in developing countries through enhanced financial, technological and technical support to...landlocked developing countries.

12.2 Achieve the sustainable management and efficient use of natural resources

13.1 Strengthen resilience and adaptive capacity to climate-related hazards and natural disasters in all countries

15.1 Ensure the conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services, in particular forests, wetlands, mountains and drylands, in line with obligations under international agreements

15.2 Promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

15.3 Combat desertification, restore degraded land and soil, including land affected by desertification, drought and floods, and strive to achieve a land degradation-neutral world

15.4 Ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development

15.5 Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, protect and prevent the extinction of threatened species

15.b Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation


# STATISTICAL BACKGROUND

Table 1

Background information on area, population and forests of the Caucasus and Central Asia

| | Area | Population | Population density | Share of rural population | Area of forest and other wooded land (FOWL) | FOWL/ head |
|---|---|---|---|---|---|---|
| | Mil. ha | Mil. | Person/ ha | % | Million ha | Ha/cap |
| Armenia | 3.0 | 3.0 | 1.0 | 36.4 | 0.4 | 0.13 |
| Azerbaijan | 8.7 | 9.6 | 1.1 | 46.9 | 1.1 | 0.12 |
| Georgia | 7.0 | 3.7 | 0.5 | 42.8 | 2.8 | 0.76 |
| Caucasus | 18.6 | 16.4 | 0.9 | 44.0 | 4.4 | 0.27 |
| Kazakhstan | 272.5 | 18.0 | 0.1 | 42.9 | 12.9 | 0.72 |
| Kyrgyzstan | 20.0 | 6.1 | 0.3 | 66.3 | 1.7 | 0.27 |
| Tajikistan | 14.2 | 8.9 | 0.6 | 68.1 | 0.6 | 0.06 |
| Turkmenistan | 48.8 | 5.7 | 0.1 | 47.7 | 4.3 | 0.75 |
| Uzbekistan | 44.7 | 32.9 | 0.7 | 46.9 | 3.4 | 0.10 |
| Central Asia | 400.2 | 71.5 | 0.2 | 49.3 | 22.8 | 0.31 |
| Caucasus and Central Asia | 418.8 | 87.9 | 0.2 | 49.3 | 27.1 | 0.31 |

Source: State of Forests of the Caucasus and Central Asia, UNECE/FAO, 2019

Table 2

Overview of the forests of the Caucasus and Central Asia, and the goods and services they supply, around 2015

| | Forest and other wooded land (FOWL) | FOWL as % of total land | Share of public ownership of forest land | Share of forest area designated for protective functions | Share of forest area conserved for biodiversity | Employment per 1,000 ha of forest | Estimated total harvest |
|---|---|---|---|---|---|---|---|
| | 1,000 ha | % | % | % | % | FTE/ 1,000 ha | 1,000 $m^3$ |
| Armenia | 395 | 13.3 | 100 | 67.1 | 33.2 | 9.0 | 536 |
| Azerbaijan | 1,139 | 13.2 | 100 | 77.5 | 10.0 | 1.8 | 90 |
| Georgia | 2,829 | 40.6 | 100 | 78.0 | 9.5 | 0.6 | 3,000 |
| Caucasus | 4,364 | 23.4 | 100 | 77.0 | 11.4 | 1.6 | 3,626 |
| Kazakhstan | 12,904 | 4.7 | 100 | 97.4 | 20.0 | 3.2 | 371 |
| Kyrgyzstan | 1,663 | 8.3 | 100 | 93.0 | 6.2 | 2.3 | 18 |
| Tajikistan | 563 | 4.0 | 100 | 73.3 | 26.1 | 4.8 | 9 |
| Turkmenistan | 4,264 | 8.7 | 100 | 100 | 2.4 | 0.4 | 10 |
| Uzbekistan | 3,369 | 7.5 | 100 | 82.5 | 12.0 | 3.1 | 36 |
| Central Asia | 22,763 | 5.7 | 100 | 93.2 | 10.8 | 2.2 | 525 |
| Caucasus and Central Asia | 27,127 | 6.5 | 100 | 89.1 | 11.0 | 2.0 | 4,151 |

