# PART II: MEDIA AND POLLUTION MANAGEMENT

# Chapter 8

# *AIR PROTECTION*

## 8.1    Urban and rural air quality

### *Reporting on air quality*

In Uzbekistan, air quality standards are defined as maximum allowable concentrations (MACs). These MAC values are set for 485 pollutants (2011 SanPiN No. 0293-11). The values are set for short-term maxima (20 minutes), for daily means, for monthly means and for annual means. Every pollutant has a defined hazard class (from 1 to 4, with class 1 the most hazardous) (table 8.1).

MACs for dust are defined for 26 categories of dust, including Aral Sea dust, anorganic dust, cotton dust, grain dust, barley dust, corn dust, wood dust, kapok dust and organic polymer dust, with nine different classes of standards (table 8.2). There are no specific standards for $PM_{10}$, $PM_{2.5}$ and TSP.

To assess the air pollution in a certain area or city, Uzbekistan uses indexes that are related to the MAC values. The most important is the Air Pollution Index, commonly abbreviated as $API_5$. To calculate the $API_5$, the average daily mean concentrations of the five most important pollutants – the five substances with the highest MAC values considering their risk class – are divided by their daily mean MAC values and benchmarked by a factor related to the MAC value of $SO_2$. The substances can be different in different locations. The API is calculated using the formula: $API_5 = \Sigma \, (q_i/MAC_i) \, \exp K_i$, in which $q_i$ is the average concentration of the pollutant i, $MAC_i$ the average daily MAC value of the pollutant and $K_i$ the exponent that depends on the class of dangerous substance compared with sulfurdioxide. The indices are presented on an annual basis.

**Table 8.1: Maximum allowable concentrations of selected ambient air pollutants, µg/m³**

| Component | Short-term maximum | Daily mean | Monthly mean | Annual mean | Hazard class |
|---|---|---|---|---|---|
| Nitrogen dioxide | 85.0 | 60.0 | 50.0 | 40.0 | 2 |
| Nitrogen oxide | 600.0 | 250.0 | 120.0 | 60.0 | 3 |
| Sulfur dioxide | 500.0 | 200.0 | 100.0 | 50.0 | 3 |
| Carbon monoxide | 5 000.0 | 4 000.0 | 3 500.0 | 3 000.0 | 4 |
| Ammonia | 200.0 | 120.0 | 60.0 | 40.0 | 4 |
| Hydrocarbons | 1 000.0 | .. | .. | .. | 4 |
| Dust from Aral Sea soil | 500.0 | 300.0 | 200.0 | 150.0 | 3 |
| Lead (PbO, PbAc) | 1.5 | 1.0 | 0.6 | 0.3 | 1 |
| Lead (sulphide) | 9.0 | 6.0 | 3.0 | 1.7 | 1 |
| Benzene | 300.0 | 200.0 | 150.0 | 100.0 | 2 |
| Phenol | 10.0 | 7.0 | 5.0 | 3.0 | 1 |
| Formaldehyde | 35.0 | 12.0 | 6.0 | 3.0 | 2 |
| Ozone | 160.0 | 100.0 | 45.0 | 30.0 | 1 |
| Cadmium (halides) | 1.5 | 1.0 | 0.5 | 0.3 | 1 |
| Mercury | 1.5 | 1.0 | 0.6 | 0.3 | 1 |

*Source*: 2011 SanPiN No. 0293-11.

**Table 8.2: Maximum allowable concentrations of dust, µg/m³**

| Component | Short-term maximum | Daily mean | Monthly mean | Annual mean | Hazard class |
|---|---|---|---|---|---|
| Anorganic dust > 70 % $SiO_2$ | 150 | 100 | 80 | 50 | 3 |
| Cotton dust | 500 | 200 | 100 | 50 | 3 |
| Grain dust | 300 | 120 | 60 | 30 | 3 |
| Corn, barley, oats dust | 500 | 300 | 150 | 50 | 3 |

*Source*: 2011 SanPiN No. 0293-11.

A few other types of indexes for air pollution are also considered for additional information but not used in publications. The standard index is defined as the highest once-measured concentration of a pollutant divided by its (short-term) MAC value. The highest frequency index is the most repeated exceedance in percentage terms of the MAC value of a pollutant.

The final level of air pollution in a city or region is characterized by four classes that are established by the API: Low, Increased, High and Very High (table 8.3).

**Table 8.3: Estimation of the air pollution levels by Air Pollution Index**

| Pollution level | Level of API₅ |
|---|---|
| Low | 0–4 |
| Increased | 5–6 |
| High | 7–13 |
| Very High | >14 |

*Source*: Air Pollution Indexes in the cities of the Republic of Uzbekistan 2009–2018. Uzhydromet, 2018.

API is calculated for 25 cities, which gives general information about the ranking of these cities regarding

air quality (table 8.4). The API values are generally low, with the exception of Angren, where the API in the period 2016–2017 was higher than 5. However, for an evaluation of the air quality in the different cities, the use of indexes is less practicable because much information about short-term, mean daily, mean monthly and mean annual concentrations and exceedance of air quality standards for different components is hidden in these indexes. The indexes can be used to rank cities and oblasts, but, for a modern air quality information system, component- and site-specific concentrations must also be available to establish necessary emission reduction measures. As an index does not relate directly to international standards for air pollutant concentrations, such as WHO or EU standards, the environmental and health risks cannot be established as direct consequences of the local concentrations of specific pollutants during different periods.

The assessment of the air quality by directly comparing measured monthly or annual means of concentration levels with, for example, WHO standards or MAC values gives a more direct picture of the situation with respect to the levels of air pollution in Uzbekistan (box 8.1 and box 8.2).

**Table 8.4: Air Pollution Index for 25 cities, 2009–2018**

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|---|---|---|---|---|
| Almalyk | 4.43 | 4.29 | 3.68 | 3.91 | 4.05 | 4.10 | 4.00 | 4.12 | 4.23 | 4.30 |
| Angren | 4.61 | 6.25 | 4.74 | 4.30 | 4.72 | 5.12 | 4.71 | 5.32 | 5.30 | 4.94 |
| Andijan | 2.65 | 2.39 | 2.66 | 3.05 | 3.35 | 2.94 | 3.80 | 3.32 | 3.62 | 3.46 |
| Bekabad | 2.25 | 2.27 | 2.74 | 2.83 | 2.79 | 2.88 | 3.20 | 3.67 | 3.92 | 3.93 |
| Bukhara | 4.48 | 4.48 | 3.51 | 3.37 | 3.22 | 3.38 | 2.98 | 3.58 | 4.32 | 4.30 |
| Gulistan | 2.03 | 2.11 | 2.23 | 2.19 | 2.18 | 1.85 | 1.89 | 2.33 | 2.37 | 2.53 |
| Denau | 1.77 | 1.86 | 1.98 | 1.50 | 1.49 | 1.49 | 1.32 | 1.45 | 1.22 | 1.10 |
| Kagan | 0.74 | 0.61 | 0.70 | 0.89 | 0.60 | 0.80 | 0.97 | 1.20 | 1.21 | 1.30 |
| Karshi | 1.39 | 1.34 | 1.32 | 1.28 | 1.32 | 1.30 | 1.30 | 1.26 | 1.25 | 1.26 |
| Kitab | 1.15 | 1.15 | 1.17 | 1.15 | 1.17 | 1.15 | 1.17 | 1.13 | 1.13 | 1.14 |
| Kokand | 2.98 | 2.86 | 2.64 | 2.55 | 3.04 | 2.29 | 2.36 | 2.62 | 2.79 | 2.61 |
| Marghilan | 1.07 | 1.15 | 0.96 | 0.77 | 1.00 | 1.23 | 1.20 | 1.28 | 1.43 | 1.31 |
| Mubarek | 0.31 | 0.32 | 0.32 | 0.31 | 0.32 | 0.33 | 0.33 | 0.34 | 0.35 | 0.49 |
| Navoiy | 4.22 | 3.89 | 3.72 | 3.50 | 3.17 | 2.93 | 3.59 | 3.90 | 4.06 | 3.97 |
| Namangan | 1.97 | 1.55 | 1.29 | 1.56 | 1.72 | 1.93 | 2.26 | 3.00 | 2.95 | 3.20 |
| Nukus | 4.42 | 4.98 | 4.65 | 4.09 | 4.31 | 4.01 | 3.95 | 4.43 | 4.55 | 3.39 |
| Samarkand | 1.80 | 1.55 | 1.36 | 1.24 | 1.62 | 1.83 | 1.90 | 1.74 | 1.55 | 2.33 |
| Sariasya | 3.06 | 3.72 | 3.23 | 2.29 | 2.60 | 2.00 | 1.59 | 1.43 | 1.23 | 1.17 |
| Tashkent | 3.66 | 3.37 | 3.32 | 3.63 | 3.85 | 4.04 | 3.51 | 3.55 | 4.10 | 3.66 |
| Urgench | 1.19 | 1.13 | 1.77 | 2.18 | 1.82 | 1.90 | 2.02 | 2.11 | 1.24 | 2.06 |
| Fergana | 3.51 | 3.48 | 2.98 | 2.94 | 3.57 | 3.84 | 4.10 | 4.52 | 4.38 | 3.73 |
| Chirchik | 2.70 | 2.51 | 2.75 | 2.86 | 2.69 | 2.95 | 3.61 | 3.61 | 3.41 | 3.46 |
| Sjachrisabz | 1.16 | 1.15 | 1.18 | 1.17 | 1.15 | 1.15 | 1.17 | 1.14 | 1.14 | 1.14 |
| Janchiul | 0.37 | 0.43 | 0.55 | 0.49 | 0.54 | 0.54 | 0.57 | 0.43 | 0.41 | 0.37 |
| Nurabad | 1.45 | 1.19 | 0.91 | 0.84 | 0.68 | .. | .. | .. | 1.41 | 1.75 |

*Source:* Air Pollution Indexes in the cities of the Republic of Uzbekistan 2009–2018, Uzhydromet, 2018.

**Box 8.1: Measured annual mean concentrations of air pollutants in selected cities, 2015–2018**

Analysis of data gathered in the monitoring period 2015–2018 shows that, in most of the cities in Uzbekistan, the concentrations of air polluting substances are below the air quality standards.

In some cities, such as Bukhara and Nukus, the annual mean dust levels are 1.3 and 2.7 times (in 2017) and 1.3 and 1.3 times (in 2018) higher than the air quality standards, which almost fully depends on the natural and climatological circumstances in these territories (table 8.5).

**Table 8.5: Annual mean concentrations of dust in selected cities, 2015–2018, µg/m³**

|  | 2015 | 2016 | 2017 | 2018 |
|---|---|---|---|---|
| Nukus | 300 | 400 | 400 | 200 |
| Tashkent | 100 | 100 | 200 | 100 |
| Andijan | 200 | 200 | 200 | 100 |
| Bukhara | 100 | 100 | 200 | 200 |
| Uzbek MAC Aral Sea dust | 150 | 150 | 150 | 150 |

*Source:* Uzhydromet, 2019.

There is also a systematic local exceedance of some air pollution standards in cities such as Angren, where the annual mean standards for sulfur dioxide, carbon monoxide, ammonia and ozone were exceeded in 2017 and 2018 by factors of 1.1–1.1, 1.0–1.3, 2.0–1.3 and 2.0–2.2, respectively.

In Bekabad, the annual mean air quality standards for nitrogen dioxide and ozone were exceeded in 2018 by factors of 1.3 and 1.1 respectively, while in Tashkent, the annual mean standard for ozone was exceeded in 2017 by a factor of 1.1, while the exceedance for nitrogen dioxide decreased from a factor of 1.3 in 2017 to no exceedance in 2018.

In Chirchik, the annual mean air quality standards for ozone and ammonia were exceeded in 2018 by factors of 1.2 and 1.3 respectively.

In Almalyk, the annual mean air quality standards for sulfur dioxide were exceeded in both 2017 and 2018 by a factor of 1.1.

In Fergana the annual mean air quality standard for ozone was exceeded by a factor of 2.7 in 2018.

Compared with WHO and EU air quality standards, the air quality standards in Uzbekistan (table 8.1) are the same for $NO_2$ and ozone, more stringent for CO (by a factor of 2) and less stringent for $SO_2$ (by a factor of 1.5). For $PM_{10}$ and $PM_{2.5}$, no air quality standards are stated in the Sanitary Rules and Norms in Uzbekistan. In the period 2004–2010, monitoring of $PM_{10}$ and $PM_{2.5}$ was performed in the framework of scientific investigations and, from August 2011, Uzhydromet started to monitor $PM_{10}$ and $PM_{2.5}$ in the ambient air in Tashkent City in the framework of a joint project with WHO and the German Federal Environment Agency, using modern equipment with automated change of filters. The results for the years 2012–2014 show that the $PM_{10}$ concentrations were slightly above the WHO interim target 2 (2.5 times higher than the WHO Air Quality Guideline) and the $PM_{2.5}$ concentrations followed the same pattern (slightly above interim target 2 and 2.5 times higher than the WHO Air Quality Guideline).

An important part of the air pollution by dust particles in Uzbekistan is due to natural causes. Natural emissions of aerosols to the atmosphere by sandstorms from the Karakum and Kyzylkum Deserts and from dry parts of the Aral Sea, which transport dust from the western to the eastern part of the country, and also transboundary air pollution by dust from neighbouring countries, cause high background levels of dust.

**Box 8.2: Monthly mean concentrations of air pollutants in selected cities, 2018**

For the cities of Almalyk, Angren, Bekabad, Chirchik and Tashkent, a monthly bulletin (Akhborot) is issued by Uzhydromet in which, for the most important air polluting substances, the possible exceeding factor (fraction of the MAC value based on monthly mean measured values) is determined.

For the year 2018, some monthly exceedances of standards are:

Almalyk: sulfur dioxide (factor of 1.2 max), carbon monoxide (factor of 1.2 max);
Angren: carbon monoxide (factor of 1.2 max), ozone (factor of 1.1 max);
Bekabad: nitrogen dioxide (factor of 1.5 max),
Chirchik: ammonia (factor of 1.6 max);
Tashkent: nitrogen dioxide (factor of 2.1 max), dust (factor of 2.4 max), carbon monoxide (factor of 1.6 max);
Fergana: ozone (factor of 2.0 max.)

*Impact of air pollution on human health*

In the urban and industrialized areas, exposure to air pollution may lead to health consequences for the population. In the 2018 World Air Quality Report by the Swiss company AirVisual, regions and cities in the world are ranked by the average yearly $PM_{2.5}$ concentration ($\mu g/m^3$). In the world capital city ranking, Tashkent (34.3 $\mu g/m^3$) is in 15th position, between Sarajevo and Skopje. For reference, the WHO Air Quality Guideline for $PM_{2.5}$ is <10 $\mu g/m^3$.

Almost 2 million people in the western part of Uzbekistan (Republic of Karakalpakstan and Khorezm Oblast) experience the direct influence of air pollution by dust blown up from the dried bed of the Aral Sea. High winds carry an estimated 15 million to 75 million t/y of contaminated sand and dust. This dust contains salts, pesticides and heavy metals, and studies and analysis of public health have shown increased morbidity rates due to diseases such as bronchitis, asthma, anaemia, heart diseases and certain types of cancer that are relatively high in these regions. Observation posts to measure $PM_{10}$ and $PM_{2.5}$ dust fractions have been in operation in the period 2004–2010, and in the period 2012–2014 in Tashkent, to obtain more information about the air quality and to monitor the effects of mitigating measures to stabilize the former sea bottom.

The annual mortality rate (per 100,000 inhabitants) attributed to household and ambient air pollution in Uzbekistan is estimated by WHO at 81.1 in 2016. The rates of most EU countries are under 40, with the exception of Romania (59.3) and Bulgaria (61.8). Indoor air pollution is responsible for 20 per cent of the mortality rate attributed to household and ambient air pollution in Uzbekistan.

*Impact of air pollution on livestock and biodiversity*

The concentrations of most air polluting substances are highest in industrial and populated areas, where no big concentrations of cattle are present so, in general, the impact on livestock is low. Dust and air pollution (by ammonia, methane, endotoxins) inside animal buildings, caused by indoor breeding, generally has more effect on livestock and domestic animals than outdoor pollution. The big exception in Uzbekistan is the western part of the country that is strongly influenced by the dust emissions from the dried bed of the Aral Sea.

The shrinking Aral Sea has led to dust storms that have caused drier soil, salinization of soil, less vegetation and a decrease in clouds and precipitation. Besides the health effects on the population, strong effects have also been found on the livestock, vegetation and biodiversity in the area. Vegetation in the area has been reduced by 50 per cent and six million hectares of agricultural land have been destroyed.

The Aral Sea disaster has increased the problems of desertification and erosion in adjacent parts of the Aral Sea region in Uzbekistan, especially in areas where water shortage and overgrazing are already a problem.

## 8.2    Trends in air emission levels

*Cooperative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)*

Uzbekistan is not a party to the Convention on Long-Range Transboundary Air Pollution (CLRTAP). It has not acceded to the Convention's Protocol on the Long-term Financing of the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP Protocol). In the last few years (2015 and 2018), workshops have been held in Tashkent on emission inventories, jointly organized by ECE with national counterparts, to help develop good quality and accurate emission inventories. Internationally accepted methodologies under the Convention have been compared with existing national methodologies and recommendations have been made on the steps towards accession to the Convention by Uzbekistan.

In May 2018, emission data for Uzbekistan in the official EMEP domain until 2016 have been estimated, calculated and submitted to the (EMEP) Centre on Emission Inventories and Projections by the Meteorological Synthesizing Centre West (MSC-W) (hosted in the Norwegian Meteorological Institute, Oslo) (table 8.6).[22] The Centre on Emission Inventories and Projections collects emissions and projections of acidifying air pollutants, heavy metals, particulate matter and photochemical oxidants from parties to CLRTAP. Submitted inventories are then reviewed by nominated experts.

In 2019, SCEEP released emission data on the emission of air polluting substances that are based on inventories prepared by its Centre for Specialized

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[22] MSC-W provided emission estimates for Uzbekistan as part of the gap-filling procedure; the estimated emission data are then used as input in the EMEP model.

Analytical Control on Environmental Protection (table 8.7).

For $SO_2$ emissions, there are considerable differences between data submitted to EMEP by MSC-W and data provided by SCEEP. Stationary source emissions of $SO_2$ are 3–10 times higher in the SCEEP data than in the submission to EMEP. Emission data for $SO_2$ from SCEEP indicate that $SO_2$ emissions are relatively high, partly due to refinery emissions and the use of coal in electricity production. $SO_2$ emissions from electric power plants are in the range of 45–60 Gg/y in the years 2010–2018.

For $NO_x$, the differences in the emission data between EMEP and SCEEP are less substantial.

Emission data provided by SCEEP for NMVOCs and $NH_3$ are not complete and lack emission factors for stationary surface sources that are used in the EMEP modelling.

$PM_{10}$ and $PM_{2.5}$ are calculated by MSC-W as there were no measurements of these fractions, except in the western part of Uzbekistan.

NMVOC emissions for 2017 (mainly hydrocarbons) are estimated by SCEEP to be around 200 Gg/y.

$NH_3$ emissions, mainly from agricultural sources (fertilization, animal husbandry), are estimated/calculated by MSC-W to be in the range of 200–250 Gg/y. The other sectors have hardly any $NH_3$ emissions.

With regard to trends in emissions, emission data that are presented by SCEEP show, in general, a steadily rising level for most emissions ($SO_2$, $NO_x$, TSP) from 2009 to 2014, with a possible slowing of growth in emissions and some decrease for $SO_2$ and TSP in the last few years. Data as presented by MSC-W show a decrease for some important emissions ($SO_2$, $NO_x$, NMVOCs, CO) but an increase for some other substances ($NH_3$, PM).

Large sources, such as traffic and electric power plants, have a great impact on emission levels as fuel use is an important factor. Table 8.8 shows the distribution of air emissions by sector for $SO_2$, $NO_x$ and TSP in 2016.

*Ammonia*

Ammonia ($NH_3$) emissions have been increasing since 2005 according to the estimation of MSC-W (table 8.6), due to the rapid growth of animal husbandry that has led to a strong rise in the number of domestic animals. The total emission is caused mainly by manure management in the agricultural sector. Industrial emissions and emissions from other sectors (wastewater treatment) are relatively low and hardly contribute (less than 1 per cent) to the total $NH_3$ emission.

**Table 8.6: Emission trends, 2000, 2005–2016, Gg**

| | 2000 | 2005 | 2006 | 2007 | 2008 | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 176 | 135 | 130 | 107 | 93 | 84 | 84 | 75 | 66 | 56 | 47 | 38 | 29 |
| NOx | 223 | 200 | 204 | 202 | 199 | 195 | 194 | 191 | 188 | 185 | 182 | 179 | 177 |
| $NH_3$ | 151 | 175 | 183 | 186 | 193 | 203 | 212 | 218 | 224 | 230 | 236 | 242 | 248 |
| NMVOC | 183 | 144 | 141 | 138 | 138 | 141 | 139 | 134 | 130 | 125 | 121 | 116 | 112 |
| CO | 740 | 594 | 580 | 573 | 568 | 594 | 576 | 560 | 544 | 527 | 511 | 494 | 478 |
| $PM_{2.5}$ | 15 | 16 | 17 | 18 | 17 | 19 | 19 | 20 | 20 | 21 | 21 | 22 | 22 |
| $PM_{10}$ | 20 | 22 | 23 | 25 | 24 | 27 | 28 | 28 | 29 | 30 | 31 | 32 | 32 |

*Source*: MSC-W, May 2018.

**Table 8.7: $SO_2$, $NO_x$ and TSP emissions, 2009–2016, Gg**

| | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 |
|---|---|---|---|---|---|---|---|---|
| $SO_2$ | 243.2 | 254.9 | 261.9 | 268.6 | 306.8 | 329.3 | 319.0 | 295.1 |
| NOx | 175.0 | 164.0 | 167.2 | 178.5 | 224.3 | 232.5 | 246.2 | 247.7 |
| TSP | 138.2 | 117.4 | 123.5 | 176.6 | 199.5 | 188.8 | 179.3 | 164.0 |

*Source:* State Committee on Ecology and Environmental Protection, 2019.

### Table 8.8: SO₂, NOₓ, TSP emissions by sector, 2016, Gg

|  | SO₂ | NOx | TSP |
|---|---|---|---|
| Electricity, gas* | 149.0 | 77.5 | 74.9 |
| Industry | 123.6 | 11.2 | 63.3 |
| Transport and storage | 21.9 | 156.9 | 15.8 |
| Other | 0.6 | 2.1 | 10.0 |
| **Total** | **295.1** | **247.7** | **164.0** |

*Source:* State Committee on Ecology and Environmental Protection, 2019.
*Note:* * Natural gas treatment (flares).

#### *Heavy metals*

Heavy metals are emitted by the metallurgical industry and mining industry, coal-fired power plants, galvanic companies and other industries. Table 8.9 shows emissions of three heavy metals from stationary sources as presented by Meteorological Synthesizing Centre East (MSC-East, based in Moscow) (expert estimates).

The EMEP Centre on Emission Inventories and Projections estimates that most of the anthropogenic deposition of heavy metals in Uzbekistan is caused by transboundary air pollution from neighbouring countries. For lead, the contribution of sources from Uzbekistan is estimated at 23.8 per cent, for cadmium, 25.3 per cent and for mercury, 30 per cent.

The emission data estimated by MSC-East show a decrease of 90 per cent for the lead emissions in the period 1990–2012. For cadmium and mercury emissions, no relevant changes were assessed, due to a lack of reliable data.

SCEEP did not provide data on lead, cadmium and mercury emissions.

The use of leaded gasoline ceased in Uzbekistan in 2008–2009.

#### *Persistent organic pollutants*

Persistent organic pollutants (POPs) are not produced in Uzbekistan. There are, however, stockpiles of obsolete pesticides.

The sources of emissions of unintentionally produced POPs (dioxins and furans) to air in Uzbekistan are metallurgical enterprises, hydroelectric and thermal power plants and uncontrolled combustion of waste and fuels, mainly in rural areas. The rural population often still uses biofuel (firewood and cotton stalks) for cooking and heating purposes. In addition, the uncontrolled combustion of MSW is an important source of polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/Fs) emissions to air.

Due to the important role of agricultural (cotton and food) production in Uzbekistan, the use of pesticides has been very high in the past. As a result of restructuring in the agricultural and economic sectors, the use of pesticides has been significantly reduced over the last decade (chapter 13). According to MSC-East, in contrast with the emissions and deposition of heavy metals, the greater part of emissions and deposition of POPs originates from national and local emissions, but for substances such as benzo(a)pyrene (B(a)P), the transboundary air pollution from other countries is more important. Secondary emissions (blown up dust) are another source of POPs in Uzbekistan.

Emission data for some POPs are shown in the country-specific report for Uzbekistan by MSC-East. An expert estimate of the emission levels and deposition of POPs in Uzbekistan is presented in tables 8.10 and 8.11.

### Table 8.9: Emissions of Pb, Cd and Hg, 1990, 2012, tons

|  | Pb | | Cd | | Hg | |
|---|---|---|---|---|---|---|
|  | **1990** | **2012** | **1990** | **2012** | **1990** | **2012** |
| Emissions | 1 870 | 185 | 3.4 | 3.3 | 6.0 | 5.9 |

*Source*: MSC-East (ru.msceast.org/tables/UZ_table_russ.pdf).

### Table 8.10: Emissions of persistent organic pollutants, 1990, 2012

|  | B(a)P (t) | | PCDD/Fs ( g TEQ) | | HCB (kg) | | PCB-153 (kg) | |
|---|---|---|---|---|---|---|---|---|
|  | **1990** | **2012** | **1990** | **2012** | **1990** | **2012** | **1990** | **2012** |
| Emissions | 0.92 | 0.92 | 132.00 | 132.00 | 1.00 | 1.00 | 50.00 | 12.00 |

*Source:* MSC-East (ru.msceast.org/tables/UZ_table_russ.pdf).

**Table 8.11: Deposition of persistent organic pollutants, 1990, 2012**

| | B(a)P (t) | | PCDD/Fs ( g TEQ) | | HCB (kg) | | PCB-153 (kg) | |
|---|---|---|---|---|---|---|---|---|
| | **1990** | **2012** | **1990** | **2012** | **1990** | **2012** | **1990** | **2012** |
| National deposition | 129.3 | 155.4 | 259.6 | 248.3 | 0.2 | 0.2 | 19.1 | 4.6 |
| Deposition from other countries | 463.2 | 1 099.8 | 169.6 | 158.9 | 10.2 | 2.3 | 15.1 | 3.3 |
| Intercontinental (outside EMEP territory) deposition | .. | .. | 91.9 | 68.8 | 2 247.7 | 312.4 | 36.0 | 6.0 |
| Secondary sources | 58.0 | 176.5 | 756.8 | 681.3 | 5 236.1 | 600.6 | 137.0 | 35.9 |

*Source:* MSC-East (ru.msceast.org/tables/UZ_table_russ.pdf).

### *Ozone-depleting substances*

Since 2002, the consumption of chlorofluorocarbons (CFCs) in Uzbekistan has ceased. The consumption of all ODSs in Uzbekistan has been reduced from 675 tons in 1993 to 1.8 tons in 2009.

The baseline for ODS consumption in Uzbekistan was set at 74.7 ODP tons (1989 HCFC consumption). In 2013, consumption had increased to 4.6 ODP tons (100 per cent HCFCs) and in 2016 to 4.68 ODP tons. In 2017, it decreased to 0.87 ODP tons (a reduction of 98.8 per cent from baseline) (table 8.12), due mainly to the ending of illegal imports of HCFC-22. A slight increase to 2.53 ODP tons was observed in 2018.

From 2013 to 2018, the project "Initial implementation of accelerated HCFC phase out in the CEIT region" was carried out by SCEEP, the Global Environment Facility (GEF) and United Nations Development Programme (UNDP).

By the 2018 Resolution of the Cabinet of Ministers No. 17, Uzbekistan revised its procedure for the importation of ODSs into the country. The revised list of products, for which a permit from SCEEP is no longer required, contains aerosols in cosmetic products, domestic chemicals and insulation panels, assuming that ozone-friendly analogues are already used.

## 8.3 Performance and gaps in air monitoring networks

The air monitoring network comprises 63 fixed stations located in 25 cities and industrial centres in the country. The observations are performed three times per day, six days per week at fixed stations of Uzhydromet. The methodological management is conducted by the Environmental Pollution Monitoring Service for Air Pollution, Surface Water and Soil of Uzhydromet.