Source: State of Forests of the Caucasus and Central Asia, UNECE/FAO, 2019


# FOREST LANDSCAPE RESTORATION IN THE CAUCASUS AND CENTRAL ASIA

Table 1

National commitments announced at the Ministerial Roundtable on Forest Landscape Restoration and the Bonn Challenge in the Caucasus and Central Asia in June 2018 (incorporating additional commitments made after the meeting).

| | |
|---|---|
| **Armenia** | **260,000 ha by 2030 (since the Conference, the Armenian government has announced it will review and adjust this commitment)** |
| **Azerbaijan** | 170,000 ha by 2030,<br>Subject to support: an additional 100,000 ha |
| **Georgia** | 1,500 ha by 2030<br>Assist natural regeneration of forests on 7,500 ha by 2030 |
| **Kazakhstan** | 1,500,000 ha by 2030<br>Subject to support: additional 300,000 ha by 2030 |
| **Kyrgyzstan** | Forest Landscape Restoration on 23,200 ha by 2030<br>Restoration of 300,000 ha of degraded pasture land by 2030 |
| **Tajikistan** | 66,000 ha by 2030 |
| **Uzbekistan** | 500,000 ha by 2030<br>Subject to support: additional 500,000 ha by 2030 |
| **Total pledged by the region: 3 million ha<br>Total pledged by the region including restoration subject to additional support: 3.5 million ha** | |

Source: Report from the Ministerial Roundtable on Forest Landscape Restoration and the Bonn Challenge (22 June 2018) Joint UNECE/FAO Forestry and Timber Section, 2018.

ANNEX 3

# FOREST LANDSCAPE RESTORATION IN THE CAUCASUS AND CENTRAL ASIA

At present, no further information is officially available on the form the implementation of these commitments will take. Preparatory work is under way. However, national experts for the UNECE/FAO study were asked to estimate what type of action might be undertaken. These unofficial and preliminary views are summarised below:

| Forest Type / Factor | Mentioned by correspondent of | Main drivers/degradation types | Policy response |
|---|---|---|---|
| **Desert forests including saxaul** | Turkmenistan<br>Uzbekistan | Fuelwood demand, aggravated by energy shortage in rural areas, leading to overcutting, overgrazing, land transfer to agriculture (in the past). Uneven water supply in pasture areas, and drought, leading to concentration of animals | Inventory of degradation, and situation of pasture. Strengthen protection to prevent overcutting and overgrazing. Extend silviculture on eroded slopes, promote natural restoration |
| **Mountain forests** | Armenia<br>Georgia<br>Kyrgyzstan<br>Turkmenistan<br>Tajikistan<br>Uzbekistan | Intense illegal logging for fuel, leading to erosion, with overgrazing, leading to decreases in productivity and in natural regeneration. Lack of irrigation water has pushed local populations to increase animal numbers. Weakened regeneration. | Anti-erosion planting increased natural regeneration. Supply of gas to rural communities. Water saving, enabling reduction in animal numbers. Supply of appropriate seedlings for regeneration |
| **Floodplain forests (tugai)** | Kazakhstan<br>Uzbekistan<br>Tajikistan | Water scarcity, salinization and changes in the hydrological regime of the rivers. Unsustainable use of forest resources by local people for fuel and grazing | Strengthen protection against overcutting and overgrazing. Creation of anti-erosion plantations. |
| **Fuelwood harvesting** | Armenia<br>Azerbaijan,<br>Georgia<br>Kazakhstan (mainly in Saxaul areas)<br>Kyrgyzstan<br>Tajikistan | Strong energy demand, leading to overcutting, erosion, soil loss, reduction of forest cover. Insufficient energy supply for rural communities | Supply alternative fuels, supply wood from sanitation fellings for rural energy, strengthen forest police functions, heavy fines, coordination with local communities, increased resources for forest managers. Improve forest inventory. Increase price of wood. |
| **Overgrazing** | Azerbaijan,<br>Armenia<br>Tajikistan<br>Kazakhstan (mainly in Saxaul areas)<br>Kyrgyzstan | Grazing pressure causes species change, loss of productivity, erosion, pasture degradation and failed regeneration. Lack of pasture land. Excessive number of animals for available pasture | Observe grazing standards, fertilise, crop rotation, agreement with herders, better monitoring, increased resources for forest managers. Strengthening forest conservation and the transition to closed pasture systems. Improving the forest landscapes and the creation of agroforestry systems. |
| **Overharvesting of valuable species (walnuts, pistachios)** | Kyrgyzstan<br>Tajikistan | Harvesting of all hazelnuts hinders regeneration, leads to degradation. | Close monitoring during harvest time, make agreements on harvest volumes, leaving 30% of hazelnuts for wildlife and regeneration, providing more resources for forest managers to improve enforcement of regulations |