The stations are divided into groups: urban "background" stations in residential areas, "industrial" stations near industrial enterprises, and "transport" stations near motorways or districts with dense traffic (table 4.2). This division is relative because the expansion of city residential areas and location of industrial enterprises mean that it is not easy to clearly define district borders.

There are no automatic monitoring stations in the network. In total, 13 substances are monitored at different locations, including dust (TSP), $NO/NO_2$, $SO_2$, $SO_3$, $O_3$, CO, $NH_3$, phenol, formaldehyde, hydrogen fluoride, chlorine and solid fluorides (table 4.1).

The problems in the air quality monitoring network are the lack of automation, inadequate location of some measuring stations, lack of modern sampling and analytical equipment and poor availability of online information.

The 2018 Resolution of the Cabinet of Ministers No. 970 "On measures to strengthen the material and technical resources of the Centre of Hydrometeorological Service under the Ministry of Emergency Situations of the Republic of Uzbekistan" foresees the establishment of new laboratories, rebuilding and modernization of monitoring stations (automation) and modernization of the analytical equipment of Uzhydromet in the period 2019–2022.

Acquiring technical support for an emission inventory and monitoring is a priority flagged by Uzbekistan at the 2017 meeting of the Task Force for Emission Inventories and Projections of CLRTAP.

The development of monitoring of fine dust ($PM_{10}$ and $PM_{2.5}$) by automatic monitoring equipment for the cities of Angren and Nurabad is ongoing, based on experience gained by Uzhydromet on a project to measure $PM_{10}$ and $PM_{2.5}$ in Nukus and Tashkent from 2011 to 2017.

**Table 8.12: HCFC consumption, 2009, 2013, 2016–2018, ODP tons**

| Baseline (1989) | 2009 | 2013 | 2016 | 2017 | 2018 |
|---|---|---|---|---|---|
| 74.70 | 1.80 | 4.60 | 4.68 | 0.87 | 2.53 |

*Source*: https://ozone.unep.org/countries/profile/uzb.

The growth in the number of stations and measurements of additional air polluting substances generates a challenge to obtain skilled and trained personnel to guarantee solid quality control and quality assurance procedures for adequate monitoring and compliance with international standards, such as organized reference methods, on-the-spot calibrations, equivalence tests and data validation.

## 8.4    Pressures on air quality

*Agriculture*

Crop agriculture in Uzbekistan needs irrigation so it is mostly located near river valleys and oases. Arable land accounts for around 4 million ha of the 20 million ha total agricultural area. Around 50 per cent of the country's land is arid pasture where mainly sheep and goats are held, sometimes with horses, mules and camels. The most important crop is cotton, but, in the last decade, the country has reduced cotton production and increased food production (chapter 13).

The agricultural sector is the largest source (99 per cent) of emissions of $NH_3$, which come mainly from the application of animal fertilizer. Because of the large area on which emissions take place, there are no critical levels of nitrogen deposition.

The application of manure from animal husbandry and the use of mineral fertilizes are the main contributors to agricultural ammonia emissions. Ammonia emissions are calculated by applying emission factors considering the different ways of breeding and manure storage, treatment and application. Ammonia emissions have been increasing since 2005 (table 8.6).

Measures to control ammonia emissions are generally operated in livestock housing and directed towards storage and emissions from slurry. Such measures are not yet widely applied in Uzbekistan.

GHG emissions from the agricultural sector accounted for 9.8 per cent of total GHG emissions in the country in 2010. They increased by 27 per cent from 1990 to 2012, from 17,050 Gg $CO_2$-eq. to 21,648 Gg $CO_2$-eq. (table 7.1). Methane and nitrous oxide are the main components of the GHG emissions in the sector. Enteric fermentation represented, on average, 55 per cent of GHG emissions from agriculture in the period 2008–2012. GHG emissions from the agricultural

sector have been increasing slightly since 2005 (figure 7.5).

*Energy sector*

Power and heat generation

According to ESCAP data, in 2016, 80 per cent of power generation was based on fossil fuels and 20 per cent on hydropower. For power generation in TPPs, 90.8 per cent comes from natural gas, 5.3 per cent from mazut and 3.9 per cent from coal (table 12.5(a)). According to national data, on average, 11.17 per cent of power generation in 2013–2018 came from hydropower (table 12.5(b)).

The TPPs run on steam turbine technology with old installations and relatively low efficiencies and they are sometimes in poor condition. The power plants are not strategically situated, as 70 per cent of the power generation occurs in the north while over 90 per cent of the gas production is in the south.

In 2016, 19 per cent of the emissions of $SO_2$ and 70 per cent of the emissions of $NO_x$ from stationary sources in the country were caused by TPPs.

New developments

Modernization of old TPPs has started and PV solar energy facilities will be built with a total capacity of 1 GW. Construction of new TPPs in Turakurgan City, Bukhara Oblast and Surkhandarya Oblast and extension of a second combined-cycle gas turbine at Navoiy are planned to be commissioned. The EBRD, together with the ADB, have invested in 900 MW combined-cycle gas turbines at the existing Talimarjanskaya TPP.

The Government plans to build a nuclear power station (chapter 12).

In 2020, the installed capacity of hydropower should be doubled (from 2 GW to 4 GW) by the rehabilitation of 14 existing and construction of 18 new facilities. Also, plans for wind energy and the use of biogas will be developed. The target is to raise the share of renewable energy in total generating capacity to 19.7 per cent by 2025.

All these developments will increase the efficiency of power generation, and should, in spite of the growth in electricity production, lead to a net decrease in the use of fossil fuels and help to reduce air pollution of $SO_2$, $NO_x$ and dust emissions.

### Refineries

In 2019, there are three oil refineries in the country, Ferghana, Alty-Arik and Bukhara, with a total annual capacity of around 11 million tons of crude oil. These refineries use crude oil and condensate from natural gas as feedstock but operate below their capacity, due to a decrease in oil production. A new refinery has been commissioned in 2018 by Jizzakh Petroleum, with an aim to produce clean-burning gasoline, diesel and jet fuel (Euro-V quality motor fuels).

Flaring of waste gas (table 12.8) is one of the largest sources of the $SO_2$ and the $NO_x$ emissions in the country, while leakage is the largest source of NMVOC emissions. The existing refineries in Uzbekistan are planned to be upgraded, with the requirement to install desulfurization units, which should result in improvement of the quality of the fuels produced, to Euro-5 standards; it should also result in reduced air pollution from the facilities through the reduction of $SO_2$, $NO_x$, VOC, $H_2S$ and PM emissions. Uzbekneftegaz is working to develop a gas-to liquid (GTL) refinery in the south-east of Uzbekistan with a capacity of 3.6 billion $m^3$ per year to produce 1.5 million tons per year of fuels and other products ("clean diesel").

### *Industry, including mining*

The industrial sector significantly contributes to GDP and there is considerable potential for further growth, due to the rich stocks of minerals and fossil fuels in the country.

The emissions of sulfur dioxide, hydrocarbons and fine dust from industrial sources are relatively high. In the permits, installation-specific emission limit values (ELVs) are defined by calculating from the MAC values in the defined sanitary zone. This approach generally leads to less stringent emission limits than general ELVs based on internationally defined best available techniques (BAT) for installations (developed under CLRTAP or the EU Industrial Emissions Directive).

The industrial emissions of $SO_2$, $NO_x$, and TSP account for 40 per cent, 5 per cent and 38 per cent of the total national emissions respectively. In industrial cities (Angren, Almalyk, Fergana, Navoiy), the influence of emissions from industry and mining on air quality leads to relatively high APIs.

### *Transport*

The transport sector causes 90 per cent of the CO emissions, 60 per cent of the $NO_x$ emissions, an estimated 17 per cent of the emissions of particulate matter ($PM_{2.5}$) and less than 10 per cent of the $SO_2$ emissions. Transport also accounts for 12 per cent of the GHG emissions ($CO_2$, $CH_4$, CO, $N_2O$, $NO_x$, NMVOCs) in the Fuel Combustion category.

For the last few years, many private cars and buses use LPG (propane) and/or CNG as a fuel. According to the Ministry of Transport, in early 2019, 50 per cent of passenger cars and trucks use CNG (methane), 36.6 per cent use gasoline, 13 per cent use LPG and 0.4 per cent use diesel (gasoil). The Government promotes the use of CNG over LPG, which is promoted for use in domestic food processing.

For gasoline and diesel, Euro-3 has come into force since 2018 (350 mg S/kg for diesel and 150 mg S/kg for gasoline) while Euro-4 has been planned from 2019.

The planned upgrading of the domestic refineries and building of a new refinery should make it possible to fulfil the desulfurization requirements, to reduce $SO_2$ emissions from the transport sector by a factor of 5–10 and reduce fuel imports.

According to the Ministry of Transport, the average age of the vehicle fleet is 8 years for light duty vehicles, 15 years for trucks and 10 years for buses.

Because of the rapid growth of the vehicle fleet and the age of many vehicles, additional measures are required to ensure that emissions of $NO_x$ decrease, to achieve an improvement in urban air quality. Policy measures have been taken that promote the greening of transport by incentives for cleaner fuels such as CNG and LPG, but other measures, such as the use of hybrid or electric cars and promotion of clean urban public transport, have not been sufficient. A positive development is that, from January 2019, zero customs duty is imposed on vehicles that operate solely on an electric motor.

In 2018, a Chinese manufacturer signed a preliminary agreement with the Ministry of Innovation Development on construction of a new electric car plant in Uzbekistan.

Uzbekistan prevents the importation of cars of foreign production for protectionist reasons, by imposing

heavy customs duties. Cars are manufactured in Uzbekistan under joint ventures between Uzbek and foreign companies, for domestic use and for export. From 2019, Euro-4 emission standards for light vehicles and Euro-IV standards for heavy duty vehicles must be implemented.

As of January 2018, there is a new procedure for a mandatory technical inspection of cars. Validation of compliance of engine exhaust gas emissions to the MACs for CO and hydrocarbons is included in the inspection. For cars fuelled by LPG or CNG, the technical condition of the gas cylinders will be inspected.

### Housing

Residential buildings are the largest energy consumer. More than 50 per cent of primary energy is spent on energy supply to the buildings sector. The specific energy consumption per $m^2$ of living area in Uzbekistan is almost three times higher than in European countries with similar climatic conditions (e.g. Spain).

Around 40 per cent of residential buildings have access to district heating, according to the 2013 report of the Centre for Energy Efficiency in Moscow. Maintenance of the district heating sector has been neglected for a long period, so the central heating services are not reliable; in some cities, such as Andijan, they have stopped entirely. This causes people to look for inadequate alternatives, such as electric heating or coal- or wood-burning stoves. During the period when heating is necessary, emissions from private households using alternative heating have an impact on the air pollution levels in the cities. In cities and in rural areas, the use of coal and wood for space heating causes unfiltered emission of $SO_2$, dust and PAHs from low-positioned sources, with significant adverse influence on the local ambient air quality.

To improve energy efficiency, quality and availability of heating services, the Government established the Ministry of Housing and Communal Utilities in 2017. There are 33 district heating companies in the country, most of them transferred to the Ministry of Housing and Communal Utilities. The 2017 Programme for Development of the Heat Supply System for the period 2018–2022 (2017 Resolution of the President No. 2912) is carried out with financial support from the World Bank. Better and more efficient district heating installations are expected to improve the air quality in urban and in rural areas.

**Photo 8.1: Cooking *plov* on the streets of Bukhara**



*Photo credit:* Ms. Alessandra Fidanza

Due to the low access to district heating, specific energy consumption from housing in Uzbekistan depends, to a large degree, on the efficiency of space heating equipment used in individual houses. The energy-saving potential in this sector is high, but is not easy achievable, due to the low energy prices that make energy-saving measures unattractive (e.g. long pay-back periods for investments).

There is no financial stimulation (subsidies) to remove unprofitable expenses to promote reconstruction and insulation of private houses and other buildings and more energy-efficient equipment.

The share of the population that used solid fuels such as wood, coal or dung for cooking was 5.5 per cent in urban areas and 25.2 per cent in rural areas (11.6 per cent nationwide) in 2010, and the situation has unlikely improved since then.

### Aral Sea

The desiccation of the Aral Sea has led to dust and salt storms in the western part of Uzbekistan, with up to 10

major storms annually. Estimations of the quantity of dust that is airborne vary from 15 million to 75 million tons per year. The bigger dust particles have been found at distances of 500 km from the source, while fine dust (<$PM_{2.5}$) can remain in the atmosphere much longer and can temporarily form a high proportion of the background dust concentration over large distances.

## 8.5 Legal, policy and institutional framework

### *Legal framework*

The 1996 Law on Ambient Air Protection covers the right of citizens to clean air and their obligations to take care of the atmosphere, state management in the field of air protection (responsibilities of SCEEP and the Ministry of Health), standards on air quality, maximum permissible emissions of pollutants from stationary sources, industrial air consumption, standards for emissions from mobile sources (vehicles and other equipment), quality of fuels, production and use of chemicals, protection of the ozone layer, spatial planning for enterprise construction and of waste disposal facilities, responsibilities of enterprises (in terms of monitoring and techniques to reduce emissions) and levies for emissions to the air and damage caused. According to the Law, new activities in industrial areas or areas with dense traffic require an SEE/EIA and a health assessment.

In the last 20 years, amendments and additions to the Law have been adopted, the last time in 2019 (referring mostly to renewed definition of powers of the Government and SCEEP). Since 2016, a set of new amendments is under discussion. The draft contains: articles on transboundary air pollution and supplementary standards for the implementation of economic incentives to reduce air pollution; new requirements for the control of harmful actions on the ozone layer and of climate change; and step-by-step introduction of more stringent requirements to meet ELVs for stationary and mobile sources.

The Ministry of Health has issued health-based air quality standards as MACs (SanPiN RUz No. 0293-11, List of hygiene standards regarding MAC values of air-polluting substances in populated areas in the Republic of Uzbekistan).

For technical equipment, many GOST-R standards and certificates are used (e.g. GOST R EH 13528-3-2010 and GOST R EH 13528-2-2010).

The Law on Ambient Air Protection is relevant for GHG emissions reduction, with several articles relating to this. Specific air-related articles in other

laws (1997 Law on Rational Use of Energy, 1993 Law on Water and Water Use, 2000 Law on Ecological Expertise, 1992 Law on Nature Protection) are also relevant legislation on protection of ambient air.

Uzbekistan announced introducing a ban on the import of motor fuels of classes below Euro-3 from 2020 and below Euro-4 from 2023. Uzbekistan intends to ban the import of vehicles of categories M and N equipped with engines that do not meet Euro-4 requirements starting from 2022 (2019 Decree of the President No. 5863).

### *Policy framework*

General policy documents on protection of the environment and sustainable development in Uzbekistan contain many air-related elements, while there is no specific policy document on air protection in Uzbekistan.

### Concept on Environmental Protection until 2030

The Concept on Environmental Protection until 2030 (2019 Decree of the President No. 5863) provides for the following measures on air protection:

- Use of dust and gas capture systems at stationary sources of pollution;
- Enrichment of coal mined in Uzbekistan in order to increase its calorific value and reduce ash content;
- Stimulating measures to improve the energy efficiency of buildings and use of cleaner fuels in households;
- Transfer of the transport fleet to CNG and electric traction.

### Programme of Actions on Environmental Protection for the period 2013–2017

The Programme of Actions on Environmental Protection for the period 2013–2017 provided that air protection would be strengthened by gradually sharpening emission standards and the use of modern abatement techniques, with assistance through international cooperation. The Programme envisaged deeper desulfurization in refineries and chemical plants, gas utilization facilities in oil and gas refineries (instead of flaring), increasing energy efficiency in electricity production by introducing combined-cycle plants, and renewable clean energy sources in the cotton industry. It also envisaged the development of the draft amendments to the Law on Ambient Air Protection. It also provided for the development of a regulatory document on the method for the

determination of fine particulate matter ($PM_{10}$ and $PM_{2.5}$) in ambient air. Improving the effectiveness of Uzbekistan's interaction with the international community in the implementation of the requirements of international treaties was also planned.

As at early 2019, the permitting processes in Uzbekistan still follow the traditional approach (SEE, MAC values and sanitary zones that lead to installation-specific ELVs). The sharpening of emission standards by using modern abatement techniques based on guidance documents from CLRTAP or the EU is not yet implemented in the permitting processes. Deeper desulfurization in refineries has been planned but not yet implemented. The draft amendments under which the measurement of $PM_{10}$ and $PM_{2.5}$ in ambient air can be regulated are not yet adopted.

### Programme of Environmental Monitoring for the period 2016–2020

The Programme of Environmental Monitoring for the period 2016–2020 (2016 Resolution of the Cabinet of Ministers No. 273) defines the responsibilities of ministries, institutions, khokimyats and enterprises for various types of environmental monitoring. For air protection, this mainly concerns Uzhydromet, SCEEP's Centre for Specialized Analytical Control on Environmental Protection (CSAC) and enterprises.

### Persistent organic pollutants

Since Uzbekistan is not a party to the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade and joined the Stockholm Convention on Persistent Organic Pollutants rather recently (in 2019), there are no national implementation plans (NIPs) or specific policy documents on these matters.

### *Sustainable Development Goals and targets relevant for this chapter*

The current stand of Uzbekistan in relation to air pollution aspects of targets 3.9 and 11.6 of the 2030 Agenda for Sustainable Development is described in box 8.3.

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**Box 8.3: Targets 3.9 and 11.6 (air pollution aspects) of the 2030 Agenda for Sustainable Development**

**3 GOOD HEALTH AND WELL-BEING**

**Goal 3: Ensure healthy lives and promote well-being for all at all ages**
**Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination**

Uzbekistan's national target 3.9 and national indicator 3.9.1 differ from the respective global ones. While the difference in the wording of the national target is not significant, the change of the indicator is. Whereas the global indicator 3.9.1 is "Mortality rate attributed to household and ambient air pollution", the national indicator 3.9.1 is "Mortality rate attributed to the toxic effect of chemicals per 100,000 population", the definition being somewhat vague without a good rationale for it.

It is evident that, in 2019, Uzbekistan is not ready to produce the global indicator 3.9.1 because of the lack of information about $PM_{10}$ and $PM_{2.5}$ levels. Data on $PM_{10}$ and $PM_{2.5}$ concentrations are available only for Tashkent City for the years 2012–2014. These data show a slight exceedance of the Interim-2 Targets of WHO, which means a factor 2.5 exceedance of the WHO Air Quality Guidelines. However, in addition to difficulties with the production of the indicator on the mortality rate attributed to household and ambient air pollution, the non-adoption of this global indicator may show that the country is not willing to gather and disclose data on the mortality attributed to air pollution.

Long-term effects of air pollution on morbidity (asthma, bronchitis) have been investigated in a few studies (in the United States and EU) and the results of health impact assessments of air pollution are not easy to transfer to other countries as climate factors, smoking habits and other social factors also play a role. Concentration response information for morbidity effects of air pollution are also known for China from United States–Chinese research (on $PM_{10}$, $SO_2$, $NO_2$ and asthma, cardiovascular disease related to hospital admissions, respiratory symptoms and hypertension).

In Uzbekistan, the annual mortality rate attributed to household and ambient air pollution in 2016 is estimated by WHO at 81.1 cases per 100,000 population ranking the country fifth in the WHO European Region (average of 36.3 per 100,000 population). Air pollution by particulate matter is the most important factor, but other components ($NO_2$, $SO_2$, PAH, $O_3$) also contribute.

Exposure of populations to high levels of air pollution leads to the additional burden of diseases and increased economic costs.

According to a comprehensive 2016 assessment by the World Bank and others, PM pollution causes approximately 19,000 premature deaths in Uzbekistan and costs the economy more than US$800 million annually in terms of total welfare losses (1.24 per cent GDP equivalent). Total forgone labour output is US$17 million.

**11 SUSTAINABLE CITIES AND COMMUNITIES**

**Goal 11: Make cities and human settlements inclusive, safe, resilient and ecological sustainable**
**Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management**

Uzbekistan has adopted global indicator 11.6.2 (Annual mean levels of fine particulate matter (e.g. $PM_{2.5}$ and $PM_{10}$) in cities (population weighted)) as its national indicator, without changes.

In Uzbekistan, two monitoring posts (Nukus and Tashkent) measuring $PM_{10}$ and $PM_{2.5}$ have operated in recent years. Initial data from the two cities indicate that $PM_{10}$ and $PM_{2.5}$ levels are high in comparison with most of the other cities in the region. The air quality in Nukus is affected by dust storms from the Aral-Kum Desert, while in Tashkent, various combustion sources may be predominant.

In view of the scarcity of ground-level data for PM, remote sensing via satellite, combined with modelling and existing surface measurements, has been used for the assessment of population exposure at the country level.

Although $PM_{10}$ and $PM_{2.5}$ data are scarce in Uzbekistan, based on the measured exceedance of the MAC values for dust described, the probability that WHO Air Quality Guidelines for the mean concentrations of $PM_{10}$ are exceeded in cities in Uzbekistan is high. In a few cities, the annual dust concentration exceeded the (national) standard of 150 $\mu g/m^3$ (figure 8.1).

In the coming years, establishing a comprehensive network for the measurement of fine PM is an urgent task.

**Figure 8.1: Annual mean dust concentration in selected cities, 2017–2018, $\mu g/m^3$**
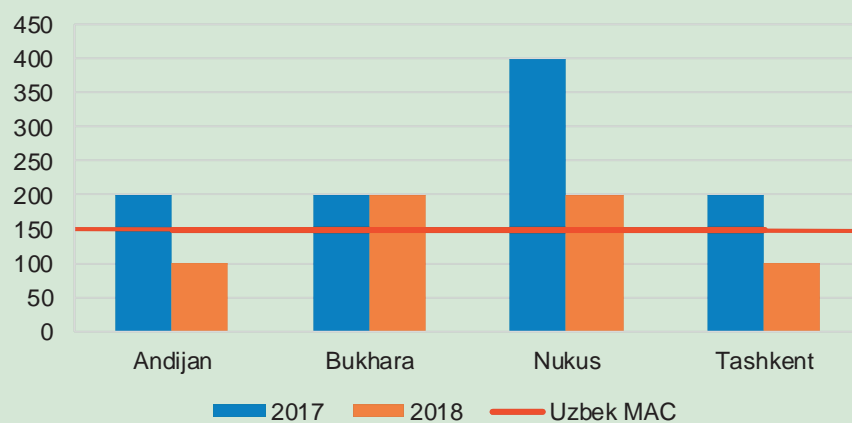


*Source*: Uzhydromet, 2019.

No substantial measures are taken to reduce air emissions from industry, traffic, households and services in order to reduce the mortality and morbidity rates from stroke, heart disease, lung cancer and chronic and acute respiratory diseases such as asthma.

BAT to abate dust emissions as described in guidance documents under CLRTAP or the EU Industrial Emissions Directive are not applied in Uzbekistan. While the need to enhance the monitoring of PM is clearly understood in Uzbekistan, the application of BAT is not promoted and emission reduction plans for air polluting industrial sectors are not developed.

*Institutional framework*

SCEEP is the primary environmental regulating institution in Uzbekistan and the overall coordinating authority for air management. It is subordinate to the Cabinet of Ministers and responsible for development and enforcement of environmental policy at national, regional (oblast) and local (district) levels. SCEEP has a central body in Tashkent, regional branches, and institutions providing scientific and technical support. Local executive authorities (khokimyats) work with the local and regional branches of SCEEP on environmental protection issues (including air protection) and spatial planning.

The tasks of the Centre for Specialized Analytical Control on Environmental Protection (CSAC) under SCEEP are:

- Monitoring and control of sources of environmental pollution and analytical (laboratory) control;

- State control over compliance with environmental legislation, including on ambient air;
- Development and implementation of new methods and techniques of analytical activities;
- Emission inventory of stationary sources;
- Compiling electronic databases of the monitoring results, for the purpose of producing newsletters and quarterly reports.

The Centre of Hydrometeorological Service (Uzhydromet) under the Cabinet of Ministers is the main air-quality-monitoring institution (besides its monitoring of radiation, quality of surface water and the usual meteorological data). Uzhydromet also prepares the information on air quality.

Other governmental bodies that are involved in issues related to air protection are:

- Ministry of Health – sanitary rules and norms on air pollution;
- Ministry of Agriculture – emissions from agriculture;
- State Committee on Statistics – emissions data on air-polluting substances;
- JSC Uzbekenergo – emissions from power plants.

The khokimyats can also improve the air quality in their territory by taking measures on spatial planning such as the promotion of clean public transport, construction and use of a cycle lane network, stimulation of cycling by shared bicycle initiatives, improved inspection of cars and stimulation of the use of electric cars.

*Regulatory, economic and information measures*

Permits

Permitting procedures for installations are regulated by the 2014 Resolution of the Cabinet of Ministers No. 14 "On approval of the Regulation on the order of preparation and approval of draft emission limits". Based on the results of inventories of pollution sources and SEE, values to limit environmental impacts are defined (ELVs to air, discharges to water, waste production) for specific installations. These approved installation-specific ELVs are valid for three years.

The ELVs for emissions to air are established in the draft maximum permissible emission. The maximum permissible emission is the mass of pollutant per unit of time that leads to environmental concentrations that do not exceed the MAC values.

SCEEP inspectors verify an installation's compliance with the ELVs established for it, as well as its timely implementation of new environmental measures and standards.

**Photo 8.2: Cycling in the streets of Bukhara**



*Photo credit:* Ms. Alessandra Fidanza

The emission limits defined for specific large combustion plants in Uzbekistan are generally less stringent in comparison with EU emission standards based on BAT.

The Regulation on SEE (2018 Resolution of the Cabinet of Ministers No. 949) in Annex No. 2 divides enterprises into four categories according to the risk level for the environment (from category I (high risk) to category IV (local, i.e. minor) impact). It is striking that large combustion plants with heat capacity ≥300 MW are placed in category II (medium risk), while, in terms of impact, they should be in category I.

All stationary sources of air pollution of categories I and II have to go through permitting procedures at SCEEP on the national level, while stationary sources of categories III and IV (less environmental impact) do so at the regional branches of SCEEP. General binding rules for these installations (ELVs that are generally applicable, legally obligatory and not necessarily taken up in permits) are not used; their use would enhance efficiency and save time, enabling the competent authority to focus on the important installations.

### Technical inspections of vehicles

All registered vehicles must undergo regular obligatory technical inspection that also includes validation of compliance of engine exhaust gas emissions of CO and hydrocarbons. For the many cars that drive on LPG or CNG, inspection of gas cylinders is also obligatory. Technical inspections are carried out by private parties along with bodies of the State Service on Road Safety of the Ministry of Internal Affairs. The frequency of mandatory technical inspections is twice a year for vehicles that transport passengers and once a year for private vehicles.

### Air emission charges

Companies pay charges for emissions of a number of air pollutants (table 3.1). For emissions in excess of permitted amounts, higher charges are due. Nevertheless, the low level of pollution charges suggests that most pollution charge rates are below the level of marginal abatement costs (chapter 3).

### Information

For several cities, (Almalyk, Angren, Bekabad, Tashkent and Chirchik), monthly bulletins (Akhborot) are published by Uzhydromet. However, they are distributed to governmental authorities only (chapter 4).

Yearly reports (Review of the state of air pollution in cities of the Republic of Uzbekistan on the territory of activities of Uzhydromet) are also published by Uzhydromet and disseminated among governmental bodies (chapter 4).

For Tashkent City, daily ecological bulletins are published online by Uzhydromet. In these daily bulletins, mean daily concentrations of sulfur dioxide, nitrogen dioxide, carbon monoxide, phenol, ammonia and hydrogen fluoride and the rate of exceedance of the (daily mean) MAC values at different measuring stations are shown.

The State Committee on Statistics publishes the yearly statistical bulletin about basic indicators on environmental protection, rational use of natural reserves and forestry and hunting, which also contains national data on air polluting emissions, by cities, in total and per substance. Data on emissions to air are based on outcomes of monitoring by SCEEP's Centre for Specialized Analytical Control on Environmental Protection. These data could be used for preparation of a pollutant release and transfer register (PRTR) under the Protocol on Pollutant Release and Transfer Registers to the Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention), though Uzbekistan is not currently a party to either the Convention or the Protocol.

## 8.6    Assessment, conclusions and recommendations

*Assessment*

Uzbekistan has a large agricultural production, but also mining, oil exploration and industrial activities. The steady economic growth in the last decade and the rapid growth of traffic in the cities necessitate serious management of the air pollution and other environmental problems in the country.

The industrial air emissions, which are relatively high for such components as $SO_2$, hydrocarbons and dust, combined with the air-polluting emissions by the growing number of vehicles and the emissions (mainly in rural areas) from domestic heating with firewood and other solid fuels, create severe air pollution in industrial and urban areas, which causes serious nuisance and health problems.

State-of-the-art technical measures to prevent air emissions from industry, such as those described by the Task Force on Techno-Economic Issues of CLRTAP or in EU Best Available Techniques Reference Documents (EU BREFs), are at this moment not prescribed in permits and not applied in Uzbekistan.

*Conclusions and recommendations*

### Air quality standards

Uzbekistan uses MAC levels of pollutants as the normative units for air quality. Air quality standards are based on short-term maximum and daily, monthly and annual mean values, but to evaluate the state of air pollution, specific indexes are used that relate indirectly to the MAC values. Indexes can be used as indicative instruments and for comparison of cities

but, in practice, the use of indexes is not a method that gives a clear picture of the real air quality to enable evaluation of human health risks, as can be achieved by applying standards from international practice in terms of concentrations.

*Recommendation 8.1:*
*The State Committee on Ecology and Environmental Protection, together with the Ministry of Health, should draw up a roadmap to transfer the current air quality assessment to air quality standards based on mean pollutant concentrations according to the internationally accepted practices.*

### Air monitoring

Uzbekistan has a comprehensive air emission monitoring network with 63 fixed posts and measurement of 13 different substances, but developments in the monitoring of some harmful pollutants such as fine dust ($PM_{10}$ and $PM_{2.5}$) by automatic equipment are slow. This prevents Uzbekistan from gathering necessary data for global indicators 3.9.1 (Mortality rate attributed to household and ambient air pollution) and 11.6.2 (Annual mean levels of fine particulate matter (e.g. $PM_{10}$ and $PM_{2.5}$) in cities (population weighted)) of the 2030 Agenda for Sustainable Development. Furthermore, it prevents Uzbekistan from developing adequate measures to address air pollution, especially in the cities and urban centres, in line with target 11.6 of the 2030 Agenda for Sustainable Development. Uzbekistan has established its own national indicator 3.9.1, which is not related to household and ambient air pollution.

*Recommendation 8.2:*
*The Cabinet of Ministers should:*

*(a)     Ensure that the number of parameters measured is increased with $PM_{10}$ and $PM_{2.5}$ for all measuring posts in vulnerable areas, such as cities and near industrial complexes;*
*(b)     Ensure the introduction of legally-binding national standards and limit values for $PM_{10}$ and $PM_{2.5}$;*
*(c)     When sufficient data about the concentrations of fine particulate matter have been collected, initiate the adoption by Uzbekistan of the Sustainable Development Goals global indicator 3.9.1 and ensure that information on the mortality rate attributed to household and ambient air pollution is available to decision-makers and the public.*

### Best available techniques

Uzbekistan does not have a specific national policy document for the protection of ambient air. The strategy for air quality and air protection management can be derived from other strategic documents such as the Programme of Actions on Environmental Protection for the period 2013–2017. Many actions were envisaged in the Programme, among which is the gradual strengthening of ELVs for air emissions by implementing modern abatement techniques.

Nevertheless, emissions of $SO_2$, $NO_x$ and dust by electric power plants, oil and gas refineries and other industries are still relatively high, compared with international standards. Much (sulfur-containing) waste gas from oil and gas production is still flared.

BAT to abate air pollutant emissions as described in guidance documents developed under CLRTAP or the EU Industrial Emissions Directive are not applied in Uzbekistan. The application of BAT is not promoted by Uzbek authorities. Emission reduction plans for air-polluting industrial sectors are not developed.

In this regard, documents produced by CLRTAP's Task Force on Techno-Economic Issues can serve as tools for setting the ELVs based on BAT, as they are specifically developed for countries with transition economies. Use of EU BREFs that have more stringent BAT-based ELVs can be the next step.

*Recommendation 8.3:*
*The State Committee on Ecology and Environmental Protection should promote the application of internationally accepted best available techniques to abate air pollution from industrial sources and seek expertise under the Convention on Long-Range Transboundary Air Pollution for this purpose.*

### Air pollution from the residential sector

Air pollution from the residential sector is an important factor for Uzbekistan's progress in achieving the global and national target 11.6 of the 2030 Agenda for Sustainable Development. Domestic heating is a big source of air pollution in cities in winter. Poor maintenance of district heating installations and the lack of insulation of buildings leads to low energy-efficiency performance. Energy efficiency of houses in Uzbekistan is three times lower than in Western European countries. The use of firewood, coal and other heat sources in individual stoves and furnaces with low emission heights contributes to bad air quality by the emission of fine particulates. The emissions from stoves and furnaces

lead to exceedance of air quality standards (dust, $SO_2$) in winter.

*Recommendation 8.4:*
*The Cabinet of Ministers should:*

*(a)   Stimulate the implementation of measures for energy efficiency in residential buildings, e.g. by enhancing the attractiveness of energy-efficiency measures by guaranteeing a reasonable pay-back period of costs and setting conditions for better technical maintenance of district heating systems;*

*(b)   Promote the use of low-carbon technology (heat pumps, renewables) and cleaner fuels such as natural gas instead of liquid and solid fuels for individual households;*

*(c)   Promote the use of individual heat-use monitoring devices in apartment buildings.*

*Chapter 9*

# *WATER MANAGEMENT*

## 9.1 Water resources

Uzbekistan has favourable conditions for groundwater formation in mountain and intermountain depressions and foothill areas, while, for surface water, the majority of the country lies between two of Central Asia's largest rivers, the Amu Darya and Syr Darya. The two rivers originate in the Pamir and Tien-Shan mountain ranges and chart a north-westerly course towards the Aral Sea.

Extensive canal systems, such as the Amu-Bukhara canal, were built during the Soviet period and have greatly altered water-flow patterns. The Karakum canal, located in Turkmenistan, significantly impacts the natural flow of the Amu Darya.

Artificial lakes and reservoirs have been created, many of which are fed by irrigation run-off. Uzbekistan's largest freshwater lake – Lake Aydar in north-eastern part of the country – was formed as a result of an emergency discharge from the Shardara reservoir (located in Kazakhstan) during the period of severe floods in 1969.

Uzbekistan's water resources are under pressure. A large agricultural demand, growing population, inefficient water use and unfavourable climatic conditions mean that strengthening water management is key to future prosperity.

### *Groundwater*

Throughout Uzbekistan, there are 97 deposits of groundwater, including 19 that are classified as protected natural areas, being zones of fresh groundwater deposits. Of the 19 protected natural areas, 11 are considered as being of national importance and eight of regional (oblast) importance. The natural resources of the Republic of Uzbekistan for fresh and brackish groundwater are estimated at 75.58 million $m^3$/day, which equates to 874.8 $m^3$/s.

The bulk (84.7 per cent) of the groundwater resources are formed in the fold mountain hydrogeological region and total 64 million $m^3$/day (740.8 $m^3$/s) with a salinity concentration of 1 g/l to 3 g/l. The balance of the groundwater deposits, 11.6 million $m^3$/day or 15.3 per cent of all resources, are in the plain regions, with concentrated deposits in the Fergana Valley (29.6 per cent) and the Tashkent Oblast (13.4 per cent).

The groundwater volume for abstraction is approved on an annual basis. In 2017, it was 17.36 million $m^3$/day (200.9 $m^3$/s), of which the total volume abstracted in 2017 was 15.28 million $m^3$/day (176.9 $m^3$/s) or 88 per cent of the approved abstraction volume. Of the groundwater abstracted, 5 million $m^3$/day (34 per cent) is supplied for household and drinking purposes.

There are 119 cities in Uzbekistan, 1,071 urban settlements and 11,088 rural settlements. Of these, 69 cities (58 per cent), 335 urban settlements (31 per cent) and 2,902 villages (26 per cent) are provided with potable water from groundwater reserves. This correlates to 60–80 per cent of the population using groundwater for drinking water purposes.

As at early 2019, there are about 8,900 registered users of groundwater, abstracting from 27,400 operating wells.

Exploration and research continues, with the aim to increase the capacity of using groundwater resources.

### *Surface water*

The water resources of the Aral Sea basin are principally formed in the basins of the two main rivers, the Syr Darya and Amu Darya.

The Amu Darya River is Uzbekistan's largest river and is formed by the convergence of the Panj and Vakhsh Rivers on the south-western border of Tajikistan, near to the south-east tip of Uzbekistan. The Amu Darya River follows a course parallel to, and at times part of, Uzbekistan's southern borders with Afghanistan and Turkmenistan, before heading north through the Republic of Karakalpakstan towards the southern section of the Aral Sea.

The Syr Darya River is formed in the fertile Fergana Valley where the Naryn and Koradaryo Rivers converge. The Syr Darya River then flows west through Fergana Oblast and northern Tajikistan, turns north to cross through Uzbekistan, and then enters Kazakhstan, eventually reaching the northern section of the Aral Sea.

Uzbekistan's third largest river is the Zarafshan River, which flows westward from the mountains of Tajikistan through east and central Uzbekistan. The total river basin covers 4,000 km$^2$ and the river length is 781 km. For the first 300 km, the river flows through Tajikistan, then it enters the Zarafshan Valley, situated in the Samarkand region of Uzbekistan. On entering Uzbekistan, the annual river discharge is 5.3 km$^3$. The river has a number of dams and barrages: Pervomai, Akdarin, Damkhodzhin, Narpai, Karmarin, Shafrikan, Kharkhur and Babkent, and many large and medium-sized canals for irrigation and water supply. Reservoirs, including Tudakul (22,000 ha), Kuyumazar (l,600 ha) and Shurkul (1,600 ha), are located in the middle reaches of the Zarafshan Valley. There are also several reservoirs that contain highly saline water. Four lakes receive drainage water through collector canals: Dengizkul (25,000 ha), Karakyr (12,000 ha), Tuzgan (5,700 ha), and Shurgak (1,600 ha). In the Samarkand and Navoiy Oblasts, the Zarafshan River water is used for irrigating 530,000 ha of land, mainly for agricultural products serving the immediate needs of the population.

Previously, the Zarafshan River was a major tributary of the Amu Darya River; however, overexploitation through irrigation results in the river ending in the Kyzylkum Desert near the city of Bukhara. Uzbekistan has several thousand small streams that also run dry in the desert, principally through overexploitation through irrigation.

The Chirchik River serves the city of Tashkent with water and is a major tributary of the Syr Darya River. The Chirchik is 155 km long with a basin area of 14,900 km$^2$. The river is formed at the confluence of the Chatkal River and Pskem River, which form the Lake Charvak reservoir. There are several dams on the river, which serve for both electricity generation and irrigation. All the main canals of Tashkent City and Tashkent Oblast, such as the Bozsu, Anhor, Salar and Burijar, are fed by the water from the Chirchik River.

The surface water resources of the Amu Darya and Syr Darya river basins, on average (with 50 per cent flow provision), comprise 114.4 km$^3$ annually, of which 78.34 km$^3$ is in the Amu Darya basin and 36.06 km$^3$ in the Syr Darya basin. Annual allocations of surface water of the Amu Darya and Syr Darya river basins between the five countries of Central Asia are determined through the Interstate Commission for Water Coordination of Central Asia (ICWC) (box 9.1).

## Artificial and natural lakes

The majority of existing lakes were created as a result of drainage water management or as storage facilities for irrigation. The Ministry of Water Management reported some 80 reservoirs in the country as at March 2019, 40 of which are considered "large" and 55 of which are the direct responsibility of the Ministry of Water Management. These lakes and reservoirs are used for irrigation storage, as part of energy provision or by the Ministry of Emergencies for flood protection. It is envisaged to use some 18 water reservoirs, in addition to irrigation and flood protection, to develop ecotourism and infrastructure for ecotourism.

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**Box 9.1: Surface water allocation from Amu Darya and Syr Darya river basins**

The ICWC, bringing together the water management authorities of five Central Asian countries, agrees on water resources available for vegetative and non-vegetative seasons on the basis of the quotas laid down in the basin schemes of the Syr Darya and Amu Darya Rivers dating back to the 1980s.

The surface water forecasting and allocation is an annual exercise. Hydrometeorology experts give a forecast based upon snow and precipitation fall and water abundance in reservoirs. This forecast limits the withdrawal of the five countries, creating what becomes known as "wet years" or "dry years". Once Uzbekistan has its limit determined by the ICWC, typically in March or April, the available water is divided among the oblasts. At a provincial level, districts are then allocated volumes of water which are then further allocated among water user associations (WUAs). A resolution of the Cabinet of Ministers determines the water allocation for each oblast on an annual basis.

Water for drinking purposes (subject to availability of water supply infrastructure) and for industry are always allocated 100 per cent of their demand in Uzbekistan. Agriculture is the sector in which the allocation may vary from the forecast demand and request.

It is generally accepted that the actual water available can vary plus or minus 30 per cent from the initial water forecasts.

Over past decades, Uzbekistan would typically withdraw an average of 61 km$^3$/year from the surface water sources available. Recent years have demonstrated an average abstraction of 48–52 km$^3$/year.

**Photo 9.1: Marsh sandpiper (*Tringa stagnatilis*), Lake Ayakogytma**



*Photo credit:* Ms. Mariya Gritsina

The Aydar-Arnasay Lakes System is located in Jizzakh and Navoiy Oblasts and forms an area of 527,100 ha. It is the largest reservoir in Uzbekistan, consisting of freshwater lakes situated in the middle stream of the Syr Darya River and on the irrigated massif of Golodnaya Steppe and Kyzylkum Desert. The lakes can also act as flood protection when the Syr Darya River floods. The lakes system was added to the Ramsar List in 2008 (chapter 6).

Lake Dengizkul is located in Bukhara Oblast and covers 31,300 ha. It is the largest saline closed water body, fed by irrigation run-off, in the south-west part of the Kysylkum Desert, with typical ecological conditions of natural lakes situated in the deserts of Central Asia. The lake, dried up by the mid-1950s because of overuse for irrigation, has been refilled since 1966 and is very important for maintaining a biodiversity of wetland-dependent species in a largely arid region. Commercial mining of gas in the vicinity of and in Lake Dengizkul is the main human activity. Lake Dengizkul was added to the Ramsar List in 2001 (chapter 6).

## 9.2 Performance and gaps in water monitoring networks

### Groundwater

Uzbekistan currently has 1,495 groundwater observation wells distributed throughout the 14 territorial hydrogeological stations. This figure is forecast to increase to more than 2,650 by the end of

2021 (2017 Resolution of the President No. 2954), in recognition of the need to expand monitoring activity in this area, not least given the high percentage of the population reliant on groundwater for drinking water purposes. At the oblast level, 14 hydrogeological stations collect and process data (chapter 4).

The shortcomings of the groundwater monitoring network include the low number of observation wells. For example, at present, not all the aquifers used to supply water are covered by the monitoring network. In addition, there is insufficient use of instrumentation, particularly for water level measurement. Laboratories are poorly equipped, mobile chemical laboratories are non-existent and there is no equipment to perform hydrogeological testing of wells.

### Surface water

Uzhydromet uses 19 hydrology observatories and 131 hydrological observation posts to monitor water flow. The information is provided to concerned agencies, including the Ministry of Water Management and Uzbekenergo. In addition, 86 sampling posts are used to monitor water quality (chemical composition) with analytical laboratories in Tashkent City and within the oblasts. A total of 59 parameters are monitored once per month, comprising 53 chemical parameters and six hydrobiological parameters (chapter 4). Microbiological analysis is completed in 10 locations. Around large cities, parameters including nitrate,

ammonia and oxygen deficiency are used as indicators of general water quality.

The Uzhydromet monitoring programme typically focuses on river water quality upstream and downstream of towns and cities to determine the impact of anthropogenic activities. These data are therefore supported by additional monitoring by entities, including utility operators and SCEEP, which focuses on particular discharges from specific industrial activities.

The monitoring programme for surface water is part of the overall state environmental monitoring programme adopted by the Cabinet of Ministers every five years (chapter 4). In addition to monitoring of water quality, efficiency of use is monitored, e.g. the area of land (ha) irrigated per volume of water ($m^3$) applied. A specialized unit within the Ministry of Water Management with a focus on innovative technologies is responsible for this indicator. Hydrological flows are monitored twice a day, with water monitoring structures a physical asset that belongs to the Ministry of Water Management.

Monitoring water use at the "field level" is considered a significant problem in Uzbekistan. Not all farms have flow-monitoring equipment, with the Ministry of Water Management estimates indicating that less than 50 per cent of farms have the necessary tools for water metering.

### *Drinking water*

Drinking water quality is monitored against the State Quality Standard O'zDst: 950:2011. This standard defines 47 indicators, the frequency of monitoring and the number of drinking water samples taken at control points for analysis of microbiological, chemical and radiological indicators.

In accordance with the requirements of this standard, water supply enterprises carry out laboratory analysis of water sources and the water treatment process before supplying water to the distribution network. Annually, the central laboratories of water supply enterprises develop plans for laboratory monitoring of drinking water quality. These plans determine the number of samples from all control points at water intakes, treatment facilities and networks. Once approved, the sampling programme is coordinated with the oblast sanitary and epidemiological authorities. The Ministry of Health has regulatory oversight and supervision of drinking water quality (chapter 4).

The sampling programme is risk based and linked to the size of the population of the community served. For example, a supply network of a city with a population of more than 50,000 people would require analysis of 1,200 samples per year at a frequency of 100 samples per month. A city of 100,000 people would require double this – 200 samples per month and 2,400 samples per year. The analysis is conducted daily on 8–10 priority indicators and monthly for a wider suite of 20–25 indicators.

### 9.3    Water quality

#### *Groundwater*

On a regional level, groundwater quality is considered generally satisfactory. Localized issues concerning salinity and the impacts of agriculture, industry or anthropogenic activity do occur, but this is dealt with at a local level. For example, groundwater deposits in the middle and lower reaches of the Zarafshan River are no longer suitable for drinking purposes due to the effects of intensive irrigation.

The results of the groundwater monitoring are used to develop quarterly, biannual and annual reports. These are supplemented by annual newsletters and operational reports to support the maintenance of hydrogeological maps tracking groundwater pollution and depletion in the different oblasts of Uzbekistan.

#### *Surface water quality*

Uzbekistan uses a Water Pollution Index (WPI) to categorize the quality of surface waters. The WPI determines the arithmetic mean value of six hydrochemical indices, including biochemical oxygen demand (BOD), expressed as fractions of their MAC. There are seven classes of water quality under the WPI, ranging from I (very clean) to VII (extremely polluted). The majority of surface water bodies in Uzbekistan are considered to be in Category III (moderately polluted).

Analysis conducted by Uzhydromet in 2017 and 2018 shows that water quality in the upper reaches of most rivers typically corresponds to class II under the WPI, being characterized by low mineralization of water and low concentrations of nutrients, well within MACs. However, concentrations of copper and phenols were recorded as exceeding the MAC by up to three times in some instances in both years. This is associated with an increased natural geochemical background of metals and the impact of intensive biochemical processes under elevated summer temperatures.

The content of salt (salinity) and sulphates increases from the middle to the lower reaches of the main rivers in Uzbekistan, often being 1.5–6.0 times the MAC. The highest mineralization and sulphate content was recorded in the lower reaches of the Zarafshan River, where the maximum permissible concentrations of sulphates was recorded as peaking at 6.1–12.0 times the MAC. In 2018, in the Aydar-Arnasay Lakes System, Lake Arnasay, which is fed by collector-drainage water, recorded average values of salinity that were consistently 10.3–16.2 the MAC corresponding to WPI class IV (polluted).

The most polluted watercourses reported by Uzhydromet in 2018 were the Siab collector channel in Samarkand and the Salar channel downstream of the cities of Tashkent and Yangiyul (table 9.1). These channels were characterized by high average concentrations of nitrite, in the range 3.4–15.5 times the MAC, and of phenols 2.7–12.9 times higher than the MAC. The quality of water in these channels corresponds to WPI classes IV (polluted) and V (dirty).

Uzhydromet noted in its 2017 and 2018 monitoring reports the absence of or reduction in the concentration of contaminants, including chromium VI, surfactants, arsenic, petroleum, organochlorine and organophosphorus, in the rivers of Uzbekistan. These contaminants were below the respective MAC and lower than observed in previous years. It is hoped that this reflects efforts to tackle pollution and plans are in place to monitor this closely to observe for a long-term trend.

According to Uzhydromet's 2017 and 2018 monitoring reports, anthropogenic factors, in particular pollution, caused various changes in the composition of aquatic biological indicators. This was particularly evident downstream of towns and cities and in sections of rivers flowing through agricultural zones. Temperature also had a significant impact on biological indicators, with temperature increases as a direct result of discharges of warm cooling water from power plants and also the natural seasonal warming of waters impacting on biological indicators. The impact of high temperatures was particularly evident when water levels were low. Natural hydrological factors were also reported as having a significant impact on biological indicators, with sharp increases in water levels impacting on biological activity in the rivers. In 2018, the water quality in the upper section of the Salar channel was reported as being in rapid decline due to a combination of low flow, elevated water temperature and the impacts of industrial and domestic discharges.

*Drinking water*

Figure 9.1 demonstrates a time series analysis of chemical and microbiological water quality non-compliance in water bodies used for drinking water supply across Uzbekistan as a whole in the period 2012–2017. Average non-compliance across the period is in the range of 5–10 per cent per year for microbiological analysis and 10–15 per cent for chemical analysis. Non-compliance of chemical analysis in open channels ranges from 16.8–25.2 per cent across the period. Microbiological compliance for urban drinking water supply is found to be marginally better than for rural areas.

## 9.4 Management of water use and pressures on water resources

*Water abstraction and use by sector*

The current annual use of water resources in all sectors of the economy of Uzbekistan is, on average, 56 km$^3$, of which about 50.4 km$^3$ (90 per cent) is used in agricultural irrigation. Table 9.2 shows the estimated water use by different sectors of the economy in 2018.
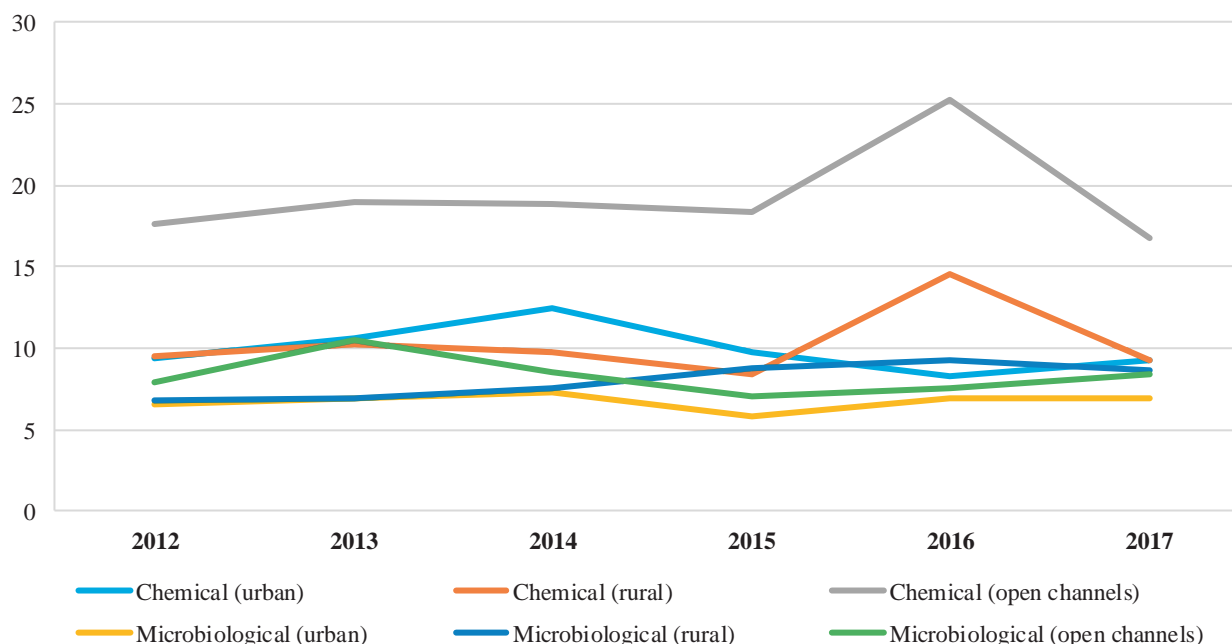
**Table 9.1: Most polluted water bodies, 2014–2018**

| | WPI | | | | | MAC exceedances (times) in 2018 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2014 | 2015 | 2016 | 2017 | 2018 | Nitrites | Copper | Phenols | Ammoniacal nitrogen | BOD$_5$ |
| Salar channel – Yangiyul town | 4.02 | 4.22 | 4.29 | 4.93 | 5.96 | 15.5 | 3.5 | 12.9 | .. | .. |
| Salar channel – Tashkent City | 4.74 | 3.4 | 3.09 | 3.29 | 3.06 | 5.8 | 2.5 | 6.5 | 2.3 | .. |
| Siab collector channel – Samarkand City | 4.55 | 3.91 | 3.32 | 3.85 | 3.99 | 5.0 | 3.2 | 11.7 | 2.3 | .. |
| Zaravshan River – Navoiy City | 3.42 | 2.16 | 1.52 | 2.05 | 1.83 | .. | 1.9 | 5.2 | .. | .. |
| Collector GPK-S, Tashkent Oblast | 1.37 | 2.68 | 1.23 | 1.2 | 2.29 | .. | .. | 8.2 | .. | .. |
| Chirchik River – Chirchik City | 1.94 | 1.95 | 2.47 | 1.38 | 2.63 | 8.5 | 1.9 | 2.8 | 1.6 | .. |

*Source:* Yearbooks of Surface Water Quality in Uzhydromet Network for 2017 and 2018.
*Note:* WPI values: ≤0.3 = class I (very clean); >0.3–1.0 = class II (clean); >1.0–2.5 = class III (moderately polluted); >2.5–4.0 = class IV (polluted); >4.0–6.0 = class V (dirty); >6.0–10.0 = class VI (very dirty); >10.0 = class VII (extremely dirty).

**Figure 9.1: Average of non-compliant water samples from municipal, rural and open water bodies used for drinking water supply, 2012–2017, per cent**



Chemical (urban) — Chemical (rural) — Chemical (open channels) — Microbiological (urban) — Microbiological (rural) — Microbiological (open channels)

*Source:* Ministry of Health, 2019.

**Table 9.2: Water use by sector, 2018**

|  | km$^3$ | % |
|---|---|---|
| Agriculture | 50.40 | 90.0 |
| Communal and domestic | 2.30 | 4.1 |
| Energy | 1.30 | 2.3 |
| Industry | 0.73 | 1.3 |
| Fisheries | 0.67 | 1.2 |
| Other | 0.60 | 1.1 |

*Source:* Ministry of Water Management, 2019.
*Note:* Numbers are estimated.

The current annual demand for water in all sectors of the economy of Uzbekistan is estimated at 64 km$^3$. Future forecasts show that the demand for drinking water supply and in industry and rural areas will increase, while demand in irrigated agriculture will be expected to decrease, due to the application of water-saving technologies and efficient agricultural practices. By 2030, Uzbekistan aims to cap the total required water volume at a maximum of 58.5 km$^3$.

### Industry, including mining

The water demands of the industrial sector have a priority over agricultural needs and environmental flow (2013 Resolution of the Cabinet of Ministers No. 82), so the demand in industry is met in full. The industrial and energy sectors of Uzbekistan together abstract more than 2 km$^3$ of water annually, of which 0.9 km$^3$ is consumed. Industry alone abstracts around 0.7 km$^3$ of water annually (table 15.4). Almost half of the water abstracted is returned in the form of an industrial effluent and these effluents can pose a threat to the environment if not treated at source.

New industrial facilities are prohibited from having run-of-river cooling systems, except in cases when recycling water supply is not technically possible.

Each industrial enterprise has its own norms for its discharge. The norms are calculated and enforced SCEEP, based on the type of industry and volume and composition of the discharge in terms of contaminants. All industrial units are expected to have their own pretreatment facility on site. Many enterprises do not comply with this requirement, due to the prohibitive costs of installation relative to the size of fines for breaching the norms.

Total water consumption for industrial demands is forecast to increase to 3 km$^3$/year by 2030 in line with Uzbekistan's development agenda.

National studies examining future industrial water demand predict strong growth in the mining sector, including of gold, and the oil and gas sector, and the potential for industrial water consumption to double by 2030–2035. Meeting the water demand and also ensuring the adequate treatment of discharges will become a priority. It is expected that industries will be required to adopt water-saving technologies.