## SURE® STANDARD FOR SUSTAINABLE AND RESILIENT INFRASTRUCTURE

This is a voluntary standard managed by the Global Infrastructure Basel (GIB) Foundation, which is a Swiss foundation based in Basel working to promote sustainable and resilient infrastructure through sustainable infrastructure design and financing on a global scale. Active since 2008, GIB works with multiple stakeholders ranging from city representatives to project developers and infrastructure financiers, with a focus on emerging and developing countries. GIB envisions a world where sustainable and resilient infrastructure is the norm rather than the exception.

The SuRe® standard (ST01 ENG Version 1.1 effective 1 May 2018) addresses a wide range of issues, including:

- Governance (management and oversight, sustainability and resilience management, stakeholder engagement, anti-corruption and transparency)
- Society (human rights, labour rights and working conditions, community protection, customer focus and community involvement, socioeconomic development)
- Environment (climate, biodiversity and ecosystems, resource management, pollution, land use and landscape)

ANNEX 5

# CLIMATE CHANGE TRENDS AND ADAPTATION OPTIONS IN CENTRAL ASIA

As a land locked region with a harsh climate, a significant energy sector in some countries, and vulnerable ecosystems, it is complex to summarise climate change mitigation and adaptation in Central Asia, especially as climate observation and weather services in the region need improvement. Climate Change in Central Asia, a "visual synthesis", produced by the Zoi Environment Network, in 2009 in close cooperation with the Governments of Switzerland, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan, and drawing on official sources and reports to UNFCCC, presents the trends and main issues, although more recent developments are not covered. This annex is based on the summaries in the visual synthesis.

The main trends may be summarised as follows:

- Air temperatures are rising, along with aridisation and desertification, extreme weather events and climate-related hazards
- Glaciers and permafrost are melting and water resources availability in the future is falling
- Infectious and vector-borne diseases, and heat stress, are expanding
- Greenhouse gas emissions fell in the fifteen years to 2005, which were marked by many economic and social problems in the region, but have been rising since
- There is increased awareness of climate change issues; policy instruments and actions are being put in place.
- Climate observation and weather services are becoming weaker.

The following options for adaptation were identified, based on a synthesis of the Second National Communications to UNFCCC and the National Strategies/Action Plans on Climate Change:

## WATER USE

- Improved climate and water monitoring and forecasting
- Integrated water resource management (IWRM)
- Revision of water consumption norms and regulations
- Broad introduction of efficient irrigation technologies
- Water re-use and recycling, drainage water management
- Water saving incentives and training for farmers
- Rehabilitation of water pipelines and canals

## AGRICULTURE

- Improved agrometeorological and veterinary services, training, scientific and technical support for farmers
- Selection and introduction of drought and pest resistant and low water consumption crops, crop protection
- Conservation of valuable agro-biodiversity
- Water storage for reliable water supply in dry years
- Crop rotation and shift towards more suitable areas
- Rehabilitation of degraded pastures and croplands
- Remote sensing and mapping of pasture conditions
- Insurance, strategic food and forage reserves

## HEALTH

- Malaria prevention and control
- Improved drinking water quality and sanitation facilities
- New regulations for farmers working in the field in summer
- Public awareness and early warning
- New urban planning principles, better microclimate control

ANNEX 5

## TRANSPORT AND ENERGY

- Adjustment of hydropower plant operations according to stream flow change and projected climate impacts
- Improved security of energy supply and transfer networks
- Revised road construction norms and traffic load
- Protection of vulnerable transport infrastructure

## ECOSYSTEMS

- Systematic research and monitoring
- Protection of important ecological corridors and sites
- Conservation of endangered species
- Public awareness, responsible eco-tourism

## DISASTER RISK REDUCTION

- Improved capacities for monitoring and forecasting of extreme weather events, hazard mapping
- Engineering protection measures and early warning
- Insurance and risk management, public awareness