**Photo 9.2: Upper Chirchik hydroengineering complex on the Chirchik River**



*Photo credit:* Basin Water Organization "Syr Darya"

### *Agriculture, including irrigation*

Agriculture's share in total water use in the period 2009–2017 has been around 89–92 per cent. Water losses in agriculture amount to 30 per cent of the water use (table 13.4).

The irrigation infrastructure of Uzbekistan is a complex set of hydraulic structures and irrigation systems. The total irrigated area as at 1 January 2018 is estimated as 4.3 million hectares, of which over 2.2 million hectares (51 per cent) is supplied with irrigation water through pumping stations. The drainage area is 3.05 million ha. Irrigated areas are categorized into four types based upon land salinity: 1 = non-saline; 2 = weakly saline; 3 = moderately saline; and 4 = strongly saline. The categorization is based upon the content of salt in the top layer of soil that would be detrimental to crop productivity. Areas 3 and 4 commonly practise leaching irrigation to try and wash the soil and alleviate the salt content. Typically, 15 per cent of irrigation water is currently used for leaching.

There are approximately 180,000 km of irrigation networks, 140,000 km of collector-drainage networks, and 1,693 pumping stations that consume 8.2 billion kW of electricity annually. There are 55 reservoirs with a total capacity of 20 km$^3$, more than 5,000 irrigation wells and 3,451 drainage wells.

Of the 4.3 million ha of land currently used for irrigation, it is believed that 1 million ha would be suitable for application of drip irrigation technology. The suitability of this technology depends on various factors, including soil and water quality. Uzbekistan is also looking at cost-effective and simple technologies and operational practices to improve irrigation efficiency. This includes the use of shallow furrows or irrigating every other furrow (alternative furrows). According to the Ministry of Water Management, the total area under water-saving techniques reached 413,200 ha or 9.6 per cent of irrigated lands in the period 2013–2019.

The 2013 Resolution of the Cabinet of Ministers No. 176 and its subsequent amendments aimed to recognize agriculturists who use water-saving

technologies. Preferential loans for procurement of water-efficient equipment and five-year relief from taxes were included as incentives to adopt water-saving practices. Nevertheless, the application of water-saving techniques is still at a very low level (chapter 13).

Cotton plantations are known to be high users of irrigation water. As at early 2019, 20,000 ha of cotton plantation has drip irrigation installed. There is a target to cover 200,000 ha of cotton fields by drip irrigation by 2025. In parallel, there are plans to reduce cotton production and move towards non-traditional, higher value crops. In 2017, the area in cotton was reduced by more than 40,000 ha.

Measures are being taken to further expand drip irrigation and other water-saving techniques in cotton production (2018 Resolution of the President No. 4087), including subsidies to raw cotton producers for introduction of drip irrigation technologies (8 million sum per ha), exemptions from customs duties for importation of drip irrigation equipment and preferential loans for procurement of drip irrigation equipment.

### Energy, including hydropower plants and reservoirs

Ten TPPs and combined heat and power plants (CHPPs) produce 79 per cent of Uzbekistan's electricity and are dependent upon "technical water" for cooling purposes. Water shortage is a key risk to continuity of operation at these plants.

On average, 11.17 per cent of power generated in the period 2013–2018 came from 37 HPPs (table 12.5(b)). As at 2018, there was 1,914 MW of capacity installed. Forecasts are for the installed capacity to double by 2030. The reservoirs supporting the new HPPs will be expected to operate in "irrigation mode" when required. The new HPPs are not expected to significantly influence existing river flow, with existing dams used to balance the water levels.

### Households

#### Drinking water supply

Most (60–80 per cent) of Uzbekistan's drinking water is supplied by groundwater, with the balance provided by surface water or other sources, including artesian wells. Due to widespread cases of unsanctioned use of groundwater, measures are now being taken to streamline activities that include the use of groundwater (2017 Resolution of the Cabinet of Ministers No. 430).

In Tashkent City, 99.8 per cent of the population are connected to the centralized drinking water supply network. This is despite significant growth in the last 5–10 years, with the population increasing from approximately 1.8 million in 2010 to 2.5 million in 2018. The SUE "Suvsoz", which operates the network in Tashkent City, reports a growth from 12,000 customers to 21,000 customers during this period.

Water meters are compulsory for state organizations and legal entities, but not for the population. Residential customers are either metered or not, with two tariffs available – a volumetric tariff for those on a meter and a flat rate tariff for those who are not. It is estimated that approximately 60 per cent of the connected customers are metered. The consumers typically pay for the meter, with an estimated pay-back time of four years. Figure 9.2 demonstrates the penetration of water meters across Uzbekistan as at the end of 2017. It shows that the City of Tashkent has more than 300,000 water meters installed, while the number of meters in more rural oblasts is very low.

The Government estimates household water use per capita at 123 l/capita/day in 2017 and 124.9 l/capita/day in 2018.

Since 2010, Uzbekistan has carried out extensive work to improve the provision of high-quality drinking water to the population. In the period 2011–2016, approximately 13,000 km of water supply networks, more than 1,600 water wells, and 1,400 water towers and reservoirs were built and reconstructed across the country, increasing access of the population to safe drinking water. In early 2019, the water supply network is approaching 54,000 km in length and has nearly 2,500 pumping stations.

Despite the recent investment, there are still gaps in the provision of high-quality drinking water and sewerage services, with settlements including those in the Republic of Karakalpakstan, Bukhara, Jizzakh, Kashkadarya, Surkhandarya, Syrdarya and Khorezm Oblasts considered disadvantaged. Figure 9.3 illustrates the coverage of apartments and households with access to centralized drinking water supply. It shows that the City of Tashkent has nearly 100 per cent coverage of the population while coverage in rural areas in Samarkand Oblast is as low as 32 per cent. Averaged out, access to centralized drinking water supply is 76 per cent nationwide and 63 per cent in rural areas. Drinking water is delivered by mobile tanker to 10.3 per cent of the population. Box 9.2 shows the differences in access to utility services and the quality of those services.

**Figure 9.2: Installed water meters in apartments/households by region as at 31 December 2017, 1,000 units**
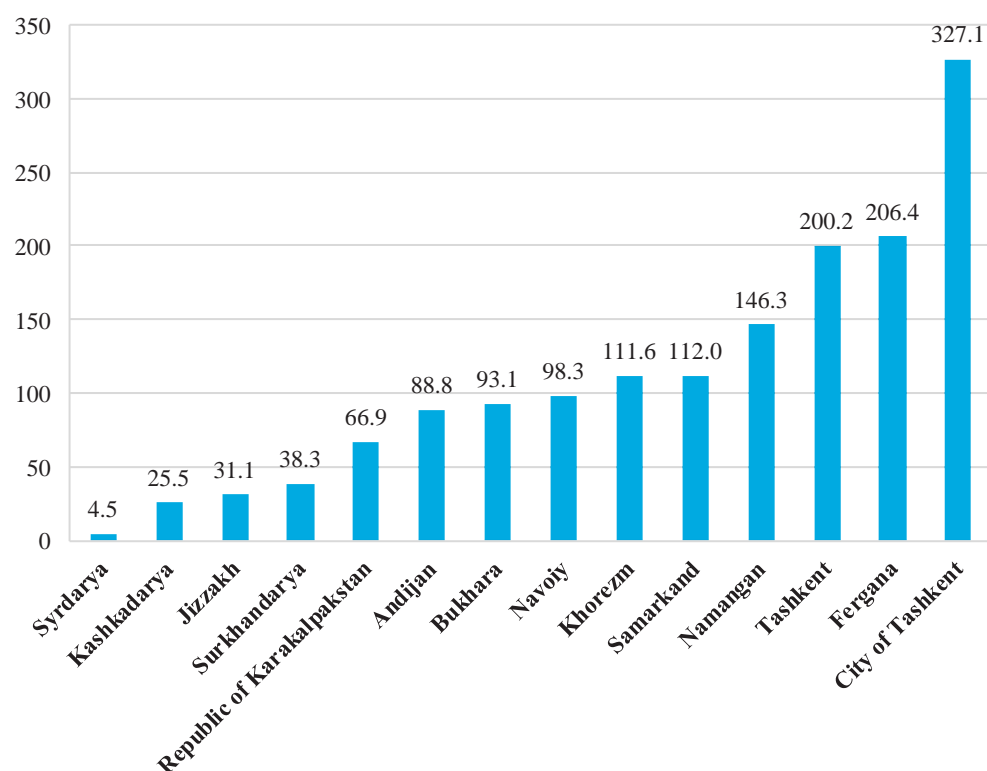


*Source:* State Committee on Statistics, 2018.
*Note:* The share of apartments/households with installed meters in the total number of apartments/households is shown in figure 9.4.

**Figure 9.3: Apartments/households with centralized drinking water supply by region as at 1 January 2018, per cent**



Total coverage    Rural area coverage    Uzbekistan (total)    Uzbekistan (rural area)
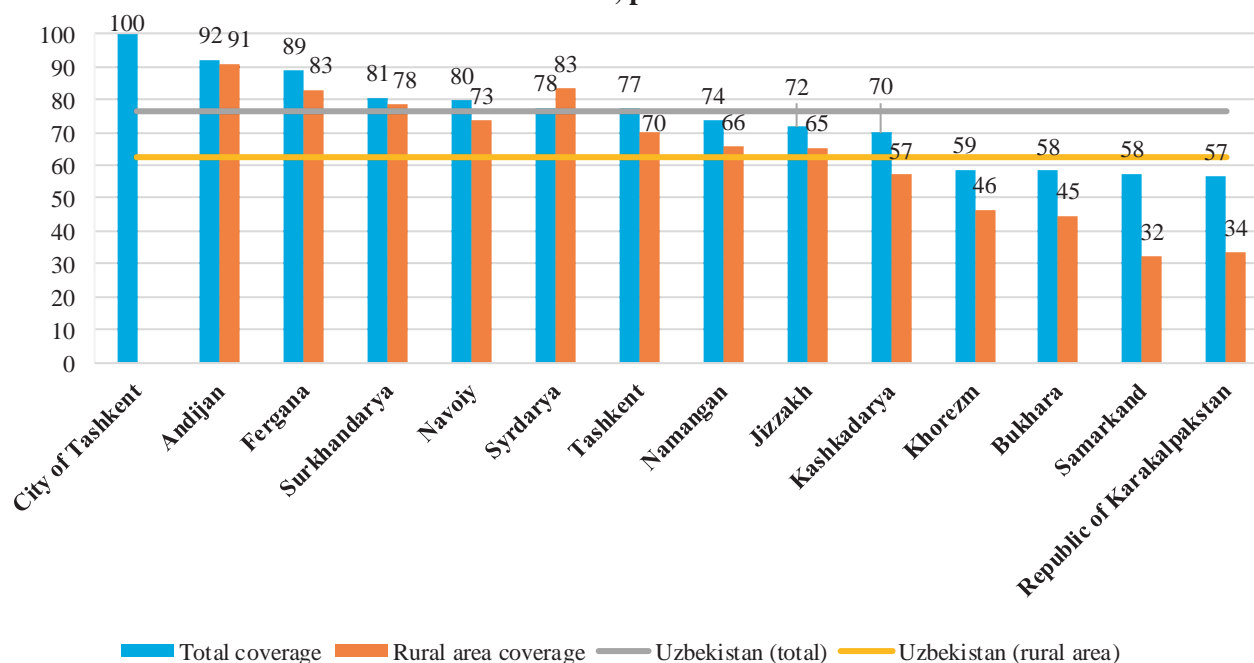
*Source:* State Committee on Statistics, 2018.

**Box 9.2: Regional disparities in utility service provision**

At the beginning of 2018, the population of Uzbekistan was 32.6 million, with 50.6 per cent located in urban areas and 49.4 per cent in rural areas.

A 2018 survey by the State Committee on Statistics shows a large range in the proportion of households connected to centralized water systems in different regions. Figure 9.4 summarizes the findings and shows that the City of Tashkent has 100 per cent coverage of apartments with centralized water supply systems and taps within the property, and approximately 70 per cent of properties are also metered. In contrast, in the Republic of Karakalpakstan, only 57 per cent of households have access to centralized water supply systems, 45 per cent have taps within the property and only 19 per cent have meters. This disparity in service provision would be expected to impact upon public health and the productivity of the local economy.

**Figure 9.4: Households with access to centralized (piped) water supply systems, tap water within property and meters by region as at 1 January 2018, per cent**
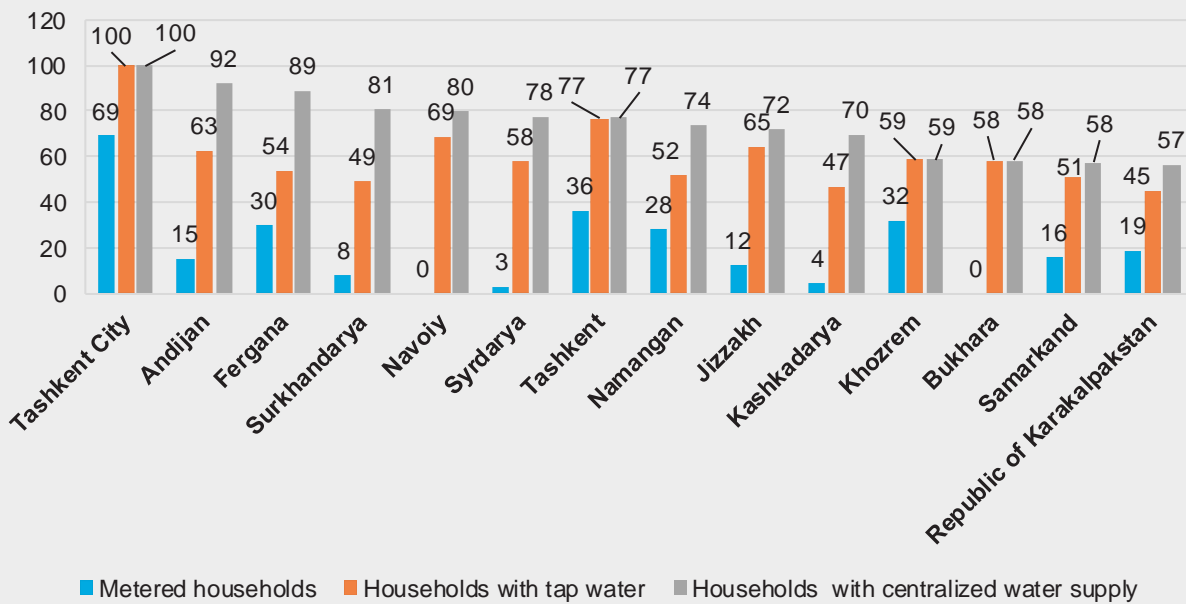


*Source:* ECE Secretariat calculations based on State Committee on Statistics Report, 2018.

While figure 9.4 shows access to water services, figure 9.5 considers the quality of those services. The Ministry of Health data for drinking water quality in the Republic of Karakalpakstan show non-compliance samples peaking at 32.3 per cent for chemical analyses and 4.6 per cent for microbiological analyses. This shows difficulties with proper management of centralized drinking water networks. Areas receiving timed supply of drinking water can often suffer from drinking water quality issues.

**Figure 9.5: Average non-compliant samples from drinking water network in the Republic of Karakalpakstan, 2010–2018, per cent**
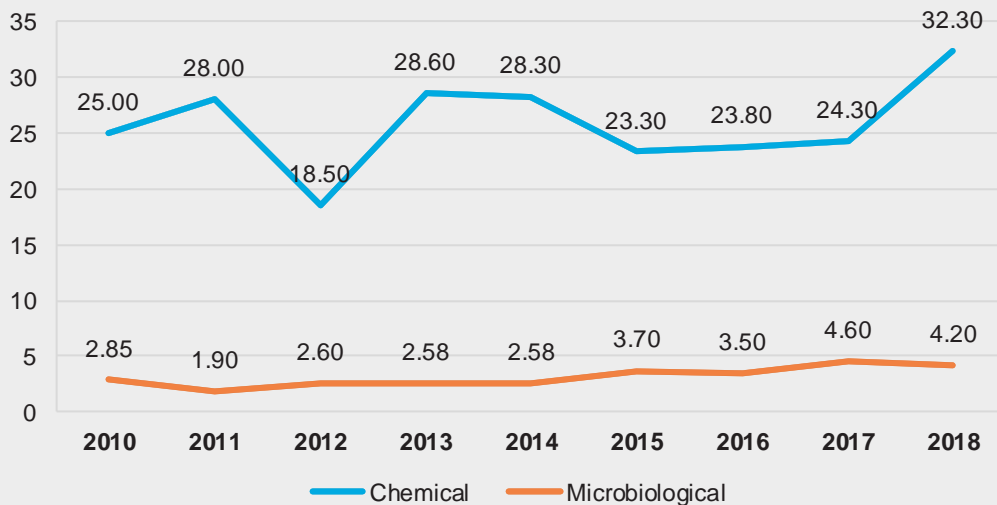


*Source:* Ministry of Health, 2019.

In Tashkent City, there are seven water supply facilities, two of which draw on surface water and five on groundwater resources, to a total volume of 2.3 km$^3$. The water supply network has 200 booster pumping stations. The network is undergoing substantial redevelopment, with recent investments including a significant project with support from EBRD, which has refurbished three large water supply facilities. SUE "Suvsoz", the local water and wastewater service provider, reports that this US$10 million project and the introduction of modern equipment has made it possible to save 1 million kW of power while delivering uninterrupted drinking water supply to Tashkent City. SUE "Suvsoz" has also focused on tackling leakage and network inefficiencies, with historic losses of 40 per cent now reduced to 20 per cent.

### Wastewater treatment

Throughout Uzbekistan, 2.6 million m$^3$/day of wastewater is collected through a sewerage network of nearly 6,000 km and more than 260 wastewater pumping stations. According to SUE "Suvsoz", in Tashkent City, 80 per cent of wastewater is currently collected and treated. Significant investment in the asset base in Tashkent City is ongoing, including through a US$30 million project with the EBRD to refurbish wastewater pumping stations. This project will help improve energy efficiency through modern pumping systems and aims to reduce the recent electricity consumption level of 300 million kWh/year to 100 million kWh/year.

The City of Tashkent has three large WWTPs and a sewerage network of 2,600 km. Approximately 91 per cent of the population are connected to the centralized service, with the balance served by septic tanks and mobile tankers. The three treatment plants are:

- Bozsu, a 750,000 m$^3$/day capacity facility that discharges its effluent to the Bozsu irrigation canal;
- Salar, a 930,000 m$^3$/day capacity facility that discharges into the Salar irrigation canal. As at early 2019, the plant operates at 89 per cent capacity with 830,000 m$^3$/day treated;
- Bektimir treatment plant, with a capacity of 25,000 m$^3$/day, which discharges into the Chirchik River.

All three facilities provide full biological wastewater treatment. The analysis of the effluent produced is conducted against a SCEEP-approved standard that is reviewed every five years.

Industrial discharges to the municipal wastewater network can be problematic, due to their characteristics and volume. Network operators (local water supply and wastewater service companies) have the power to set wastewater discharge limits into the network, with detailed rules specified in the legislation (2010 Resolution of the Cabinet of Ministers No. 11 and 2018 Resolution of the Cabinet of Ministers No. 820). There is also a penalty mechanism for those industrial entities that do not comply. In particular, Resolution No. 820 requires industrial facilities to have a pretreatment facility prior to discharge to a sewer. This requirement is yet to have a major impact in practice as the costs of installing a pretreatment facility are higher than the fines.

Households pay a flat rate user fee for sewerage services, while industrial sector users pay a volumetric fee based upon the water intake to the industrial facility. All customers receive one bill for wastewater and one bill for drinking water. Support schemes exist for vulnerable customers who face difficulty paying bills.

The sewerage network in Tashkent City suffers from a propensity for blockages and, due to its age and being clay pipe in certain locations, penetration by tree roots. It is a combined sewerage and storm water network, so does tend to have localized flooding issues in spring, when the rainfall is high and storm water is generated.

### Sanitation access

According to the State Committee on Statistics, at the end of 2017, only 35.8 per cent of the housing stock in the country had sanitation services provided, and only 10.8 per cent in rural areas. There is a risk that drinking water and sanitation services may not keep pace with the rate of residential property development to meet the demand of the rapidly growing population of Uzbekistan. The cost of development of drinking water and sewerage networks and water and wastewater treatment plants is reported as a concern, with high costs a deterrent to investment by developers. Opportunities exist to revisit existing national design and construction standards (former SNiPs) for water supply and sanitation facilities, to lower unit capital and operation and maintenance costs without compromising service quality. This would ensure higher cost effectiveness of interventions in the sector funded from the public budget, private investors or donors, while softening the affordability constraints for consumers, households, housing developers and the public budget.

*Developments in infrastructure*

Since 2010, the Ministry of Water Management has invested US$110 million for lining irrigation channels and US$71 million for amelioration projects. An annual investment plan is developed, based upon asset quality and performance and prioritized need for investment. The plan would propose for example, the length of irrigation channels to be lined or pumping stations to be refurbished, and this would be submitted for government consideration.

Upgrading pumping stations with modern equipment or moving to gravity-fed systems where practicable has a significant impact upon power consumption. Uzbekistan will target 5 per cent power savings per year through enhanced infrastructure solutions and improved operations and maintenance (O&M) practices.

A range of IFIs and donors are involved in supporting water sector development in Uzbekistan. Recent projects have been completed with the support of the ADB, EBRD, Islamic Development Bank, Japan International Cooperation Agency and World Bank. New investments provide opportunities to increase capacity within water management and to deliver against strategic objectives. Therefore, it is important to maintain a focus on human capacity to support these investments, in addition to investment in water-saving technologies.

## 9.5      River basin management

In 2003, the Government initiated the transfer of water resources management from an administrative-territorial system to a basin management system (2003 Resolution of the Cabinet of Ministers No. 320, no longer in force). At that time, 10 basin irrigation system administrations (BISAs) were established, along with 50 irrigation system administrations (ISAs).

This structure was reviewed in 2017 to further move towards establishing water management on a hydrographic principle. The 2017 Decree of the President No. 5134 and 2017 Resolution of the President No. 3172 (both no longer in force) called for the reorganization of the Lower Syr Darya, Lower Amu Darya and Zarafshan BISAs. This reorganization created six BISAs: the Lower Syr Darya, Syr Darya-Zarafshan, Lower Amu Darya, Left-Bank Amu Darya, Zarafshan and Lower Zarafshan. In total, as at 2019, the Ministry of Water Management oversees the activities of 12 BISAs and the Ministry of Water Management of the Republic of Karakalpakstan. Twelve BISAs and the Ministry of Water

Management of the Republic of Karakalpakstan manage around 100 irrigation systems. Currently, all basin administrations are arranged within the borders of oblasts.

BISAs are funded directly from the state budget and employ 41,500 staff and specialists. Their main tasks are to manage the targeted and rational use of water resources, implement an integrated technical water management policy, and ensure uninterrupted and timely water supply to users, rational management of water resources within the basin, reliable measurement of water use, and water use accounting and reporting for water users and consumers.

The principal structural units of the BISAs are the main canal management organizations (MCMOs) and ISAs. Based on the approved abstractions for each river, the BISAs work with the MCMOs and ISAs to determine the water requirements and water delivery plans for each basin. The ISAs are responsible for working with individual WUAs to determine the water requirements for their members, typically, individual farms. There are approximately 1,500 WUAs providing water services to more than 80,000 water consumers.

While Uzbekistan does not have a legal requirement to develop river basin management plans (RBMPs), a number of projects have taken place to progress thinking in this area. An example is the draft Integrated Water Resource Management and Water Use Efficiency Plan for Zarafshan River Basin, developed in 2013 with the support of UNDP. The development of RBMPs in Uzbekistan would ensure the greater engagement of civil society and different categories of water users in water management.

## 9.6      Impact of and adaptation to climate change

The Central Asian region is threatened by the melting of mountain glaciers which are one of the main sources of formation of surface run-off.

The flood period in the region is gradually occurring earlier in the year, shifting from the traditional June–July to April–June. Flooding and mudflows occur increasingly in spring rather than summer.

A cross-governmental task force that includes the Ministry of Emergency Situations, SCEEP, Ministry of Water Management and State Committee on Geology and Mineral Resources is tasked with protecting the population from floods and mudslides and investigates mountainous areas annually, identifying areas deemed to be at risk of collapse. The

recommendations of this annual review can lead to populations being temporarily evacuated if the risk of flood in the coming season and levels of preparedness are deemed insufficient. Populations can be permanently relocated if the risk is deemed permanent and cannot be mitigated.

Another body, the State Anti-flood Commission, was established in 2017. The Ministry of Emergency Situations forms part of this Commission. The Commission submits data and recommendations to the Cabinet of Ministers for review.

Looking to the long term, Uzbekistan is concerned about diminishing freshwater reserves, particularly in the western region.

Also looking to the long term, the Tashkent Institute of Irrigation Engineers and Agricultural Mechanization and Uzhydromet are conducting hydrological studies and research on internal rivers. As glaciers retreat, it is anticipated that there will be a trend towards rainfall as the main source of water in rivers, changing the mode of formation of water resources. Irrigation periods will become shorter and crops may mature faster, and this will necessitate a review of the modes and norms of irrigation.

The ongoing research and activities in this area are led by a number of agencies. Given the importance of the issue, this area of adaptation lends itself well to a coherent strategy to align activities and prepare for future challenges.

## 9.7 Legal, policy and institutional framework

### *Legal framework*

The 1993 Law on Water and Water Use targets the efficient use of water, protection of water from pollution or depletion, improving the condition of water bodies and protecting the rights of citizens and enterprises with regard to water. The Law assigns a priority to the supply of drinking and domestic water to the population over other uses. It generally prohibits the use of groundwater of drinking water quality for uses other than drinking water supply. In 2013, a draft water code was developed to replace the 1993 Law, but it was not adopted.

The 2017 Resolution of the Cabinet of Ministers No. 430 includes measures to further streamline activities that include the use of groundwater. This Resolution includes Appendix No. 1 "Regulation on the issuance of permits for drilling water wells" and Appendix No. 2 "Regulation on state monitoring of groundwaters".

The 2013 Resolution of the Cabinet of Ministers No. 82 "On approval of the Regulation on water use and water consumption in the Republic of Uzbekistan" defines water allocation procedures among various uses of water. The limits of water intake are defined first for drinking, medicinal and municipal needs, then for industry, then for agriculture and, last, for environmental flow.

The 2010 Resolution of the Cabinet of Ministers No. 11 "On additional measures to improve environmental protection activities in the utilities system" defines the rules for acceptance of industrial wastewater discharges in municipal sewerage networks and the system of "compensation payments" (in fact, fines) for discharges in excess of allowed limits.

The 2017 Resolution of the President No. 2954 "On measures to strengthen control and accounting for the rational use of groundwater resources in the period 2017–2021" aims to preserve precious groundwater resources from overabstraction.

Several standards aim at ensuring drinking water quality:

- SanPiN No. 0200-06 "Sanitary rules and norms of hygienic assessment, definition of classes of surface water and groundwater sources, and their selection for centralized drinking water supply of the population of Uzbekistan";
- O'zDST 951:2011 "Sources of centralized drinking water supply. Hygiene, technical requirements and selection rules";
- O'zDST 950:2011 "Drinking water. Hygiene requirements and quality control".

There are concerns with compliance with a number of elements of the existing legal framework. In particular, the performance of industrial enterprises with regard to water conservation and pretreatment of effluents prior to discharge is considered an issue.

The legal framework does not yet necessitate the production and implementation of RBMPs. In particular, this misses an opportunity to fully engage the range of stakeholders in line with the integrated water resources management (IWRM) approach.

### *Policy framework*

The Programme for Integrated Development and Modernization of Drinking Water Supply and Sewerage Systems for the period 2017–2021 (2017 Resolution of the President No. 2910) provides for the construction and reconstruction of 10,200 km of water conduits and pipelines, 1,677 water wells and 1,744

water towers and reservoirs, as well as installation of 1,440 pumping facilities, with a number of projects already delivered under this programme. A Clean Water Fund (now called the Fund for Development of Water Supply and Sanitation Systems) was established as part of this programme to provide funds for improvement and modernization of the whole water supply and sewerage system and provision of the population with quality drinking water, particularly in rural areas.

The 2018 Resolution of the President No. 4040 "On additional measures for the development of drinking water supply and sewerage systems in the Republic of Uzbekistan" approved programmes for the phased reconstruction and construction of sewage treatment plants in 20 cities of the country.

The Programme of Measures for Further Development of Hydropower in the period 2017–2021 (2017 Resolution of the President No. 2947) details steps towards developing hydropower potential through construction of 42 new HPPs and refurbishment of an existing 32 HPPs. The Programme aims to increase hydropower capacity by 1.7 times by 2025. The Programme considers 18 construction projects and 14 refurbishment projects for a total of US$2.65 billion.

The policy framework does not yet cater for the use of RBMPs. The framework does not sufficiently focus on the use of economic instruments and cost recovery with regard to the use of groundwater and surface water. Progress in this area would help support conservation objectives. Policies regarding the use of water metering, particularly at the water user level, would also support wider conservation objectives.

Linkages between land use planning and water management are not sufficiently present in the current policy framework. This is the case for agricultural, municipal and industrial projects, where opportunities exist to ensure water quantity and quality considerations in the development of new projects. Municipal projects need to consider access to good quality drinking water and sanitation and encourage consumers to use water wisely. Industrial projects need to consider the effluent produced and any pollution impacts, while also considering the opportunities for water reuse within an industrial facility and the need for on-site treatment prior to the release of any discharges. Agricultural projects need to consider the current and long-term availability of water, the impact of changes in crop type or irrigation technology, and water quality, particularly in terms of

drainage. Stronger linkages between land use and water management, as early as possible in the planning process, has potential to realize planning objectives and promote water-efficient behaviour.

*Sustainable Development Goals and targets relevant to this chapter*

The current status of Uzbekistan vis-à-vis selected targets under Goal 6 of the 2030 Agenda for Sustainable Development is described in box 9.3.

*Institutional framework*

In 2018, the Ministry of Agriculture and the Ministry of Water Management were established out of the former Ministry of Agriculture and Water Management.

The responsibilities of the Ministry of Water Management include:

- The development and implementation of a water resources management policy in conjunction with all stakeholders, which focuses on efficient water use and protection of water resources;
- Ensuring each region and sector of the economy is provided with sufficient water resources;
- Operation and maintenance of irrigation and land reclamation infrastructure, reservoirs, pumping stations and other water management and hydraulic structures;
- Increasing the awareness and engagement of water users to promote efficient water use throughout the country;
- Introducing modern water-saving technologies and best practice with regard to water management;
- The development of human capacity through the training of water sector specialists;
- Working internationally to develop interstate relations in the management of transboundary water resources, attraction of foreign investment and technical assistance and participation with international organizations in the field of water management.

In fulfilment of part of these duties, the Ministry of Water Management has already established a working group to meet donors and look at infrastructure needs and opportunities, and a cross-ministerial working group to consider roles and responsibilities and their delineation within the sector.

**Box 9.3: Selected targets under Goal 6 of the 2030 Agenda for Sustainable Development**

**Goal 6: Ensure availability and sustainable management of water and sanitation for all**

Goal 6 has been nationalized by Uzbekistan as "Conservation and rational consumption of water and sanitation for sustainable development and their availability for all".

**Target 6.1: By 2030, achieve universal and equitable access to safe and affordable drinking water for all**

Target 6.1 has been nationalized by Uzbekistan as "By 2030, achieve universal access to safe drinking water", therefore omitting the equitability and affordability aspects of the global target. The national indicator aims to consider access of the population to drinking water as follows:

6.1.1 Proportion of population using:
a) centralized water supply;
b) alternative sources of water supply.

As drafted, the national indicator does not consider affordability of connection or quality of connection and these elements could be considered for future development. Furthermore, it leaves the "safety" aspect outside the indicator, somewhat presuming that "centralized" water supply is safe, whereas this is not always the case.

The data provided by the State Committee on Statistics indicate that access to centralized drinking water supply is, on average, 76 per cent nationwide and 63 per cent in rural areas (figure 9.3). An estimated 6 hours/day are spent by residents without access to centralized water supply receiving water from alternative sources (including transportation, storage and purification (http://nsdg.stat.uz/)). According to the Ministry of Housing and Communal Utilities, the situation is less optimistic: only about 63.5 per cent of the population are covered by centralized drinking water supply services, whereas about 25 per cent of the country population are to use wells, springs, rivers and other water sources, and about 10 per cent depend on water supplied by carriers (chapter 17).

The reporting by Uzbekistan under global indicator 6.1.1 indicates 86.5 per cent of the population using safely managed drinking water services in urban areas in 2015; there were no data for rural areas (https://unstats.un.org).

**Target 6.2: By 2030, achieve access to adequate and equitable sanitation and hygiene for all and end open defecation, paying special attention to the needs of women and girls and those in vulnerable situations**

This target has been nationalized by Uzbekistan as "By 2030, achieve access to adequate and equitable sanitation and hygiene, paying special attention to the needs of vulnerable populations". Open defecation is not an issue in Uzbekistan. As drafted, there is no indication of gender. Nevertheless, gender issues feature prominently with regard to access to water and sanitation in Uzbekistan (chapter 17) and this should be considered for inclusion for completion.

Two national indicators have been approved under target 6.2:

• 6.2.1.1 Proportion of population using safely managed sanitation services and a hand-washing facility with soap and water (similar to global indicator 6.2.1);
• 6.2.1.2 Proportion of population covered by centralized sewerage system.

Although the entire population in the country has access to a basic sanitation, according to the Ministry of Housing and Communal Utilities, in early 2019 only about 15.6 per cent are connected to centralized sewage.

**Target 6.3: By 2030, improve water quality by reducing pollution, eliminating dumping and minimizing release of hazardous chemicals and materials, halving the proportion of untreated wastewater and substantially increasing recycling and safe reuse globally**

When nationalizing target 6.3, Uzbekistan omitted "halving the proportion of untreated wastewater", part of the wording of the global target. Two national indicators were approved under target 6.3:

• 6.3.1 Proportion of wastewater safely treated (the same as global indicator 6.3.1). Uzbekistan reports to have safely treated 99.3 per cent of wastewater in 2017 (http://nsdg.stat.uz/);
• 6.3.2 Water pollution index (WPI). This indicator is considered well established and the country intends to use its national WPI system for tracking it.

**Target 6.4: By 2030, substantially increase water-use efficiency across all sectors of economy and ensure sustainable withdrawals and supply of freshwater to address water scarcity and substantially reduce the number of people suffering from water scarcity**

Two indicators are developed under target 6.4:

- 6.4.1 Change in water-use efficiency over time. The global indicator on water-use efficiency tracks the extent to which a country's economic growth is dependent on the use of water resources, and enables policymakers and decision-makers to target interventions at sectors with high water use and low levels of improved efficiency over time. This indicator tracks the value added (US dollars) per volume of water withdrawn (m3), by a given economic activity over time. Uzbekistan reports for 2015 US$1.2 per m3 of water. This figure is the lowest of all countries that reported against this indicator for 2015 (https://unstats.un.org);
- 6.4.2 Level of water stress: Freshwater withdrawal as a proportion of available freshwater resources. The indicator tracks how much freshwater is being withdrawn by all economic activities, compared with the total renewable freshwater resources available. Building on the Millennium Development Goals indicator (Proportion of total water resources used), it also accounts for environmental water requirements. The indicator includes water withdrawals by all economic activities, with a focus on agriculture, manufacturing, electricity, and water collection, treatment and supply. Uzbekistan reports a figure of 136.9 per cent for 2015, suggesting unsustainable abstraction (https://unstats.un.org). This figure is the second highest of all countries that reported data for 2015, suggesting the need for action in this area.

**Target 6.5: By 2030, implement integrated water resources management at all levels, including through transboundary cooperation as appropriate**

Target 6.5 has been nationalized by Uzbekistan without changes but omitting global indicator 6.5.2 (box 6.5).

For indicator 6.5.1 (Degree of integrated water resources management implementation (0–100)), Uzbekistan scores at 45 per cent (medium-low) in 2017. The indicator relates to the degree to which IWRM is implemented, derived from responses by the country to a survey with questions relating to each of the four components of IWRM: enabling environment, institutions and participation, management instruments and financing. The survey takes into account the various users and uses of water, and has the aim of promoting positive social, economic and environmental impacts at all levels, including the transboundary level, where appropriate.

While progress can be achieved in all aspects of implementation of IWRM, the indicator highlights some key focus areas. For enabling environment, Uzbekistan scored an average of 38.3 per cent, with the lowest scores of 30 per cent for "National law(s) in the field of water resources" and "Subnational strategy in the field of water resources and management plans and so forth at the level of the basin/aquifer based on IWRM".

The questionnaire responses against financing also scored low, securing an overall score of 34 per cent. A score of 20 per cent was achieved for "Income, received from the relevant charges from water users at the basin level, at aquifer or at the subnational level" and 30 per cent for "National budget for financing of recurrent costs of IWRM components" and "Subnational budgets or budgets at the basin level, including infrastructure of water resources".

In contrast, Uzbekistan scored 70 per cent for "National monitoring of available water supply (includes surface and/or groundwater)" under the category on management instruments, and also for "Organizational structure of transboundary water management for the most important basins/aquifers" under the category on institutions and participation, and "The agreements on transboundary water resources management in most important basins/aquifers" under enabling environment, demonstrating areas of comparative strengths of Uzbekistan with regard to IWRM.

**Target 6.b: Support and strengthen the participation of citizens' self-government bodies in improving water and sanitation management**

The global target and its indicator were nationalized by Uzbekistan without changes. As at early 2019, some scoring is available for Uzbekistan in the global database (https://unstats.un.org), but it does not allow clear analyses to be made.

The Ministry of Agriculture now focuses on implementing the policy on agriculture and food security, aiming at modernization of the sector and introduction of resource-saving technologies and best agronomic practices. Of particular relevance to water management is the policy development around irrigation technologies and crop plantation. The policies around land allocation for cotton and other crops, as Uzbekistan considers agricultural productivity and the gradual shift to higher value crops that consume less water, will have a significant impact on long-term water management.

The Ministry of Housing and Communal Utilities is a new ministry established in April 2017 to increase coordination, action and customer service around critical utility services, including drinking water and sewerage services. With particular regard to water management, the Ministry is responsible for the development and modernization of water supply facilities and sewerage facilities, formation of a tariff policy for water supply and sewerage services (in conjunction with the Ministry of Finance) and capacity development of staff working in the sector.

The responsibilities of the Ministry of Emergency Situations include prevention of natural and human-made emergency situations and civil protection.

The Ministry of Health oversees the work of the State Sanitary and Epidemiological Surveillance Service (SSESS). It is responsible for monitoring drinking water quality for microbiological and chemical contamination.

The responsibilities of Uzhydromet under the Cabinet of Minsters include the monitoring of the hydrological regime and quality of rivers, lakes and reservoirs. A database is maintained, with key information being routinely shared with governmental stakeholders and used to produce its annual monitoring report.

The State Committee on Geology and Mineral Resources conducts exploration and research with regard to groundwater, issues permits for groundwater abstraction and registers groundwater users.

The State Committee on Ecology and Environmental Protection (SCEEP) controls discharges of industrial wastewater by enterprises. SCEEP inspectors visit each enterprise on a quarterly basis. For persistent offenders, this inspection frequency can be increased.

In 2017, the State Inspectorate for Control over Drinking Water Use (Gosvodinspektsya) was established under the Cabinet of Ministers. The State Inspectorate and its territorial branches control the compliance with requirements on drinking water production and transportation, provision of sanitation and wastewater treatment services. Gosvodinspektsya verifies how water and wastewater enterprises comply with requirements of the legislation.

Since 2017, JSC Uzbekhydroenergo brings together the Uzbekenergo and Uzsuvenergo HPPs. This entity aims to increase the efficient use of hydropower, form a single water and energy resources management system and gradually increase the share of renewable hydropower resources in the energy production system.

In Tashkent City, drinking water supply and wastewater treatment is provided by the SUE "Suvsoz". It is responsible for the operation of water and wastewater assets, developing proposals for infrastructure development or renewal and maintaining the relationship with customers, including tariff collection. In 2018, the city's water infrastructure was separated from the Ministry of Housing and Communal Utilities, so "Suvsoz" is required to report directly to the khokimiyat (mayor)'s office. This is a one-year trial until October 2019.

In the oblasts, similar structures exist in the form of SUEs responsible for water and wastewater services and coordinated by the Ministry of Housing and Communal Utilities.

Basin irrigation system administrations (BISAs) are responsible for the development, operation and maintenance of infrastructure and delivery of surface water within each region. Each BISA consists of a main canal management organization (MCMO) and irrigation system administrations (ISAs) and delivers water to the boundary of WUAs. WUAs provide services in water distribution and the operation and maintenance of on-farm irrigation and drainage systems. Water users pay a fee for this service rather than for the volume of water used.

The Fund for Development of Water Supply and Sanitation Systems (formerly the Clean Water Fund) is a state fund that finances investments in construction and rehabilitation of water supply and sewerage networks (chapter 3).

### Coordination among various institutions in the water sector

The management of water in Uzbekistan is fragmented, with many actors involved. Each actor is responsible for developing its own strategy and policies and also for monitoring and collecting data. While significant data are collected on water quantity and quality, opportunities remain for coherent use of data and information to inform decision-making and prioritize action. Opportunities exist to coordinate the various activities, align strategic frameworks and harmonize the use of data collected to generate the information required by decision-makers. This is particularly acute for compliance and enforcement regarding discharges to the environment. A number of agencies are involved in water quality monitoring, with samples taken against a prior agreed schedule. Samples are taken by enterprises at source, and within urban areas and upstream and downstream of urban areas by different government agencies. Sharing this data promptly can lead to appropriate compliance and enforcement action, preventing immediate environmental issues and also flagging activities requiring investment and longer- term interventions, e.g. new collection or treatment infrastructure.

Given the significance of agriculture as the major water user in the country, it is vital that policy coherence is achieved and that efforts are aligned to increase agricultural productivity and conserve water. The "nexus" of water, food, energy and land use requires coordination across government to allow development of robust cross-sectoral policies and drive resource security. The ADB's Asian Water Development Outlook 2016 ranked Uzbekistan at

"Level 2 – engaged" in a five-tier scoring system with regard to water security, illustrating that there are significant opportunities to improve coordination.

### *Regulatory and economic measures*

With regard to management of groundwater, the abstraction of water is controlled by a regulatory framework. The hydrogeological stations of the SUE Uzbekhydrogeology at the State Committee on Geology and Mineral Resources issue permits for drilling wells for access to groundwater. The cost of drilling the well is at the expense of the applicant. Records of water use are expected to be kept in line with the requirements of the permit. Hydrogeological stations of Uzbekhydrogeology also issue permits for special water use or consumption. These permits aim to control the use of groundwater and limit overabstraction.

The Ministry of Water Management, through its 13 BISAs at oblast level and 43 ISAs at local level, issues permits for special water use for irrigation.

Drinking water and wastewater tariffs, and any proposed increases, are approved by the Ministry of Finance. The drinking water and sanitation tariffs in Tashkent City, levied by SUE "Suvsoz", are closely linked to electricity consumption, with power costs forming 27 per cent of the tariff. Therefore, if electricity costs increase, this creates pressure to increase drinking water and sanitation tariffs. There is a tariff methodology that is periodically reviewed. SUE "Suvsoz" currently reports that approximately 15 per cent of its customer base do not pay their bills. Low bill collection rates across the country pushed the Government to introduce stringent measures: as of 1 January 2018, all water supply services are subject to receiving 100 per cent prepayment of average monthly bills from all customers.

In rural areas, 3.3 million people are reliant on mobile tankers for delivery of water. Prices for water delivered by tanker range from 10,000–25,000 sum per $m^3$, with the fee linked to distance travelled and terrain.

The abstraction of water from natural sources is subject to payment of a water use tax. There are a number of tax exemptions, however, that weaken incentives for more rationale use of water. For example, water utilities can abstract water for production of drinking water for the population free of charge; they only have to pay for water resources used for their own needs (chapter 3). Irrigation water users do not pay for their water consumption, but only pay for the transport of water and for the maintenance of

the channels and related infrastructure (chapters 3 and 13).

Poor availability of metering to monitor water use at the "field level" has a number of ramifications; as well as preventing accurate water use measurements and demand forecasting, it precludes the development of economic instruments, such as a fee for volumetric water use. Under the present monitoring regime, irrigation norms are applied so that farmers are charged per hectare of land irrigated rather than a fee linked to the volume of water consumed or the crop grown. This means that there are no incentives for efficient water use and no robust data to manage supply and demand.

### *Information measures*

The State Water Cadastre, maintained by Uzhydromet, contains annual and long-term data on the surface water regime and resources, as well as information on the use and quality of both surface water and groundwater resources (chapter 4).

The information portal CAWater-Info is maintained by the Scientific and Information Centre of ICWC (as of 2012, with financial support from Uzbekistan). The portal provides information on the state of water resources in Uzbekistan and Central Asia and transboundary water management in the subregion.

## 9.8    Assessment, conclusions and recommendations

### *Assessment*

Since 2010, Uzbekistan has made progress in many areas of water management, in particular in the area of investment in new capital infrastructure to increase access to drinking water and sanitation and for refurbishment of irrigation infrastructure to reduce water losses. In parallel with this investment, significant reform is ongoing to improve water-use efficiency and the productivity of agriculture, with water being increasingly diverted to higher value crops, along with efforts towards the installation of efficient irrigation equipment and adoption of effective practices.

Reorganization of line ministries, including the formation of the Ministry of Water Management and the Ministry of Housing and Communal Utilities in 2017–2018, has recently been completed in an attempt to add focus to the key issues of water resources management and water supply and sanitation. The need to move towards the principles of IWRM remains, in particular towards greater stakeholder

involvement in policymaking and decision-making, despite some progress in this area.

Concerns remain about the impact of industrial discharges to the sewerage network or the environment, disparity in access to and the performance of rural water supply and sanitation systems, and general water availability and long-term sustainability. Underpinning these long-term concerns is the fact that water management remains fragmented, with many actors involved.

Access to adequate and affordable water supply and sanitation services in line with Sustainable Development Goal 6 remains a concern. While work is being done to improve access, quality of service remains an issue.

*Conclusions and recommendations*

Cross-sector coordination and integrated water resources management

Policy coherence, cross-ministerial dialogue and IWRM are considered key to the progression of Uzbekistan's water management ambitions. Concerns over long-term future water supply and demand, land use and the role of water in supporting policies for economic growth expose water allocation and water security issues.

A cross-ministerial policy dialogue, also involving the private sector, academia, civil society and development partners, has the potential to address some of the policy coherence concerns outlined above. ECE and the OECD have experience in facilitating these platforms in Eastern Europe, the Caucasus and Central Asia. Key outcomes of the national policy dialogues on IWRM typically take the form of evidence-based policy packages oriented towards practical implementation.

A national policy dialogue on IWRM in Uzbekistan could facilitate broad consultations and deliver analysis to support the Government's objectives and strategic direction for the water sector. It would establish the evidence base to support strategy and policy decisions and provide a platform for consultation on issues ahead of presentation to the Government. Tackling the coordination of data management would be key to supporting this overall objective.

Recommendation 9.1:
*The Cabinet of Ministers should improve policy coherence, cross-sectoral cooperation and coordination with the wider water community by:*

(a)     *Improving the cross-sectoral collection, sharing and use of data;*
(b)     *Developing a roadmap of key strategic objectives for the water sector as a whole, to allow focus of action;*
(c)     *Considering the establishment of a national policy dialogue on integrated water resources management.*

Capital infrastructure investments to tackle regional disparities and increase water-use efficiency

There are disparities in access to and quality of water supply and sanitation services in Uzbekistan. This is true among different oblasts and also between urban and rural areas. A range of investments has been delivered to bridge this disparity, including the recent Programme for Integrated Development and Modernization of Drinking Water Supply and Sewerage Systems for the period 2017–2021 to ensure provision of centralized drinking water to apartments and households. Investments of this type make a real difference to the day-to-day lives of citizens, improve public health and productivity and contribute directly to Uzbekistan's commitments under the Sustainable Development Goals, in particular Goal 6. However, at present, sanitation services do not keep pace with the provision of drinking water supply. Addressing provision of these vital services at the planning stage is key to preventing the deferral of problems to a future development stage, when retrofitting of utility services may be difficult. As the cost of developing drinking water and sewerage networks and water and wastewater treatment plants is reported as a concern, opportunities exist to revisit existing national design and construction standards (former SNiPs) for water supply and sanitation facilities to ensure appropriate plant is developed at the appropriate time.

A range of investment opportunities also exists to increase water-use efficiency. Whether for the lining of canals, updating of irrigation infrastructure with technologies such as drip irrigation or improving of drainage facilities, these investments are to be developed in areas where the maximum impact can be realized. Monitoring impact after investments have been delivered would also help focus future plans.

Recommendation 9.2:
*The Cabinet of Ministers should continue progress in infrastructure development by:*

(a)     *Identifying priority communities and settlements to target for expansion of sustainable water supply and sanitation infrastructure;*

*(b)      Initiating the review of national design and construction standards for water supply and sanitation facilities in rural areas, to reduce capital and operational costs and make infrastructure more affordable;*

*(c)      Identifying priority investments that could be made to refurbish existing irrigation infrastructure and improve collector-drainage systems, with a focus on investments that would make a step change in efficient water management, reduce land salinity and increase agricultural productivity;*

*(d)      Designing appropriate financing mechanisms to support these investment programmes and human and technical capacities to support the investments.*

*See Recommendations 13.2 and 17.4.*

<u>Water efficiency and conservation</u>

A range of activities is ongoing in Uzbekistan to consider efficient irrigation practices and increase agricultural productivity. This has focused on efficient irrigation technologies, including the roll-out of drip irrigation where appropriate, moving to shorter furrows and alternate watering of furrows, and also changing crop type, to reduce the production of cotton and replace it with higher value crops, including orchards and vineyards. In urban areas, industrial water users have the opportunity to embrace efficient manufacturing and processing operations and look for

opportunities for effluent recycling and treatment before release to the environment. There are also opportunities to tackle water consumption in the growing residential population. However, the linkages between land use planning and water management are not sufficiently present in the current policy framework to ensure that water quantity and quality considerations are duly taken into account in the development of new agricultural, municipal and industrial projects.

<u>*Recommendation 9.3*</u>*:*
*The Cabinet of Ministers should continue its efforts to drive efficient use of water in all sectors of the economy and by all water users by:*

*(a)      Developing policies and strategies to support water efficiency, including metering schemes to monitor consumption and financial incentives for purchasing water-efficient technologies and investment in the human capacity and awareness campaigns to support effective roll-out;*

*(b)      Embedding water-efficient principles in land use planning to ensure that best practice in this area is adopted from the start of new municipal, industrial or agricultural developments;*

*(c)      Ensuring that agricultural policies and strategies are coordinated with water management objectives so that the necessary crop mix, irrigation technology and practice and required water volume are aligned.*

*Chapter 10*

# WASTE AND CHEMICALS MANAGEMENT

## 10.1    Practices and trends in municipal waste management

*Generation and collection*

Generation of municipal solid waste (MSW) is estimated from norms on waste generation. These norms are defined in kilograms or in cubic meters of waste per person per day, differ from oblast to oblast and are approved by the local administration. Due to the lack of reliable data, the generation of MSW was estimated by the State Committee on Ecology and Environmental Protection (SCEEP) based on the value of 219 kg/person/year, which it considered to be a typical MSW generation value for Uzbekistan (table 10.1).

In 2018, information on the composition of MSW was published by SCEEP (table 10.2). Prior to that, as part of the Asian Development Bank (ADB)'s Uzbekistan Solid Waste Management Investment Project 2, an analysis of MSW was done at high-rise and low-rise residential areas in Mirzo Ulugbek District, Tashkent City, from October to November 2012. As each waste analysis was based on a different methodology, the results are not directly comparable.

The population covered by waste collection services numbered more than 15.7 million (53 per cent of the country's population) in 2018. Of that number, SUE "Makhsustrans" in Tashkent City served 1.2 million, Toza Khudud enterprises served 9.7 million and private companies served 3.7 million people.

Waste is disposed of in three types of sites (table 10.3). Official dumpsites include those that are recognized by local administrations as areas designated for waste disposal; unofficial dumpsites are sites that are regularly used but were not designated for disposal; and other dumpsites are those that are used irregularly and only limited or unverified information on them is available.

### Table 10.1: MSW generation, 2010–2017, 1,000 t

|  | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|---|---|
| **MSW** | 6 132.3 | 6 378.0 | 6 472.6 | 6 568.6 | 6 677.9 | 6 793.9 | 6 914.9 | 7 034.3 |

*Source:* State Committee on Ecology and Environmental Protection, 2018.

### Table 10.2: MSW composition

|  | SCEEP (2018) | ADB (2012) | SanPiN (2011) |
|---|---|---|---|
| Food waste | 27.53 | 64.06 | 38.4 |
| Garden waste | 12.91 | .. | .. |
| Paper and cardboard | 3.22 | 6.84 | 18.9 |
| Mercury lamps, medical and wireless powered devices | 0.29 | 0.71 | 0.0 |
| Glass | 4.62 | 6.56 | 3.7 |
| Plastics | 7.91 | 11.31 | .. |
| Metals | 1.38 | 1.75 | 3.4 |
| Construction waste | 3.32 | 0.71 | 8.9 |
| Textiles | 3.28 | 1.81 | 3.9 |
| Leather, rubber, bones | 2.29 | 1.29 | 0.8 |
| Wood | 1.42 | .. | 4.9 |
| Other | 31.83 | 4.96 | 17.1 |

*Source:* State Committee on Ecology and Environmental Protection, 2018; ADB Waste Characterization Study, 2012; 2011 SanPiN No. 0297-11.
*Note*: ADB data reflect the situation in Tashkent City only. Garden waste is included in food waste in the analyses of the ADB and SanPiN. In the analysis provided in the SanPiN, plastics were included in Other waste.

**Table 10.3: MSW dumpsites, 2017, number**

|  | Official | Unofficial | Other* |
|---|---|---|---|
| Republic of Karakalpakstan | 17 | 12 | 804 |
| Andijan | 15 | 29 | 1 865 |
| Bukhara | 15 | 26 | 1 137 |
| Jizzakh | 10 | 250 | .. |
| Kashkadarya | 16 | 141 | 1 384 |
| Navoiy | 9 | 10 | 695 |
| Namangan | 12 | 96 | 1 786 |
| Samarkand | 15 | 86 | 2 502 |
| Surkhandarya | 18 | 12 | 1 613 |
| Syrdarya | 12 | 83 | 498 |
| Tashkent | 23 | 96 | 2 358 |
| Fergana | 15 | 15 | 2 091 |
| Khorezm | 9 | 75 | 1 217 |
| **Total** | **186** | **931** | **17 950** |

*Source:* State Committee on Ecology and Environmental Protection, 2018.
*Note:* * not confirmed.

### Tashkent City

The system of MSW management for Tashkent City was introduced by the Tashkent Solid Waste Management Project (1999–2006) financed by the World Bank and EBRD.

### Waste collection

Collection of MSW in Tashkent City is undertaken by the specialized company SUE "Makhsustrans". Secured MSW points are used for collection of MSW in densely populated areas and in low-density areas waste is brought to collection vehicles by residents. Secured MSW collection points were originally introduced under the project with the idea of preventing damage to containers and maintaining cleanliness around containers, but the operators of MSW collection points started to sort waste brought by residents. In 2018, about 700 manned MSW collection points and 12,000 containers were available in densely populated areas of Tashkent. MSW is delivered to three transfer stations.

The fleet of waste collection vehicles acquired under the project was not properly maintained, due to a shortage of financing, and the need for additional waste services was satisfied by allowing private companies to serve Tashkent. As of 2018, 55 per cent of MSW in Tashkent is collected by "Makhsustrans" and 45 per cent by private companies. Selection of private operators is conducted through electronic auctions.

The transfer stations compact received waste into dedicated cylindrical containers with a capacity of 20 tons. MSW is weighed at the entrance. The amount of MSW delivered to transfer stations is 1,400 tons per day or 650,000 tons per year. However, after 15 years of operation and minimal maintenance, a lack of financing and no regular investments to renew the vehicle fleet or make general repairs to equipment, transfer stations and long-haul vehicles are in need of repair or replacement.

### Waste disposal

Waste generated in Tashkent is disposed of at the landfill at Akhangaran, located 22 km south-east from the centre of Tashkent. The landfill, which started operation in 1967 as an uncontrolled dumpsite, was upgraded during the period 2000–2005. A weighbridge, garages and a personnel building were built and the covering of waste with inert material was introduced. The landfill was equipped with a compactor and other vehicles needed for landfill operation and access to the site was guarded by police. As at March 2019, vehicles are not operational, except for one bulldozer; therefore, waste is not compacted and fires caused by self-ignition are occurring. The protection of the site was transferred to a private security company, which is not sufficiently deterring people who enter the site at night and scavenge scrap metals. In addition, the capacity of the site will be exhausted within several years.

This landfill will be closed and "Makhsustrans" has contracted a South Korean company, Sejin, to perform the closure and rehabilitation works on the landfill in exchange for the right to collect and burn landfill gas under the carbon credit scheme. It is expected that electricity generation from the landfill gas will achieve a capacity of 16 MW.

**Photo 10: MSW collection point in Tashkent City**



*Photo credit:* State Committee on Ecology and Environmental Protection

### Ongoing projects

To remediate the situation in MSW management in Tashkent, a loan of US$69 million from the ADB was agreed and the Solid Waste Management Improvement Project 2 started in December 2014 and is planned to end in 2021. By June 2018, 13,500 new containers had been purchased. Then an additional 4,050 containers were purchased under a separate contract. The network of waste collection points was extended by 150 units. A US$13 million contract for delivery of 182 collection vehicles and special vehicles was signed and these vehicles were delivered.

A new sanitary landfill will be developed in the area neighbouring the existing Akhangaran landfill. This new landfill will have capacity for the next seven years, with the possibility of extension for the following 50 years.

### *Other cities*

### Waste collection

Collection of MSW in other cities is carried out by municipal and private companies. MSW is typically accumulated in MSW collection points fenced off with brick walls, usually without containers, or is accumulated at the curbside or delivered to a passing collection vehicle. Collected waste is transported out of the city to the municipal dump.

Although responsibility for waste management was assigned to local administrations (khokimiyats), in practice, the main responsibility falls to makhallas (traditional self-governing communities) and shirkats (apartment block owners' associations). Shirkats are subordinated to makhallas. The population of a makhalla may be about 2,000–3,000 people, while that of a shirkat is typically 200–500 people. Leaders of makhallas and shirkats decide where waste collection points are established, assign persons responsible for their maintenance, often collect additional money to ensure that waste is collected (besides regular waste fees paid by the population), agree collection schedules and, in the event a regular collection vehicle fails to collect waste, hire a private truck and driver to transport waste.

All makhallas have their own street sweeping staff and streets are cleaned on a daily basis; thus, littering is not considered a problem. If a waste bag is dropped on the way to a waste collection point, the street sweeping staff must carry it to a waste point.

Daily collection is a standard requirement, defined by the legislation and requested by the population. But this creates a pressure on collection companies as they usually do not have enough vehicles to meet this requirement. This situation is caused by the lack of containers, irregular or no cleaning of them and bad experience with using old types of containers, which are rectangular, leave waste remains in the corners and generate odours.

The problem of ensuring regular and reliable collection of MSW is considered by central and local administrations, who are searching for optimal service arrangements. Municipal companies are gradually being replaced by private companies, but the private sector is still too weak to meet the challenge. Regular waste collection is a new market for private companies, which lack experience in this type of service, as, traditionally, private companies were providing waste collection for individual or small businesses on an irregular basis. Also, specialized collection vehicles are owned by the municipality, which does not allow a private company to introduce its own operational standards, but it must improvise with the equipment available to provide a waste collection service. The latest government initiative started in 2017 with the creation of Toza Khudud (Clean Zone) enterprises on a regional basis, which should develop a countrywide infrastructure for integrated waste management.

## Waste disposal

The number of dumpsites used in Uzbekistan is known (table 10.3) but details of their operation are not yet collected and summarized. Typically, cities other than Tashkent dispose of their waste on allocated sites, usually on the city outskirts. Such sites do not include barriers controlling pollution or surface water control. Access control is limited to recording vehicles entering the site. Dumpsites are often scavenged for plastics and metal by local people. Sites are regularly set on fire to make space for additional waste.

The unsatisfactory situation in waste disposal was recognized by the Government and one of the responsibilities of Toza Khudud enterprises is to replace existing dumpsites by controlled landfills.

## Toza Khudud enterprises

Activities of Toza Khudud enterprises are focused on increasing the population coverage of waste services. Coverage was estimated at 22 per cent in 2016,

increased to 53 per cent in 2018 and is projected to reach 83 per cent in 2021. This was achieved by the purchase of 210 new collection vehicles in 2018 and it is planned to purchase 510 additional vehicles in the period 2019–2021.

Toza Khudud enterprises are also implementing new systems on waste collection and disposal. Regional plans were developed to support the switch from direct transportation to uncontrolled dumpsites, towards the introduction of transfer stations and managed landfills. This would reduce the number of active disposal sites and decrease environmental risks of waste disposal.

### *Vehicles used in waste management*

Changes in vehicles used for street cleaning and waste collection between 2011 and 2017 are shown in table 10.4. The number of specialized waste collection vehicles doubled in this period. This has improved the situation mainly in cities other than Tashkent, where "Makhsustrans" operates a fleet of 540 waste collection vehicles.

**Table 10.4: Vehicles used in waste management and street cleaning, 2011, 2017, number**

|                            | 2011  | 2017  |
|----------------------------|-------|-------|
| Street washing vehicles    | 244   | 247   |
| Waste collection vehicles  | 1 077 | 2 079 |
| Snow removal vehicles      | 19    | 21    |
| Sewage trucks              | 166   | 205   |
| Other trucks               | 264   | 432   |

*Source:* State Committee on Statistics, 2017.

### *Sorting waste*

Sorting of MSW waste is not yet formally introduced as a national policy, but the informal sector and private companies are active in recovering recyclables from waste. The recycling rate was estimated to be 5–10 per cent[23] in 2017. The actual recycling rate could be higher considering that the separation is done on several levels. First, the operators of manned waste collection points are sorting out recyclables. Then, the personnel on collection vehicles are also separating out recyclables, which are stored in large plastic bags hanging from the collection vehicle. Finally, separation is being done on disposal sites, which are visited by large groups of scavengers. Separated recyclables, mainly plastics, paper and metal scrap, are purchased by "middlemen" or agents who sell recyclables to processing companies.

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[23]   Central Asia Waste Management Outlook, Zoï Environment Network, UNEP, ISWA, 2017.

The first waste sorting plant with a capacity of 180,000 tons/year was put into operation in Angor District of Surkhandarya Oblast in January 2018.

## 10.2 Practices and trends in the management of other waste

Waste generation is regulated by defining waste generation norms for each type of waste. These norms define how much waste a company is generating as a percentage of raw material or per unit of production. This approach is used because the practice of weighing waste has not been introduced in Uzbekistan. Based on the waste generation norm, a limit on temporary waste storage is established.

### *Manufacturing waste*

Manufacturing includes the textile, automotive, food processing, machinery and construction industries (chapter 15). Typically, large companies may operate several factories with the same or a similar type of production. This allows straightforward introduction of waste management rules specific for a manufacturing sector and supports knowledge transfer between factories controlled by one company.

Companies manage their waste in-house, using their own transportation and own disposal sites, located close to factory premises. Private sector provision of specialized waste management services is not yet sufficiently developed.

Statistics on waste are categorized by hazard and toxicity classes. Categorization of waste by industrial sector is not available. The increase of industrial waste generation in the period 2010–2013 was caused by improvements in waste reporting, rather than by an actual increase in the amount of generated waste (table 10.5).

### *Mining and quarrying waste*

Uzbekistan is rich in mineral resources, the most important being gold, uranium, copper, coal, oil and gas (chapter 15). Mining companies are organized as combines, in which one company exploits several mines, processes extracted ore and also produces equipment needed for mining (drills, pipes, machinery) and, in the case of gold, may also produce jewellery.

This set-up of mining companies has a positive impact on waste management since all waste generated from several mine operations is the responsibility of one legal body. Being aware of that responsibility, mining companies are operating adequate tailing and dumping facilities for mining waste. Also, possibilities for recycling are often found in-house, and thus the need for transferring waste to another legal body is limited.

The Navoiy Mining and Metallurgical Combine (NMMC) is mining uranium and gold. Uranium is extracted by in-situ leaching, which minimizes waste (chapter 12). Gold mining is conducted in open pit mines, which are 3–5 km wide and about 500 m deep.

The Almalyk Mining and Metallurgical Combine (AMMC) is mining copper, silver, gold, molybdenum, tungsten, zinc, cadmium and selenium. As at January 2019, it operates the following waste facilities:

- Tailing pond No. 1 contains 546 million tons of enrichment tailings, with annual input of 6.7 million tons and its operation is planned until 2025;
- Tailing pond No. 2 contains 775 million tons of enrichment tailings, with annual input of 27.8 million tons;
- Kalmakir mine dumpsites A-7 and A-8 accumulated 74.5 million ton of sulphide ores;
- Kalmakir deposit dumpsites No. 39, 9, 10, 8a and A-4 accumulated 63.8 million tons of oxidized ores;
- Chadak gold recovery plant, Shinavazsai tailing pond contains 1.8 million tons of concentrate tailings and was operated from 1970 to 1979;
- Chadak gold recovery plant, Rezaksai tailing pond contains 6.9 million tons of concentrate tailings, with annual input of 185,000 tons; it was operated from 1979 and plans to close in 2019;
- Angren mine tailing pond accumulated 16.4 million tons of enrichment tailings, with annual input of 642,000 tons and its operation is planned until 2020;
- The copper enrichment facility (CCF) has disposed of slag from its operation onto a dumpsite since 1964. As at March 2019, the dumpsite contained 7.6 million tons of slag. Since 1998 this slag is sent for reprocessing to CCF-2, which produces concentrates of copper (68 per cent), gold (50 per cent) and silver (53 per cent). Approximately the same amount of slag sent from CCF to the dump is extracted for reprocessing to CCF-2.

The average annual production of coal in Uzbekistan is about 4 million tons. JSC Uzbekcoal is mining lignite through open pit mining; 85 per cent of coal mined in the country is used in Angrenskaya and Novo-Angrenskaya TPPs.

**Table 10.5: Industrial, including mining, waste, 2010–2017, million tons**

|                  | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 | 2016 | 2017  |
|------------------|------|------|------|------|------|------|------|-------|
| **Industrial waste** | 41.3 | 78.2 | 87.0 | 107.0 | 98.0 | 101.0 | 104.0 | 114.7 |

*Source:* State Committee on Ecology and Environmental Protection, 2018.

Oil and gas mining is managed by the company Uzbekneftegaz, in cooperation with foreign companies. This leads to implementation of modern waste management systems for drill cuttings and similar waste generated in the oil and gas sector. For example, Lukoil Uzbekistan Operating Company has constructed and operates waste management facilities for drilling cuttings on the Khauzak, Southwest Gissar, Kandym and Shady oilfields.

Information on waste generated by the mining sector is limited. The system of collection of waste management data based on four hazard classes does not allow the clear identification of types and amounts of mining waste.

### *Waste from the energy sector*

Uzbekistan's 10 thermal power plants (TPPs) use natural gas as their main fuel. About 4 per cent of electricity in the country is generated from burning coal in the Angrenskaya and Novo-Angrenskaya TPPs (table 12.5(a)). Angren coal is of poor quality and has high ash content. Ash and slag are stored on four dumpsites, amounting to a total of 15 million tons.

Ash and slag are generated in the range of 600,000–700,000 tons per year. There is an increasing trend to recycling this waste: in 2015, the recycled share was 12 per cent, and this had increased to 30 per cent in 2017. The main use for waste from the energy sector is in the production of cement and construction materials.

### *Construction and demolition waste*

Tashkent City is implementing large infrastructure and housing projects. Information on construction and demolition waste is not available. Transportation and disposal of construction and demolition waste is not controlled. Strict control of the transportation of construction and demolition waste is planned – vehicles will be GPS tracked and marked with a Quick Response (QR) code to allow fast identification of a vehicle's route and destination.

Construction and demolition waste is often used as filling material.

It is accepted practice that residents scavenge demolition waste and reuse windows, doors, beams or bricks.

### *Agricultural waste*

Livestock husbandry occurs mainly on grazing pastures on smaller plots of dekhan farms and homestead land, and manure is traditionally used as natural fertilizer. GEF and UNDP are financing the introduction of anaerobic digestors to farming communities where larger amounts of manure are generated, as a source of renewable energy from generated biogas. About 45 anaerobic digestors were in operation in 2017 and the Government has plans to increase their number to more than 700 by 2020. Implementation of this programme would reduce the negative impact of manure waste on the environment.

The main crops in Uzbekistan are cotton and wheat. Traditionally, waste from cotton is used as fuel or is burned in the field. Cotton seeds are used for production of oil, which is used as an addition to animal fodder.

Consumption of fertilizers has increased continually, from 193 kg/ha in 2009 to 233 kg/ha in 2016 (figure 13.5). According to the 2017 data, the volume of pesticides applied to arable land was 0.4 kg/ha. The area of pesticide application to cotton and wheat increased to almost 5 million ha in 2018 (table 13.3).

### *Hazardous waste*

Uzbekistan classifies hazardous waste based on four hazard classes that cover 134 types of waste. These classes are based on toxicity and do not reflect all hazardous properties as defined in the Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention). The Uzbek system of classification considers only health aspects and not complex environmental protection aspects. Published data on hazardous and non-hazardous waste from manufacturing are presented separately for large companies and for small companies and distinguish between waste suitable or not suitable for recycling (table 10.6).

**Table 10.6: Manufacturing waste, 2017, tons/year**

|  | Total | 1 class | 2 class | 3 class | 4 class | 5 class |
|---|---|---|---|---|---|---|
| **Large companies** |  |  |  |  |  |  |
| Toxic waste, of which: |  |  |  |  |  |  |
| Not suitable for recycling | **41 584 845** | 2 113 | 525 | 464 | 41 581 742 | .. |
| Suitable for recycling | **42 830 703** | 1 047 | 7 911 | 7 064 | 42 814 681 | .. |
| Non-toxic waste, of which: |  |  |  |  |  |  |
| Not suitable for recycling | **21 031 320** | 6 | 2 600 | 27 562 | 3 652 | 20 997 500 |
| Suitable for recycling | **9 081 449** | 25 | 967 762 | 6 844 071 | 320 950 | 948 641 |
| **Small companies** |  |  |  |  |  |  |
| Toxic waste, of which: |  |  |  |  |  |  |
| Not suitable for recycling | **3 257** | 86 | 56 | 37 | 3 078 | .. |
| Suitable for recycling | **4 178** | 66 | 106 | 2 391 | 1 616 | .. |
| Non-toxic waste, of which: |  |  |  |  |  |  |
| Not suitable for recycling | **100 538** | 1 104 | 23 | 1 178 | 1 509 | 96 724 |
| Suitable for recycling | **73 142** | 6 | 7 543 | 9 517 | 8 550 | 47 527 |

*Source:* Statistical bulletin "Main indicators of nature protection and rational use of natural resources, forestry and hunting for 2017", 2018.
*Note*: The table presents annual reported generation of manufacturing waste. Although a fifth class is not formally defined, all waste with properties below the fourth hazard class is categorized as being in a fifth class.

*Medical waste*

The generation of medical waste in health-care facilities in Uzbekistan is estimated at 20,000 tons per year. Medical waste is divided into five groups:

- A: non-hazardous waste, similar to municipal waste;
- B: hazardous waste;
- V: highly hazardous waste (infectious);
- G: waste similar to industrial waste;
- D: radioactive waste.

Single-use containers are used for needles and sharp items and transported to disposal sites. The use of containers for other types of medical waste is not common practice, as hospitals do not have budget allocated for this type of consumable.

In Tashkent City, non-hazardous waste (groups A and G) is transported directly to a disposal site. Hazardous waste (group B) is first sterilized in a 0.5 per cent chloride solution for 10 minutes and then sent to landfill. Liquid waste of group B (blood, vomited matter, urine and fecal matter) and similar biological liquids are allowed to be disposed to a centralized sewerage system. Where a centralized sewerage system is not available, this category of waste is disinfected using chemical and physical methods.

In medical institutions in district centres, syringes and similar waste are collected into cardboard boxes and then burned in simple muffle furnaces that do not meet the modern requirements, including for environmental safety.

Highly hazardous waste of group B undergoes autoclave treatment at 132°C for 20 minutes in those places where it is generated.

A specialized service for collection and treatment of medical waste is not available in Uzbekistan, although there is demand for such a service, mainly from private health-care facilities.

Public hospitals face challenges to comply with rules and requirements on safe handling and treatment of medical waste, due to limited funds being allocated in hospital budgets for medical waste management.

*Radioactive waste*

Radioactive waste is generated from the operation of nuclear fuel cycle facilities, research reactors and radiation sources used in research, medicine and industry. Large amounts of radioactive waste are accumulated in the uranium mining process.

The Institute of Nuclear Physics of the Academy of Sciences has operated a WWR-SM reactor since 1959 and the SUE Republican Burial Site for Radioactive Waste has operated since mid-1970. There is also an older radioactive waste storage facility at the Institute, which was operated from 1950 to 1970. The Institute is located near the village of Ulugbek, in Mirzo-Ulugbek District of Tashkent City.

The WWR-SM research reactor in the Institute is water cooled, has a capacity of 10 MW and is expected to continue operation until 2022. The plan for its decommissioning is already prepared. A temporary

storage facility for spent fuel is located near the reactor.

The Republican Burial Site for Radioactive Waste includes storage for high-level, low-level and liquid radioactive waste. The site is located 60 km north-east of Tashkent and 10 km south-east of the town of Chirchik, at an altitude of 800 m.

A subsidiary of the Institute, the SUE "Radiopreparat", has used a storage facility for filters, containers and other contaminated equipment since 1976.

A significant proportion of the radioactive waste was formed during the development of the Soviet Union's nuclear industry and accumulated on the mined-out uranium deposits in the Chatkalo-Kuramin region and Kyzylkum region excavated by NMMC.

There are 16 radioactive storage facilities in Uzbekistan, for all types of radioactive waste, with a total capacity of more than 5,000 $m^3$. Three of them are full and sealed and five are empty and ready to receive waste.

Mining of uranium by NMMC resulted in the accumulation of 1.4 million $m^3$ of ore in Uchkuduk. NMMC is performing rehabilitation works to minimize environmental impact in the central Kyzylkum region, which includes Uchkuduk, Zarafshan and Zafarabad.

NMMC operates a disposal site for solid radioactive waste in cell 6A of the tailing pond RU MMP-1. The area of the tailing pond is 630 ha and contains 57 million tons of radioactive waste. NMMC performs rehabilitation works on the tailing pond; already, 18 million tons of processed gold-bearing ore has been deposited over the radioactive waste on an area of 290 ha.

Accumulation of radioactive waste and radioactive contamination from uranium mining was identified in the past in Charkesar mine, where there is 482,000 $m^3$ of waste on an area of 20.6 ha, and in Yangiabad uranium ore field, where there is about 500,000 $m^3$ of waste and an area of 50 $km^2$ is contaminated by radioactivity. These areas were partially decontaminated and fenced off to minimize risk to the local population. Rehabilitation works in Yangiabad were carried out from 2006 to 2015. In Charkesar, works started in 2002. Assistance from international donors for cleaning up these legacy sites is provided through the multilateral fund Environmental Remediation Account for Central Asia, managed by the EBRD (chapter 6). The costs of remediation are

assessed at US$85 million and the remediation is expected to be finished in 2027.

*Persistent organic pollutants waste*

Uzbekistan is not a party to the 1998 Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention). In 2019, it became a party to the 2001 Convention on Persistent Organic Pollutants (Stockholm Convention). Information on POPs is not openly available.

Large amounts of pesticides have been used, especially in cotton farming. Unused and obsolete pesticides have accumulated in many places in the past, and present environmental and health risks. Many of the polluted sites have been excavated and pesticides and contaminated soil were disposed of in centralized sites and storage facilities. There are 14 burial sites where at least 18,375 tons of obsolete pesticides are buried or otherwise disposed of. There are also five central storage facilities holding a total of 1,350 tons of obsolete pesticides. This information is based on the national inventory of POPs conducted in 2001 and 2009 with support of the UNEP project "Inventory of Obsolete, Unwanted and Banned Pesticides in the Republic of Uzbekistan" and the World Bank-funded pilot project "Technical Study of Obsolete Pesticides in Uzbekistan". Newer data are not available.

Uzbekistan does not have a facility for safe destruction of pesticides, but the Navoiy Electrochemical Factory receives metallic containers, previously used for pesticides, for shredding and disposal.

*Specific waste streams*

Uzbekistan has not yet introduced a specific waste streams approach by formulating strategies and targets for these streams, but the private sector is already active in processing recyclables. SCEEP is preparing a new reporting system for recyclables based on reporting from companies processing recyclables. An overview of identified waste processing companies is presented in table 10.7.

The capacity of waste processing companies exceeds supply from agents buying recyclables; therefore, waste for recycling is imported from neighbouring countries. This is a good position before implementation of recycling programmes as there will be enough processing capacity for separated waste from the domestic sources.

**Table 10.7: Recycling companies and amount of processed waste**

|  | Companies (number) | Processed waste (tons) |
|---|---|---|
| **Total** | **183** | **631 360** |
| Polyethylene | 72 | 34 391 |
| Paper | 65 | 90 990 |
| Tyres and rubber | 16 | 35 549 |
| Textiles | 1 | 7 000 |
| Glass | 7 | 11 137 |
| Oils | 1 | 35 000 |
| Metals | 10 | 215 897 |
| Other | 11 | 201 396 |

*Source:* State Committee on Ecology and Environmental Protection, 2018.

## 10.3    Transboundary movement of waste

Uzbekistan has been a party to the Basel Convention since 1996. Transboundary movement of waste in the period 2015–2017 is shown in table 10.8. Earlier data are not available.

**Table 10.8: Transboundary movement of waste, 2015–2017**

|  | 2015 | 2016 | 2017 |
|---|---|---|---|
| Imports |  |  |  |
| Number | 3 342 | 3 428 | 3 307 |
| Amount (t) | 581 889 | 427 599 | 165 484 |
| Exports |  |  |  |
| Number | 266 | 301 | 379 |
| Amount (t) | 4 318 | 3 092 | 23 409 |
| Transit |  |  |  |
| Number | 142 | 147 | 119 |
| Amount (t) | 7 924 | 7 932 | 5 909 |

*Source:* State Committee on Ecology and Environmental Protection, 2018.

Uzbekistan imports waste from Kazakhstan, Kyrgyzstan, the Russian Federation and Tajikistan. Exports are weighted towards the People's Republic of China and the Russian Federation. Imported waste, mainly metal, plastics and paper, is used as input for waste recycling companies. Exported waste is metal slag and metal scrap.

## 10.4    Practices and trends in chemicals management

The National Profile on Management of Chemical Substances was prepared in 2012 by the State Committee for Nature Protection and the United Nations Institute for Training and Research (UNITAR) with support under the Strategic Approach to International Chemicals Management (SAICM). This report contains data from 2008, 2009 and 2010. The National Profile does not provide enough information on chemicals management.

*Production*

According to the National Profile, the main chemicals in the country are mineral fertilizers (1.1 million tons in active substances per year), crude oil (4 million tons/y), primary processing of crude oil (4.3 million tons/y), ammonia (1.3 million tons/y) and sulphuric acid (1.1 million tons/y).

The main producer of chemicals is the company Uzkhimsanoat, which includes 12 industrial facilities producing nitrogen, phosphorus and potash fertilizers.

*Imports and exports*

According to the National Profile, about one third of produced mineral fertilizers was exported. Exports also included calcinated soda (30,000 tons/y), nitric acid (14,600 tons/y), ammonia (14,500 tons/y), nearly all cotton cellulose (3,700 tons/y) and sodium chlorate (5,700 tons/y).

Imports reported by Uzkhimsanoat in the National Profile were relatively small. The main imported substances were unprocessed phosphate (39,600 tons), magnesium chloride (5,600 tons), granulated polypropylene (1,040 tons) and barium carbonate (less than 600 tons).

The National Profile does not provide information on storage and transportation of chemicals. This report states that there is very limited information on the use and disposal of chemicals covered by SAICM.

*Chemicals emergency preparedness, response and follow-up*

Uzbekistan does not have specific legislation on chemical emergency preparedness and response. Chemical emergencies are included in the general framework of technogenic emergencies. The Ministry of Emergencies plans and performs training and operates local bases where personnel and equipment are located. Depending on the extent of emergency situations, Civil Defence can be involved by a decision of the Prime Minister.

Factories or parts of a factory are classified as hazardous production facilities if they have on their territory flammable, explosive, toxic or other material endangering human health or environment. Facilities performing mining or smelting activities or where equipment is operated under pressure are also

hazardous. These facilities classified as hazardous are required to develop emergency response infrastructure (e.g. firefighting systems), develop emergency response plans and ensure that employees are regularly trained.

A national system of early warning and response in emergency defines that the head of a region (khokim) is responsible for applying one of the three emergency regimes.

## 10.5 Pressures from waste and chemicals on the environment

### *Air*

Fires on municipal dumpsites are frequent, releasing pollution into the atmosphere. Setting waste on fire is used as a method of reducing the amount of waste dumped and gaining access to previously dumped metal scrap. On the Akhangaran landfill, which receives the large amount of waste from Tashkent City, self-ignition of waste also occurs due to inadequate landfill gas venting. Fires on dumpsites can be minimized by introducing controlled waste disposal and improved access control. SCEEP has started a programme for planning and development of a nationwide network of transfer stations and modern landfills in 2018.

Dust containing radioactive matter or metals from tailing ponds and waste ore heaps created from mining and processing of ore can spread to surrounding areas. The spreading of dust has an impact on soils, land and water, and potentially also on biodiversity, ecosystems and human health. The spreading of dust can be minimized by maintaining an appropriate water level in tailing ponds and rehabilitation of unused tailing ponds and ore heaps. Uzbekistan is implementing rehabilitation measures on several historical hotspots and large tailing ponds operated by mining companies.

### *Water*

MSW illegally dumped into rivers or in water protection areas affects water quality, especially in the event of flooding. This risk can be minimized by improved waste collection and its transportation to controlled landfills. SCEEP has been investing in collection equipment since 2017 to increase the coverage of the population by waste collection services.

### *Soil and land*

Pollution to soil and land is a secondary result of the transportation of waste or its components by air or water. Because production and disposal facilities are located close to each other, it is difficult to distinguish whether results of soil monitoring show increased values of heavy metals and radiation originating from mining and processing activities or from waste disposal.

### *Landscape*

Accumulation of waste in disposal sites or tailing ponds is a visual disturbance to the landscape. This can be observed in areas of mining and ore processing activities. Uncontrolled disposal and illegal dumping are common practice in Uzbekistan and also result in landscape damage.

The negative impact of waste on the landscape can be minimized by remediation of dumpsites, but such projects have not yet started in Uzbekistan.

### *Biodiversity and ecosystems*

Waste dumpsites have localized impact and usually do not represent a threat to biodiversity and ecosystems. Information on the direct impact of waste management activities on biodiversity and ecosystems is not available.

### *Health of selected population groups*

Scavengers are exposed to fumes from burning disposal sites or to injury from disposed waste. Data on the number of scavengers in Uzbekistan or number of accidents on disposal sites are not available.

Specific impacts on human health have occurred in areas where the mining of radioactive material formerly took place. Uzbekistan has already implemented measures (land reclamation, fencing, rainwater run-off control, dismantling of abandoned facilities, blocking of access to mines) to minimize the impact of these sites on the local population.

### *Development and well-being of local communities*

Well planned, reliable and efficient waste management is one of conditions for the sound development and well-being of local communities. Uzbekistan started to implement a nationwide waste collection and disposal system, but it is too early to assess the impact of these changes.

## 10.6    Legal, policy and institutional framework

### *Legal framework*

The 2002 Law on Waste describes the responsibilities of authorities on the state, regional and local levels and the rights and duties of companies and citizens in the sphere of waste management. Further, it introduces waste norms, environmental certification of waste, and the requirement to keep national records of imported, exported and generated waste, national list of sites where waste is treated or disposed of and waste passports. The Law defines compensation payments for disposal of waste, which are similar to a landfill tax.

The Law was amended in October 2018 to introduce new definitions of waste management and treatment, and of sites where waste is managed, and also the responsibility of waste producers to finance waste recycling and minimization. These amendments are in line with international practice in waste management.

The Law on Waste defines only general responsibilities and rights, while details are formulated in subsidiary legislation introduced by national, regional and local authorities. Traditionally, waste was regulated by hygiene/sanitary authorities in the form of sanitary rules and norms (SanPiNs) and waste legislation issued by the national authority responsible for the environment was added later.

Classification, inventory, storage and treatment of industrial waste are defined in the 2002 SanPiN No. 0127-02. These rules introduce four classes of hazard/toxicity and the method of calculation of hazard class, which is based on the toxicity (Lethal Dose, 50 per cent (LD50)) of individual waste components. They also introduce the form for keeping records of industrial waste within an enterprise and the form for a waste passport. These forms are used by waste generators but a national summary is not available.

The 2011 SanPiN No. 0300-11 provides additional rules for non-hazardous/non-toxic waste and introduces division of industrial waste by disposal or recycling. This SanPiN requires monitoring of the environmental impact of disposed waste.

A system for classification of wastes is presented in the 2002 SanPiN No. 0128-02, which provides a list of 134 waste types according to their hazard or toxicity class. The list includes only selected toxic waste types and cannot be used as a general system, as non-hazardous wastes are not included. For comparison, the EU system lists more than 600 waste types.

The 2004 SanPiN No. 0157-04 defines rules for disposal of municipal waste and includes morphology and physical-chemical characteristics of municipal waste and default generation norms. These rules also include requirements on site selection and development and operation of a disposal site, but they do not meet internationally recognized standards for landfills. These rules were not enforced due to underfinanced waste services: operators did not have funds to develop disposal sites to these standards.

The 2011 SanPiN No. 0297-11 defines rules for sanitary cleaning of residential areas and standards for waste collection and rules for inspections of residential areas.

The 2004 SanPiN No. 0158-04 regulates asbestos waste management. Asbestos waste is considered to be moderately or low-level hazardous/toxic and it is permitted to dispose of asbestos waste together with municipal waste. This approach is not in line with international practice, which considers asbestos waste as hazardous and requires its disposal in a dedicated landfill.

The 2011 Resolution of the Cabinet of Ministers No. 266 regulates the collection of mercury-containing lamps. Sellers of these lamps shall collect old lamps and send them for mercury removal to lamp producers or importers. The system of financing the collection of mercury-containing lamps is based on the extended producer responsibility principle, as the producer of these lamps shall cover the cost of collection and mercury removal.

The 2013 Resolution No. 2438, jointly adopted by the then State Committee for Nature Protection, the Ministry of Finances, Ministry of Emergencies and Ministry of Health, concerns the transportation and disposal of toxic chemicals and other toxic substances and operation of special disposal sites. Toxic chemicals regulated by this legislation are obsolete pesticides. This act defines the conditions under which pesticides become obsolete and requires that obsolete pesticides are transferred to the company "Qishloqhojalikkimyo" for disposal.

The 2014 Resolution of the Cabinet of Ministers No. 295 requires waste generators to keep records of toxic and non-toxic waste and report this information to the State Committee on Statistics in order to improve information on waste. Enterprises submit data on waste (in fact, waste is a section of the statistical form "1-ECO: report on nature protection") to the territorial bodies of SCEEP, which verify it and forward to the territorial bodies of the State Committee on Statistics. The Resolution also formulates the rights and duties of

SCEEP when performing inspection of waste-related activities.

The 2018 Resolution of the Cabinet of Ministers No. 765 "On measures to improve the system of allocation of territories for provision of waste collection services" has enabled private companies to provide waste collection services to regional authorities. This decision introduced a system for selection of waste services providers by electronic auction. The regional authority (i.e. the Council of Ministers of the Republic of Karakalpakstan, oblast khokimiyats or Tashkent City Khokimiyat) is responsible for presentation of the territory that will be serviced by a private company. Private companies participating in a tender prepare documentation proving their capacity to provide the requested services. The selected company concludes a contract on provision of waste services with the regional authority.

The entry of private companies into provision of waste services, which were traditionally provided by municipal companies, required regulation of their activities. The 2019 Resolution of the Cabinet of Ministers No. 95 established rules for the provision of waste collection and removal services and defined the rights and duties of private companies and their clients. These rules shall be further specified in the contract on provision of waste services. In addition to technical requirements, which include types of waste to be collected and transported, these rules also present financial requirements, which include methods of waste fees collection and recovery of debts from unpaid waste fees.

The 2018 Resolution of the Cabinet of Ministers No. 787 defines rules for the siting and operation of waste infrastructure and MSW management. This document provides guidance on placement of public dustbins and development of container stands and stipulates that apartment block areas shall be equipped with containers and for private houses areas the "bring" system shall be used. It defines rules for the collection of bulky waste, construction waste, waste from the operation of vehicles, including end-of-life vehicles, green waste from parks, liquid municipal waste and hazardous municipal waste. It also introduces the requirement to provide containers for separate collection, transportation and disposal of municipal waste. The disposal of recyclables is banned by this decision. Street cleaning requirements by season (summer/winter) are also defined and responsibility for inspection and control is assigned to the local administration.

The 2017 Order of the President No. 5057 approved the lists of special equipment and components not produced in Uzbekistan, and therefore imported, to facilitate the creation of a system for the collection, transportation, recycling and disposal of municipal waste in cities. Such equipment and components were exempted from import duties.

The 2000 Resolution of the Cabinet of Ministers No. 151 regulates transboundary movement of waste, requires that waste that will be imported or exported must pass "ecological certification" and defines a list of wastes that are subject to this certification.

The 2018 Resolution of the President No. 3730 defines the collection vehicles and containers needed for Toza Khudud enterprises, indicates the number of dumpsites that need improvement and the type of improvement required. It also exempted Toza Khudud and "Makhsustrans" from the road tax and import tax on waste collection vehicles and equipment, as well as the land tax. This Resolution also banned the use of plastic bags thinner than 40 microns and the distribution of plastic bags free of charge.

The 2017 Resolution of the President No. 2916 "On measures for drastic improvement and development of waste management system for 2017–2021" introduced the system of Toza Khudud enterprises as a new system for providing waste collection and disposal services. This Order includes a list of actions aimed at improvement of municipal waste management, targeting collection and transportation of municipal waste, development of dumpsites and closure of illegal sites and development of recycling, and also education, training and awareness in waste management. Actions planned for the first phase until 2017–2018 included strengthening of the collection fleet with new vehicles, establishment of Toza Khudud enterprises and legislative changes, and have already been implemented.

The 1999 Law on Protection of the Population and Territory from Natural and Man-made Disasters defines the rights and responsibilities of state authorities and of the population on preparedness and response and aims to prevent the occurrence and expansion of emergency situations, reduce losses from emergency situations and provide adequate response.

The 2006 Law on Industrial Safety of Hazardous Production Facilities defines criteria for classifying a production facility as hazardous. It also defines requirements on the design, construction and operation of hazardous production facilities, and requirements on the training of employees and planning and preparation for emergency situations. According to this Law, technical equipment used in a hazardous production facility must be certified and

individual activities/processes must be licensed. Hazardous production facilities are subject to industrial safety expertise and must have insurance to cover expenses in the event of an accident causing damage to health, property or the environment. An industrial accident must be investigated by a governmental commission.

*Policy framework*

Strategy on Municipal Solid Waste Management for the period 2019–2028

The 2019 Strategy on Municipal Solid Waste Management for the period 2019–2028 (2019 Resolution of the President No. 4291) is a follow-up to two previous acts of the President (2017 Decree of the President No. 5024 and 2018 Resolution of the President No. 3730) that started the process of modernization of municipal waste management.

The Strategy is focused on development of a countrywide system of collection and disposal of municipal waste and allocation of the financing needed for its completion. The Strategy expresses support for actions on waste minimization and recycling. Its implementation necessitates the involvement of the private sector and private investments. The Strategy defines a set of progressive targets for waste management (table 10.9), which the existing Law on Waste is unable to support.

An important component of the Strategy is the introduction of centralized and controlled landfilling. Disposal sites shall be monitored, and existing sites will be prioritized by risk assessment, to identify where urgent action is needed. The Strategy contains an annex that defines for each oblast where landfills and transfer stations have to be developed.

The Strategy stipulates that financing of the municipal waste management system should be strengthened by the introduction of the "polluter pays" principle, the allocation of governmental funds and an increase in user fees, while recognizing social impacts. Financing should cover not only the transportation of MSW but also the cost of recycling and disposal and investment costs of required infrastructure. The Strategy suggests combined financing from waste fees and governmental subsidies.

Concept on Environmental Protection until 2030

The 2019 Concept on Environmental Protection until 2030 (2019 Decree of the President No. 5863) goes beyond MSW to also cover other types of waste. With regard to industrial waste, the Concept provides for: the introduction of a waste classification system based on industrial sectors and/or chemical-physical characteristics; economic incentives for the introduction of no-waste and low-waste production technologies; incentives for the introduction of technologies for processing and disposal of mining and quarrying waste; and ensuring the organization of environmentally safe storage of hazardous waste at industrial sites.

The Concept also refers to the need for a system for handling the specific waste streams (mercury-containing lamps and devices, batteries, etc.) and for medical waste management.

Sustainable Development Goals and targets relevant to this chapter

The current stand of Uzbekistan vis-à-vis targets 3.9, 11.6, 12.4 and 12.5 of the 2030 Agenda for Sustainable Development is described in box 10.1.

**Table 10.9: Targets of the Strategy on Municipal Solid Waste Management for the period 2019–2028, per cent**

|  | 2021 | 2025 | 2028 |
|---|---|---|---|
| Population covered by waste collection services | 85 | 100 | .. |
| Recycling of MSW | 25 | 45 | 60 |
| Specific waste streams recycling | 10 | 15 | 25 |
| Diversion from disposal | 25 | 45 | 60 |
| Upgrading of disposal sites to comply with legislation | 25 | 65 | 100 |
| Remediation of closed disposal sites | 20 | 65 | 100 |
| Use of alternative sources of energy on MSW treatment facilities | 15 | 25 | 35 |
| Monitoring of disposal sites | 20 | 75 | 100 |

*Source:* 2019 Resolution of the President No. 4291.

**Box 10.1: Targets 3.9 (chemicals management aspects), 11.6 (waste management aspects), 12.4 and 12.5 of the 2030 Agenda for Sustainable Development**

**Goal 3: Ensure healthy lives and promote well-being for all at all ages**
**Target 3.9: By 2030, substantially reduce the number of deaths and illnesses from hazardous chemicals and air, water and soil pollution and contamination**

Pesticides, kerosene, household chemicals and carbon monoxide are common causes of unintentional poisoning. Uzbekistan has established a legal framework regulating imports and use of chemicals.

With regard to global/national indicator 3.9.3 (Mortality rate attributed to unintentional poisoning), the trend of the mortality rate from unintentional poisoning in Uzbekistan has remained stable since 2000. According to WHO data, the mortality rate from unintentional poisoning in Uzbekistan was 1.0 person per 100,000 population in 2016; in 2000, it was 1.2 persons per 100,000 population. Unintentional poisoning occurs more often in the male population (1.5 per 100,000 population) than in the female population (0.5 per 100,000 population). The national data match the WHO estimates: according to the State Committee on Statistics, the mortality rate attributed to unintentional poisoning was 1.0 person per 100,000 in 2016 and 1.3 persons per 100,000 in 2017 (http://nsdg.stat.uz). The global average mortality rate from unintentional poisoning was 1.4 persons per 100,000 population, and for Europe it was 0.7 person per 100,000 population, in 2016.

Uzbekistan's national indicator 3.9.1 (Mortality rate attributed to toxic impact of chemicals per 100,000) is different from the global indicator 3.9.1 (box 8.3). The State Committee on Statistics provides no data on this indicator.

**Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable**
**Target 11.6: By 2030, reduce the adverse per capita environmental impact of cities, including by paying special attention to air quality and municipal and other waste management**

With regard to the global/national indicator 11.6.1 (Proportion of urban solid waste regularly collected and with adequate final discharge out of total urban solid waste generated, by cities), the coverage by regular collection is about 53 per cent of the total population in 2018, but reliable data on collected waste are not available. Dumpsites that comply with modern landfilling standards are not existent in Uzbekistan.

The country started a reform of its municipal waste collection and disposal system in 2016. If the reform of municipal waste management remains a priority, this target can be achieved by 2030 with respect to its waste management aspects.

**Goal 12: Ensure sustainable consumption and production patterns**
**Target 12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment**

The global indicator 12.4.1 refers to the number of parties to international MEAs on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement. For this indicator, countries are rated based on their participation in five agreements: the Basel Convention, Rotterdam Convention, Stockholm Convention, Montreal Protocol and Minamata Convention. Of these, Uzbekistan participates in the Basel Convention and Montreal Protocol, and since 2019 – in the Stockholm Convention. Implementation of the Basel Convention is limited and, since 2014, there has been no communication with the Convention Secretariat.

With regard to indicator 12.4.2 (Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment), Uzbekistan does not have reliable data on hazardous waste. Moreover, the definition of hazardous waste differs from practice in EU and OECD countries. The average annual amount of hazardous waste per capita in OECD countries is 150 kg per capita for the period 2006–2011, while Uzbekistan reports in average tons per capita as the sum of waste belonging to hazard classes 1, 2 and 3. The national value is 0.7 tons per capita in 2017 (http://nsdg.stat.uz/).

Due to inconsistency of the country's waste data classification system with international practice, it is not possible to assess the country's progress towards achieving target 12.4.

**Target 12.5: By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse**

Uzbekistan's national indicator 12.5.1 (Processing level of municipal solid waste, percentage) is narrower than the global indicator 12.5.1 (National recycling rate, tons of material recycled). The State Committee on Statistics provides no data on the national indicator. Material recycling of MSW in Uzbekistan is estimated at 9 per cent while the OECD average is 34 per cent. The ongoing reform of the municipal waste system is aimed, in its second phase, at achieving target 12.5.

With regard to the global indicator 12.5.1, the structure of data on industrial waste does not allow assessment of the overall recycling rate in Uzbekistan.

*Institutional framework*

Responsibility for waste management is divided among a number of institutions at the national, oblast and local levels.

The State Committee on Ecology and Environmental Protection (SCEEP) was restructured in 2017–2018, its responsibilities in waste management were strengthened and the institutional arrangements were restructured. The Department of Coordination and Organization of Waste Management is led by the Deputy Chairperson of SCEEP and employs 13 people. The Department is divided into: the Unit for Methodology and Regulation Development on Waste Management; Unit for Organization of Waste Management; Unit for Waste Disposal, Recycling, Burial and Processing and Introduction of Innovation; and Unit for Economic Analysis and Tariffs in Waste Management (figure 1.2).

Organizations directly subordinated to SCEEP include the Republican Association of Specialized Sanitary Cleaning Enterprises, SUEs "Toza Khudud" and SUE "Makhsustrans" (figure 1.1). The Republican Association of Specialized Sanitary Cleaning Enterprises acts as a coordinating body for investments, financing, purchasing, construction and development of infrastructure and equipment for municipal waste management.

The agency under the Ministry of Housing and Communal Utilities, Kommunkhizmat, prepares investment programmes on waste management for approval by the Cabinet of Ministers and monitors municipal waste management. These responsibilities overlap with those of the Republican Association. The Law on Waste mentions Kommunkhizmat among institutions with waste management responsibilities, but waste-related responsibilities are not specified in the Regulation on Kommunkhizmat (2017 Resolution of the Cabinet of Ministers No. 340).

The Ministry of Health ensures compliance with sanitary standards in waste management and defines sanitary norms for products made from waste. The Ministry prepares sanitary and epidemiological expertise for waste management facilities and methodology for classification of waste by hazard/toxicity classes.

The State Inspectorate for Supervision of Geological Exploration and Work Safety in Industry, Mining and the Household Sector under the Cabinet of Ministers (Sanoatgeokontekhnazorat) was responsible for the control and supervision of mining and processing waste from industries. It was also responsible for the proper management of radioactive waste materials. In December 2018, the State Inspectorate was transformed into the State Committee on Industrial Safety (Goskomprombez). The State Committee is responsible for implementing state policies and exercising control of radiation and nuclear safety at nuclear power facilities and over nuclear technology, as well as of industrial safety at hazardous production facilities.

The SUE "Sanoat Xavfsizligi" (Industrial Safety) provides services to industries in equipment testing and certification and provides industrial safety expertise

The territorial bodies of SCEEP are responsible for implementing national waste management programmes and approval of local waste management programmes. Their responsibility is also to decide about the siting of waste management facilities and enforcing waste management legislation. Local waste management programmes, if formulated at all, were not yet implemented.

Local authorities (khokimiyats) participate in the process of siting waste management facilities, promote sanitary cleaning of residential areas and timely payment of waste fees and perform state control of waste management facilities.

Coordination on waste management at national, regional and local levels

The waste management system is in the process of transformation, which is also changing the modalities of cooperation among institutions controlling the waste management system. The old system was not functioning. Cities were practically left alone to deal with MSW collection and disposal. Only the capital was under close control and municipal and national administrations there were cooperating well.

The system of cooperation among national, regional and local administrations was weak, due also to the lack of funds for financing waste management. Legislative requirements defined at the national level could not be implemented at the local level, because these requirements were not supported by allocation of the requisite funding.

Another limiting factor for effective cooperation in waste management is that the same body is assigned both implementation and inspection responsibilities. Therefore, it checks its own activities so might not wish to reveal its own shortcomings or failures. This situation is observed on several levels. For example, SCEEP is responsible for regulating, inspecting and

monitoring waste management and its structure includes "Makhsustrans" and Toza Khudud enterprises – companies that provide waste collection and disposal services. The territorial bodies of SCEEP are responsible for implementation of waste management programmes and support of waste management services in their respective administrative entities, as well as, simultaneously, for inspections of waste management. On the local level, most local administrations (khokimiyats) are operating local disposal sites and are simultaneously responsible for inspection of waste facilities. However, this situation is not specific to waste management and it is how the system of government in general works in Uzbekistan, in all sectors (i.e. there is no division of regulation from the provision of services).

### *Regulatory, fiscal and information measures*

<u>Permits</u>

Permits regulating waste management, as is known in international practice, are not used in Uzbekistan. No waste-related activities require a licence according to the 2000 Law on Licensing of Certain Activities. Instead, indirect or partial measures are used for limiting or regulating waste management. For this reason, no centralized register of issued permits is used in Uzbekistan. The legislative system assumes that a waste generator, transporter and operator of a recycling or disposal facility must comply with all legislation and, therefore, a site-specific permit is not needed. For example, the 2011 Resolution of the Cabinet of Ministers No. 35 on transportation of hazardous goods by road vehicles includes a list of hazardous goods that are permitted for transportation. Using this approach, a transport-specific permit is replaced by general legislation.

Environmental certification is used for regulating the transportation of waste and development of waste facilities and operations. Such certification is conducted by a company, albeit state-owned, and the legal status of such certification is different from a permit issued by a governmental body.

Also, setting norms for waste generation does not have the character of a permit. The norms related to waste generation are prepared by applicants. Local administrations only approve the proposals.

A system of integrated permits is not introduced in Uzbekistan.

<u>Taxes and fees</u>

The abolition of road tax (3 per cent of vehicle value) and import tax (10–30 per cent of vehicle value, depending on engine volume) for waste collection vehicles and equipment in 2018 (2018 Resolution of the President No. 3730) should help attract local companies to provide waste management services. Such fiscal instruments are used by countries that are improving their waste management systems.

Payment for waste services has been a topic of discussion between foreign donors and the Government since the Tashkent Solid Waste Management Project (1999–2006). Despite the need to ensure sustainability of waste services, the Government gave priority to socially acceptable prices. Waste fees for the population are based on monthly per capita payments. The level of waste fee is set by the collection company and approved by the local administration (khokimiyat).

Waste fees of "Makhsustrans" in Tashkent rose from 2,600 sum per person per month in 2014 to 4,500 sum per person per month in 2019, an increase by 73 per cent. But in real terms, taking consumer price inflation into account, there was an increase of only 15 per cent. In United States dollar terms, the waste fee dropped from US$1.1 in 2014 to US$0.5 in 2019, which reflects the sizeable depreciation of the national currency in the wake of the exchange rate liberalization in 2017. Private waste companies in Tashkent charge waste fees in the range of 3,300–3,500 sum (some US$0.4) per person per month. Legal entities (companies) are paying 41,900 sum (US$5.0) per $m^3$ per year. One person generates approximately 1.1 $m^3$ per year according to the waste generation norm and pays 54,000 sum per year. This corresponds to 49,090 sum per $m^3$, some 17 per cent more than legal entities have to pay.

The deterioration of MSW infrastructure and reduction in availability of waste services is the result of insufficient financing. User fees are low, beneath the level needed for "Makhsustrans" to achieve sustainable operation. The World Bank and EBRD Tashkent Solid Waste Management Project (1999–2006) stressed the need to set user fees to cost-effective levels, but its proposals were not accepted by the Uzbek authorities.

The Akhangaran landfill collects a gate fee of 13,000 sum (US$1.6) per ton of waste delivered to the landfill by private vehicles; "Makhsustrans" vehicles do not pay this gate fee.

Outside Tashkent, regional waste fees, established in 2016 by oblast heads (khokims), ranged from 1,200–2,000 sum per person per month and 20,000–32,000 sum per m$^3$ of waste per year for companies. The collection rate is below 50 per cent. Detailed information on taxes and fees in the regions of Uzbekistan is not available.

Starting from 2019, waste fees are collected by the General Prosecutor's Office. This should improve the collection rate and control of waste fee.

### Information

Information on waste is still limited. Reporting waste by classes of toxicity does not help to identify major waste generators and waste types to be targeted as a priority.

SCEEP maintains the State Cadastre of Waste Disposal Sites. The database contains information on municipal and industrial waste disposal sites since 2014 and waste recycling companies were included in 2017. The database also contains information on generated waste, but these data are based on calculation and not on weighing.

### Training for sound management of chemicals

Hazardous industrial facilities prepare a response plan to potential emergencies that defines possible occurrence and development of emergencies and resources needed to provide an adequate response. This plan also prescribes theoretical and practical training on response to emergency situations.

## 10.7 Assessment, conclusions and recommendations

### *Assessment*

Municipal waste management is undergoing a transformation aimed at expanding collection service to the whole population of Uzbekistan and ensuring an increase in recycled and safely disposed of waste. Recent positive developments include the increase in coverage of the population by waste services and operationalizing of the first waste sorting plant in the country. The transformation is supported by the Strategy on Municipal Solid Waste Management for the period 2019–2028, which sets well-defined goals until 2029. However, it will be difficult to assess whether the goals will be achieved, as data on waste are estimated and incomplete.

Information on waste types and amounts is not detailed and structured and does not support current reforms. Waste management is based on calculated and administratively agreed waste norms and not actual data obtained from weighing waste at disposal or recycling sites.

The Law on Waste and implementing legislation is complex and represents a mix of the old approach, when waste management was regulated by the Ministry of Health, and the new approach, with waste management regulated by SCEEP. The implementation (provision of waste services) and enforcement (monitoring and inspection) functions are often assigned to the same public authority.

Industrial waste management is on a higher level than municipal waste management, although much less waste is monitored, due to the outdated system of four toxicity classes of waste. This system does not allow identification of the nature of industrial waste and resulting environmental impact (beyond health impacts). Although waste management plans are required by the legislation, they do not seem to have an impact on improvement of waste management.

Financing of waste management is not incorporated to a full extent in the budgets of state-owned services (health care) and state-owned enterprises. Also, in the municipal waste management sector, waste fees are insufficient for sustainable provision of waste collection and disposal. Such a situation leads to underestimation of waste management costs.

Uzbekistan does not possess the expertise and financial resources to deal with the impacts of waste generated in the past. While the country cooperates well with international organizations in managing the legacy of radioactive waste, such cooperation for the management of obsolete pesticides and other POPs is not sufficient. Greater involvement of foreign donors in municipal and industrial waste management could lead to faster and more effective transformation of waste management to international standards.

### *Conclusions and recommendations*

### Waste legislation

The waste legislation is undergoing a change from the traditional approach led by the Ministry of Health, which emphasized hygiene aspects, towards a modern approach oriented towards broader environmental aspects of waste management. The adoption of the 2019 Strategy on Municipal Solid Waste Management for the period 2019–2028 and including private companies as providers of waste services creates new challenges in the legislative area. The 2002 Law on Waste, although recently amended, does not comply

with the needs of the new system of waste management. As at 2019, the Law on Waste is weak in defining permits for the operation of waste facilities, providing waste services and transboundary movement of waste. Inspection of waste management is limited if these permits are absent as such.

*Recommendation 10.1:*
*The State Committee on Ecology and Environmental Protection should develop a new law on waste in accordance with the best international practice and in line with the Strategy on Municipal Solid Waste Management for the period 2019–2028 and ensure that the law includes well-defined site-specific permits regulating waste management activities.*

### Waste management reform

Municipal waste management in Uzbekistan is starting a transformation, moving towards a modern, centralized system based on nationwide planning. The emphasis is on controlled disposal, recycling and monitoring of the impact of waste. The implementation of actions defined in the Strategy on Municipal Solid Waste Management for the period 2019–2028 would support the achievement of target 12.5 of the 2030 Agenda for Sustainable Development, achieve financial sustainability of the waste sector and encourage the industrial sector to strengthen its efforts on industrial waste recycling.

*Recommendation 10.2:*
*The State Committee on Ecology and Environmental Protection should:*

*(a)    Establish a nationwide system of municipal waste collection and disposal in line with the Strategy on Municipal Solid Waste Management for the period 2019–2028;*
*(b)    Elaborate a priority list for the modernization of controlled landfills.*

### Waste classification

Industrial waste management is not yet fully regulated at the national level, except for radioactive waste hotspots. The main drawback is the use of waste classification based on four hazard classes, which is not compatible with international practice, therefore hindering the assessment of progress towards achieving target 12.4 of the 2030 Agenda for Sustainable Development. Uzbekistan does not have comparable data to produce the global indicator 12.4.2 (Hazardous waste generated per capita and proportion of hazardous waste treated, by type of treatment). The use of waste classification based on hazard/toxicity classes does not conform with international practice

and does not support waste recycling and proper disposal.

*Recommendation 10.3:*
*The State Committee on Ecology and Environmental Protection, in cooperation with the State Committee on Statistics, should consider introducing a waste classification system based on chemical-physical characteristics and abandon the system of four hazard classes, so that to ensure compatibility of data to produce the global Sustainable Development Goals indicator 12.4.2 and support waste recycling and proper disposal.*

### Waste data

Waste data in Uzbekistan are based on calculation using per capita or per ton of product values. This approach rarely results in reliable data. The development of new transfer stations and disposal sites is an excellent opportunity to start using data from weighbridges for national waste reports.

*Recommendation 10.4:*
*The State Committee on Ecology and Environmental Protection should start the transition from calculated waste data to waste data from weighbridges in the preparation of national statistics and reports.*

### Landfills

All disposal sites used in Uzbekistan are in urgent need of modernization and they are not achieving standards of controlled waste disposal. Although the investments in municipal waste infrastructure planned under the Strategy on Municipal Solid Waste Management for the period 2019–2028 include the development of controlled landfills, the standards for development and operation of disposal sites are outdated or lacking.

*Recommendation 10.5:*
*The State Committee on Ecology and Environmental Protection should continue to prepare the standards for siting, construction, operation, closure and monitoring of waste disposal sites in line with international practice.*

### Obsolete pesticides

Information on the situation in management of obsolete pesticides is not openly available. This does not allow access to international expertise and funding to eliminate risks of obsolete pesticides to the environment and people. Also, information on the use of PCBs and PCB-containing equipment is non-existent and thus it is not possible to assess the impact of these POPs on the environment.

*Recommendation 10.6:*
*The Cabinet of Ministers should reconsider its position on obsolete pesticides and task the State Committee on Ecology and Environmental Protection to engage in international cooperation in POPs management.*

*Recommendation 10.7:*
*The State Committee on Ecology and Environmental Protection should investigate the use of PCBs and PCB-containing equipment in the industrial sectors and prepare a plan for the elimination of PCBs and their safe disposal.*

## Medical waste

The management of medical waste is underdeveloped, and hospitals and other health-care facilities are managing waste on their own. There is no regional approach to the provision of specialized waste service for health-care facilities.

*Recommendation 10.8:*
*The State Committee on Ecology and Environmental Protection, in cooperation with the Ministry of Health, should:*

*(a)    Prepare a national strategy for management of medical waste that would focus on the regional approach to treatment and disposal of medical waste;*
*(b)    Consider establishing a state-owned enterprise specialized in medical waste management.*

## Chemicals management

Chemicals management is not included as part of environmental policy. The last chemical profile of Uzbekistan was prepared in 2012 and the information presented therein may be outdated. Emergencies and accidents involving chemicals are managed together with all technogenic emergencies and accidents.

*Recommendation 10.9:*
*The State Committee on Industrial Safety should:*

*(a)    Consider preparing a Chemical Profile of Uzbekistan, using the latest data;*
*(b)    Include chemical management as a separate category of risk management in industry;*
*(c)    Provide training focused on safe management of chemicals.*

*Chapter 11*

# BIODIVERSITY AND PROTECTED AREAS

## 11.1    Trends in species and ecosystems

### *Species diversity*

According to the Institute of Botany of the Academy of Sciences, as at 2018, the flora of Uzbekistan included 4,383 vascular plant species (4,155 native and 228 naturalized alien species) belonging to 115 families and 650 genera, including a large number of endemic, threatened and globally important species. However, the knowledge of flora composition differs for particular biogeographic regions and administrative regions of the country. In 2018, the most complete information was available for some mountain ranges (Western Tien-Shan and Nurata Mountains, jointly accounting for some 8 per cent of the country's territory) and the Aral Sea region. Floristic field research and inventory works were carried out in the Kyzylkum Desert, Fergana Valley, Baisyn Mountains and Ustyurt Plateau, while credible and updated information for many other regions was either deficient or unavailable. The 2006 Third National Report to the CBD indicated the occurrence of 2,548 algae (compared with 4,146 in the 1998 NBSAP), some 500 lichen and 2,102 fungi species; no information on recent changes in the above numbers is available.

According to the Institute of Zoology of the Academy of Sciences, the fauna included some 14,846 invertebrate (1,179 roundworm, 850 protozoa, 533 flatworm, 223 mollusc, 61 annelid and some 12,000 arthropod species), and 715 vertebrate species (467 bird, 107 mammal, 77 fish, 61 reptile and 3 amphibian species). The current number of fish species (77) was lower by some 9 per cent than indicated in the 2015 Fifth National Report to the CBD (which mentioned 84 species).

### *Globally threatened species*

The global IUCN Red List (version 2019-1) contains records on 209 plant and 556 animal species occurring in Uzbekistan. According to the IUCN assessments, 16 plant species are globally threatened by extinction, including 4 species categorized as Critically Endangered (CR), 8 as Endangered (EN) and 4 as Vulnerable (VU). So far, only five of these globally threatened plant species have been included in the national Red Book. Further, 1 plant species was

categorized by IUCN as Near Threatened (NT), 15 as Data Deficient (DD) and 177 as Least Concern (LC). As for fauna, according to IUCN assessments, 46 animal species (19 bird, 10 mammal, 7 reptile, 7 fish, 1 mollusc and 2 other invertebrate species) are globally threatened by extinction, including 9 species categorized as CR, 8 as EN and 29 as VU. A further 27 fauna species are categorized as NT, 19 as DD and 464 as LC.

Not all plant, fish, mollusc and other invertebrate species have so far been assessed for the IUCN Red List. Therefore, the flora, fungi and fauna could include more species globally threatened by extinction, that have not yet been assigned relevant IUCN Red List categories. Similarly, due to missing or incomplete data from recent field research and inventory works, numerous species were temporarily categorized as DD, despite their confirmed rarity status.

Globally threatened fauna species still present in the country include: the critically endangered (CR) saiga antelope (*Saiga tatarica*) of the Ustyurt population migrating into Uzbekistan in the winter season, sociable lapwing (*Vanellus gregarious*) and slender-billed curlew (*Numenius tenuirostris*); endangered (EN) Saker falcon (*Falco cherrug*), Egyptian vulture (*Neophron percnopterus*), steppe eagle (*Aquila nipalensis*), Pallas's Fish-eagle (*Haliaeetus leucoryphus*) and white-headed duck (*Oxyura leucocephala*); vulnerable (VU) Tien-Shan brown bear (*Ursus arctos ssp. isabellinus*), snow leopard (*Panthera uncia*), Bukhara urial (*Ovis vignei ssp. bochariensis*), Ustyurt urial (*Ovis vignei ssp. arkal*), goitered gazelle (*Gazella subgutturosa*), Menzbier's marmot (*Marmota menzbieri*), marbled polecat (*Vormela peregusna*), European turtle-dove (*Streptopelia turtur*), red-breasted goose (*Branta ruficollis*), lesser white-fronted goose (*Anser erythropus*) and marbled teal (*Marmaronetta angustirostris*); near threatened (NT) Asiatic wild ass (*Equus hemionus ssp. kulan*), which was considered to be locally extinct in Uzbekistan until the confirmation of its reoccurrence in 2012, Bukharan markhor (*Capra falconeri ssp. heptneri*), Vinogradov's jerboa (*Allactaga vinogradovi*), a local subspecies of the argali sheep (*Ovis ammon ssp. severtzovi*) and Dalmatian pelican (*Pelecanus crispus*); and least

concern (LC) Bukhara deer (*Cervus elaphus ssp. bactrianus*).

As many as 92 animal species or subspecies occurring in Uzbekistan are included in Appendices to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), while 176 bird and 10 mammal species are listed in Appendices to the Convention on the Conservation of Migratory Species of Wild Animals (CMS).

### *Regionally rare and endangered species*

Information on the conservation status, level of threat (risk of extinction in the wild) and trends in populations of regionally rare and endangered flora and fauna species was available in subsequent editions (1983 Fauna, 1984 Flora, 1998, 2006, 2009) of the Red Book. All Red Book editions published to date used the national system of extinction threat level categorization, which is different from the IUCN Red List categorization system (the national category "0 – apparently extinct" roughly corresponds to IUCN categories EX and EW, "1 – disappearing" to CR and EN, "2 – rare" to VU, "3 – declining" to NT and "4 – data deficient" to DD). Most recently, the fifth Red Book edition was prepared for adoption and publication. Pursuant to the 2018 Resolution of the Cabinet of Ministers No. 1034 "On measures to organize the preparation, publication and maintenance of the Red Book", a new system of threat level categorization is to be used in the fifth Red Book edition, identical to the system used in the Red Book of the Russian Federation (0 – probably extinct, 1 – threatened by extinction, 2 – population diminishing in size and/or distribution, 3 – rare, 4 – indefinite status and 5 – recoverable and recovering).

As for flora, the increasing number of listed species (163 in 1984, 301 in 1998, 302 in 2006 and 321 in 2009) resulted not only from the worsening conservation status, but also from the identification of new, not previously assessed species.

As for fauna, the 2009 Red Book Vol. II (Animals) included 189 species and subspecies: 60 arthropod (61 with subspecies), 48 bird (51 w. ssp.), 24 mammal (25 w. ssp.), 17 fish (18 w. ssp.), 16 reptile, 14 mollusc (15 with subspecies) and 3 annelid species. Hence, the species listed in the 2009 Red Book accounted for some 26.2 per cent of the total number of reptile species occurring in the country, 23.4 per cent of the mammal species, 23.3 per cent of the fish species, 10.9 per cent of the bird species, 6.7 per cent of the mollusc species, 4.9 per cent of the annelid species and 0.5 per cent of the arthropod species. The fifth Red Book edition is expected to list 206 animal species and

subspecies. According to recent research results and assessments, the level of threat should be changed in comparison with the previous Red Book edition in the case of 12 species (8 bird, 2 mammal, 1 fish and 1 reptile species).

### *Trends in threatened wild species populations*

Statistical data on the population numbers of rare and endangered flora and fauna species are collected on a regular basis (mainly inside protected areas (PAs) or waterfowl concentration areas), but officially published statistical data sources generally do not contain information on biodiversity. Hence, the proper assessment of recent trends in threatened wild species populations since 2010 is not possible.

However, the 2019 Sixth National Report to the CBD informed of decreasing trends in populations of numerous threatened wild species, including the CR saiga antelope, of which the Ustyurt population has decreased by 99.5 per cent since 1990. The current size of the saiga population inside Uzbekistan was estimated at some 200 individuals. However, the occurrence of saiga in the country resulted mainly from the Ustyurt herd migration to the south in the winter season, which was at first impeded by the construction of the state border fence in 2012 (modified in 2016 to allow wildlife migrations). Since 2017, due to the construction and operation of the Beyneu–Shalkar section of the Trans-Kazakhstan Railway, saiga migrations to the south of the railway line are no longer recorded.

According to the 2019 Sixth National Report to the CBD, a decrease in population numbers had also been confirmed for other mammal species, including the VU marbled polecat, NT Vinogradov's jerboa and Pallas's cat (*Otocolobus manul*), and the LC Turkestan steppe polecat, corsac fox (*Vulpes corsac*) and sand cat (*Felis margarita*). Negative trends were also observed in populations of the VU Central Asian tortoise (*Testudo horsfieldii*), sand boa (*Eryx miliaris*) and Tartar sand boa (*Eryx tataricus ssp. tataricus*), and the endemic Szczerbak's even-fingered gecko (*Alsophylax szczerbaki*), agama (*Phrynocephalus moltschanovi*) and Trans-Caspian toad-headed agama (*Phrynocephalus raddei Boettger*). The decrease in population of the EN Saker falcon was estimated at some 90 per cent (down to 120–150 individuals in 2018), and negative trends also affected the populations of other bird species, e.g. the CR sociable lapwing, EN Egyptian vulture (a decrease from some 200 pairs in the period 1990–2000 to 130–140 pairs in 2018) and steppe eagle, the VU European turtle-dove and red-breasted goose, the NT Dalmatian pelican, Eurasian curlew (*Numenius arquata*), ferruginous

duck (*Aythya nyroca*) and black-tailed godwit (*Limosa limosa*), and the LC griffon vulture (*Gyps fulvus*), squacco heron (*Ardeola ralloides*) and Turkestan white stork (*Ciconia ciconia asiatica*).

However, the most striking example was the environmental disaster in the Aral Sea region, formerly abundant in flora and fauna species. The still ongoing processes of the Aral Sea shallowing and dessication, shrinkage or disappearance of lakes in the Amu Darya River delta, discontinuation of seasonal floodplain inundation, drop in the ground water level, deterioration of habitats (e.g. wetlands and floodplain "tugai" forests) and degradation of native plant communities, which turned the region into the sandy-salty Aralkum Desert with a surface exceeding 5.5 million ha, resulted in a sharp decrease in the biological diversity of the region. The whole ichthyofauna of the Aral Sea (originally including 34 fish species) disappeared as a result of the increasing water salinization. Some 26 bird, 12 mammal, 11 plant and 11 fish species became regionally extinct, while some mollusc and arthropod (in particular crustacean) species are close to extinction in the region. Nesting habitats of numerous aquatic bird species either vanished or declined significantly.

In order to protect threatened fauna species and prepare for the reintroduction of locally extinct ones, more than 40 years ago the specialized Species Breeding Centre (SBC) "Jeyran" (currently, a PA encompassing 16,522 ha in Bukhara Oblast) was established in Uzbekistan. According to the 2019 Sixth National Report to the CBD, in 2017, this nursery harboured 23 individuals of the EN Przewalski's horse (*Equus ferus ssp. przewalskii*), 985 of the VU goitered gazelle (*Gazella subgutturosa*) and 125 of the NT Asiatic wild ass (*Equus hemionus ssp. kulan*). Information on other herbivorous species protected in this nursery, i.e. the VU Bukhara urial (*Ovis vignei ssp. bochariensis*) and the NT Bukharan markhor (*Capra falconeri ssp. heptneri*), and data on population numbers recorded in other years, are not available. Two small (300–400 ha) nurseries for breeding the VU Asian houbara bustard (*Chlamydotis macqueenii*) were established with the financial assistance of the United Arab Emirates (in 2007 in Peshkunsky district of Bukhara Oblast, and in 2008 in Karmana district of Navoiy Oblast), which allowed the release of 16,320 houbara bustard individuals into the wild, while Zarafshan State Strict Nature Reserve (SSNR) operated the facility for breeding Bukhara deer.

*Endemic species*

The new edition of "Flora of Uzbekistan" (Vol. I published in 2017) contained the first lists of endemic species identified in each botanical-geographical region (eight regions divided into 23 units in the mountainous areas and a further eight regions divided into 15 units in the lowland part of the country). According to the Institute of Botany, the flora included 350 country endemic species (approximately 8 per cent of the total), 137 of which were listed in the Red Book. Some 10–12 per cent of endemic species are considered to be relict endemics, preserved after the drying of the Tethys Sea and development of the arid climate in Central Asia. The 2015 Fifth National Report to the CBD mentioned several examples of relict endemics, preserved mainly in the mountainous regions of Pamir-Alay (e.g. *Otostegia buharica*, *Allium verticellatum*, *Astragalus thlaspi*, *Zygophyllum bucharicum*, *Cleome gordjaginii*, *Fumariola turkestanica*, *Dionysia hissarica*, *Cephalorhizum oopodum* and *Ostrovskia magnifica*) and Western Tien-Shan (e.g. *Thesium minkwitzianum*, *Kamelinia tianschanica*, *Nanophyton botschantzevii* and *Kuramosciadum corydaliifolium*). The low mountains of the Kyzylkum Desert constitute another important botanical region, rich in rare, threatened, endemic and relict species.

The global IUCN Red List data on endemic species (version 2019-1) includes three endemic fish (sturgeon) species. According to the 2019 Sixth National Report to the CBD, the fauna includes 53 species and subspecies of terraneous animals of local (Turanian or Turkestan) origin, endemic to Central Asia: 30 reptile, 16 mammal and 8 bird species and subspecies. The highest level of endemism is among fish (50 per cent) and reptiles (49.2); it is much lower among mammals (14.95) and birds (1.7 per cent).

*Widespread species*

Although collected on a regular basis (e.g. in state forestry units, hunting or fishing grounds), statistical data on the population numbers of widespread wild animals (including game species) is absent in publicly accessible official statistics, which makes proper assessment of recent trends in their populations since 2010 not possible.

The recent National Reports to the CBD contain some fragmented data on the populations of several game species, the annual hunting quotas and the number of hunted animals. In general, populations of most game species showed an increasing trend, followed by an increase in use of their annual hunting quota. For instance, the population of the LC wild boar (*Sus*

*scrofa*) increased from some 1,700 individuals in 2010 to 5,210 in 2016 and 5,917 in 2017, and the use of its annual hunting quota (180 for 2016 and 2017) increased from 59 hunted specimens (32.7 per cent of the quota) in 2016 to 125 (69.4 per cent) in 2017. Between 2016 and 2017, the population of the LC Eurasian badger (*Meles meles*) increased from 5,067 to 8,639 individuals; however, despite the above increase, the annual quota was lowered from 450 to 400, while the number of hunted badgers increased from 134 to 213 (29.7 and 52.2 per cent of the quota respectively). In 2016–2017, the population of the LC Tolai hare (*Lepus tolai*) increased from 158,800 to 186,000, the annual hunting quota was raised from 12,000 to 15,000, and both the number of hunted hares and the use of quotas were higher in 2017 than in 2016 (12,784 vs. 6,588 and 85.2 per cent vs. 54.9 per cent respectively). The above numbers prove that, in the case of game mammals, the annual hunting quotas allowed not only for their regeneration but also for the continuous increase in their population numbers (regardless of poaching of several mammal species). No data is available on the status of and trends for other widespread mammal species, e.g. the grey wolf (*Canis lupus*) or red fox (*Vulpes vulpes*).

As for the game bird species, the LC chukar partridge (*Alectoris chukar*) population numbers varied from some 316,000 in 2010 to 354,100 in 2011, 226,500 in 2016 and 251,500 in 2017 (hence, they decreased by some 20 per cent in the period 2010–2017). Despite this decrease in population, in 2016–2017, the number of hunted partridges and the use of its annual hunting quota (51,000 in 2016 and 2017) more than doubled, increasing from 11,980 (23.5 per cent) to 26,879 (52.7 per cent). The LC common pheasant (*Phasianus colchicus*) population size varied from 150,000 in 2010 to 196,700 in 2016 and 171,700 in 2017; however, despite the recent decrease in numbers, the annual quota for 2017 (9,770) was higher than for 2016 (6,000), as were the number of hunted pheasants (7,462 in 2017 vs. 3,297 in 2016) and the use of annual quota (76.4 per cent in 2017 vs. 54.9 per cent in 2016).

### *Alien species*

In October 2018, under the Global Register of Introduced and Invasive Species, Uzbekistan compiled its first list of non-indigenous (alien) introduced or invasive plant species naturalized in the country, which contained 228 species. As for fauna, the majority of alien species had been introduced intentionally for commercial purposes, in particular the non-native fish species (which constituted some 50

per cent of the ichthyofauna). Alien fauna included two synanthropic bird species: the common myna (*Acridotheres tristis*) and Eurasian collared turtle-dove (*Streptopelia decaocto*). Although both species are known carriers of parasites and viruses harmful to other birds (including poultry) and, due to its aggressive behaviour, the common myna threatens the populations of native bird species occurring in urban and suburban environments, their influence on the native species is still considered insignificant in Uzbekistan. The five alien mammal species include the American mink (*Neovison vison*), Eurasian red squirrel (*Sciurus vulgaris*), brown rat (*Rattus norvegicus*), muskrat (*Ondatra zibethicus*) and coypu/nutria (*Myocastor coypus*); the latter two were intentionally introduced game species and, thus, hunting helped to control the spread of their populations.

### *Ecosystems*

General description

According to the 2019 Sixth National Report to the CBD, natural and semi-natural landscapes and ecosystems extend over some 82 per cent of the territory of Uzbekistan. In the remaining 18 per cent of the country, natural landscapes, ecosystems and habitats have largely been transformed into anthropogenic ones, mainly as a result of agricultural practices, settlement and infrastructure development.

Mountain ecosystems cover some 13 per cent of the country and alluvial river valleys some 2 per cent, while desert and steppe ecosystems (e.g. the Kyzylkum Desert, Ustyurt Plateau and Karshi Steppe) stretch over the remaining 85 per cent of the territory, which determines the country's vulnerability to the effects of climatic changes, in particular, desertification. The plains of the north-western, northern and central parts of the country are predominantly covered by deserts, semi-deserts and steppes. The smaller, south-eastern part of the country, apart from having heavily transformed agricultural and urban areas, harbours piedmont semi-desert, piedmont steppe and mountain ecosystems of the Western Tien-Shan and Pamir-Alay ranges, with the distinct altitudinal zonation of vegetation belts, including mountain steppes, subalpine mountain forests, sub-alpine and alpine meadows, and nival zone ecosystems (Khazret Sultan in the Gissar range reaches the elevation of 4,643 m) (map 11.1).

**Photo 11.1: Chukar partridge (*Alectoris chukar*), Kyzylkum Desert, Bukantau Butte**
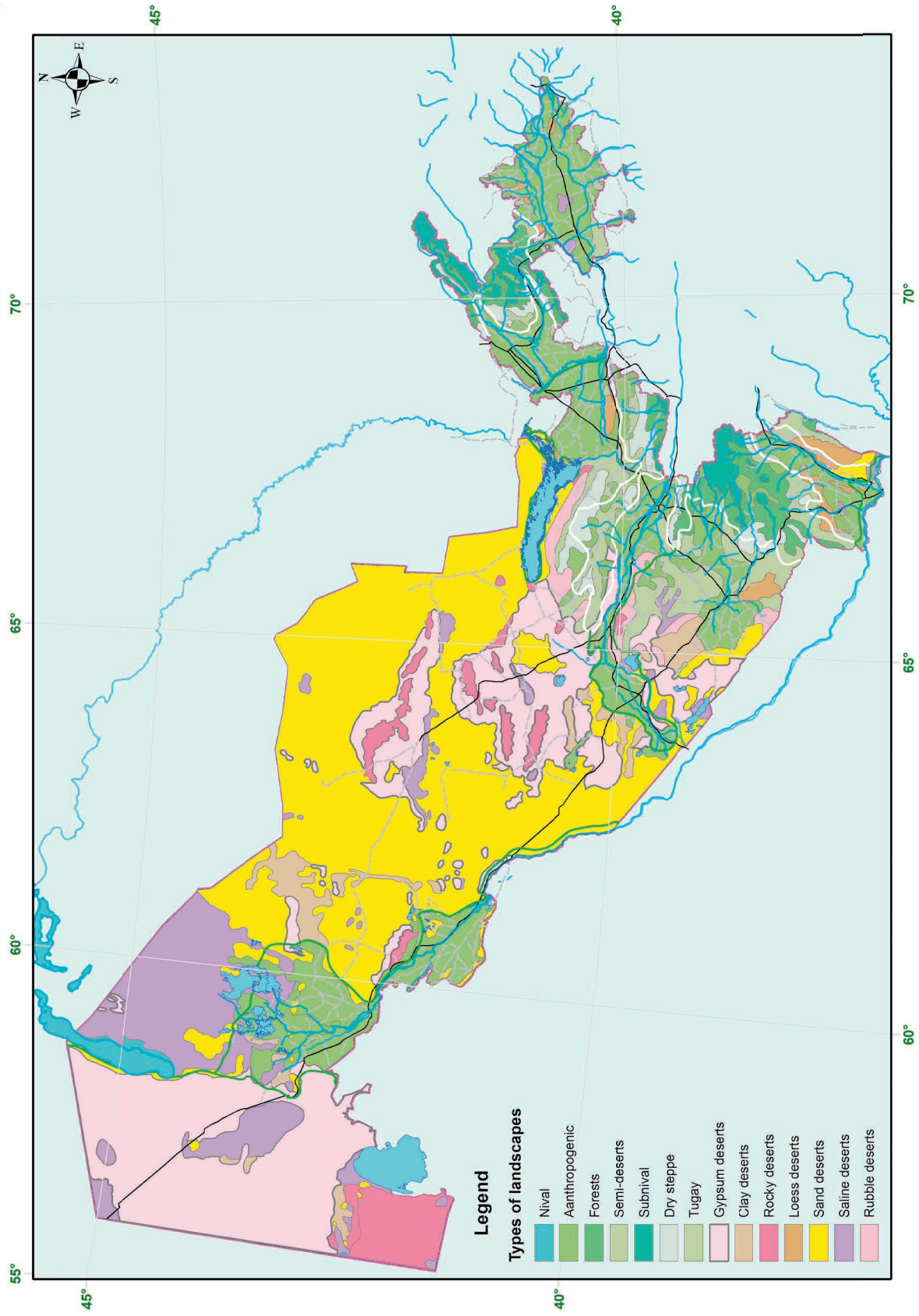


*Photo credit:* Ms. Mariya Gritsina

**Photo 11.2: Goitered gazelle (*Gazella subgutturosa*) in the Species Breeding Centre "Jeyran"**



*Photo credit:* Ms. Mariya Gritsina

**Map 11.1: Landscapes**



Legend

**Types of landscapes**

Nival
Aanthropogenic
Forests
Semi-deserts
Subnival
Dry steppe
Tugay
Gypsum deserts
Clay deserts
Rocky deserts
Loess deserts
Sand deserts
Saline deserts
Rubble deserts

*Source*: 2019 Sixth National Report to the CBD.
*Note*: The boundaries and names shown on this map do not imply official endorsement or acceptance by the United Nations.

The country harbours some 525 lakes, most of which have an area of less than 100 ha; only 32 lakes exceed 1,000 ha in area. The human-made Aydar-Arnasay Lake System (which emerged in 1969–1970 as a result of excess Syr Darya floodwater flow into the saline depression of the south-eastern Kyzylkum) stretches over some 340,000 ha. Another specific phenomenon of anthropogenic origin is the irrigation-wastewater lakes, which are fed with agricultural drainage waters (collector discharge and drainage run-off). Many larger irrigation-wastewater lakes (e.g. Sudochye, Dengizkul and Sarygamysh) and the Aydar-Arnasay Lake System became important concentration areas for nesting, transient and wintering bird species. Riverine and riparian ecosystems are best preserved in river corridors (e.g. of the Amu Darya, Syr Darya, Surkhan Darya and Zarafshan Rivers), and in the extensive delta of the Amu Darya River.

As a result of past hydrotechnical works (including regulation of rivers during the Soviet era), irrigation network development, current anthropogenic pressures and ongoing climatic changes, and due to changing environmental conditions, most aquatic, coastal, wetland and riparian ecosystems are in decline, largely affected by periodic fluctuations in water level and salinity. However, most dramatic are the transformations and disappearance of natural ecosystems in the Aral Sea basin. In the dried-up part of the Aral Sea, another new ecosystem spontaneously emerged, the sandy-salty Aralkum Desert (with an area exceeding 5.5 million ha, of which more than 3.3 million ha are on the territory of Uzbekistan). Nowadays, this is intentionally transformed through the planting of saxaul and desert plant species, in order to stabilize the moving sands and mitigate the adverse effects of frequent storms carrying salt, sand and dust.

According to the 2015 Fifth National Report to the CBD, the priority ecosystems and habitats for biodiversity conservation in Uzbekistan are: forest ecosystems; tugai and floodplain ecosystems stretching along the Amu Darya, Syr Darya, Zarafshan, Chirchik and Akhangaran Rivers; low mountains and escarpments of the Ustyurt Plateau; piedmont steppes and adyrs (belts of low, barren hills) in the foothills of the Western Tien-Shan and Pamir-Alay mountain ranges; alpine meadows; and wetland ecosystems threatened by climatic changes, resulting in water scarcity.

### Forest ecosystems

Uzbekistan is always described as a forest-poor country, but, even so, many spatially limited forest areas are of significant importance for the conservation of wild species diversity, ecosystems and habitats and also provide important ecosystem services (e.g. soil formation and protection, water provision, retention and purification, slope stabilization, prevention of wind and water erosion, flood and climate regulation). According to the legislation, forests constitute the national wealth, subject to rational use and protection by the State. This is why all forest fund lands are owned by the State and indicated in official statistics as protected areas. According to the 2015 FAO Global Forest Resources Assessment, some 83 per cent of forests in Uzbekistan are designated as protective forests serving as desertification control, while a further 12 per cent are conserved for the protection of biodiversity.

A proper assessment of the current state, trends in forestry over time and progress made by the country since 2010 is not possible, due to the unavailability of comprehensive, complete, reliable and publicly accessible statistical data on forest resources. The national inventory of forests and state forest fund land was last carried out in 1987. As at 2019, the State Committee on Forestry plans to prepare the new national forest resources inventory.

Three main types of forests can be distinguished in Uzbekistan: drought- and soil-salinity-resistant forests in desert regions, mountain forests, and tugai or riverine forests. The first two types are forests with sparse tree cover. According to the 2019 Sixth National Report to the CBD, as at January 2018, the vast majority of the state forest fund land (9.53 million ha, 84.6 per cent of the total) was located in sandy deserts, and much less in the mountain regions (1.12 million ha, 9.95 per cent), valleys (0.26 million ha, 2.31 per cent) and floodplains (0.11 million ha, 0.98 per cent).

The species composition of forests in Uzbekistan includes some 200 species of trees and shrubs, either native or deliberately introduced. The main forest-forming species in sandy deserts are the white saxaul (*Haloxylon persicum*) and black saxaul (*Haloxylon ammodendron*); the desert forest vegetation also includes *Tamarix* and kandym *Calligonum* shrubs and annual plants such as prickly saltwort species (*Salsola paletzkiana* and cherkez *Salsola richteri*). Mountain forests are either deciduous (e.g. growing at altitudes between 800 m and 2,000 m in the Western Tien-Shan range) or coniferous (e.g. juniper "archa" forests of the Pamir-Alay range, growing above 2,000 m). Deciduous mountain forest trees include pistachio (*Pistacia vera*), almond (*Amygdalus bucharica*, *A. spinosissima*), walnut (*Juglans regia*), common sea buckthorn (*Hippophae rhamnoides*), barberry (*Berberis vulgaris*), hawthorn (*Crataegus turkestanica*) and apple tree species.

**Photo 11.3: Western Tien-Shan, Pskem Mountain Range**



*Photo credit:* Ms. Mariya Gritsina

**Photo 11.4: Ustyurt Plateau, Eastern Cliff**



*Photo credit:* Ms. Mariya Gritsina

Valley forest species composition includes poplar, ash, maple, plane and elm species. The floodplain tugai forests are formed by the desert poplar (*Populus pruinosa*), LC Euphrates poplar (*Populus euphratica*), LC Persian olive (*Elaeagnus angustifolia*) and various *Tamarix* and willow species.

The largest complexes of natural riparian tugai forests survived in the Amu Darya River delta (in the Republic of Karakalpakstan) on an area of some 30,000 ha (approximately 10 per cent of their original extent, but as much as 75 per cent of tugai forests in the country and 20 per cent of tugai forests left in Central Asia). Some remnant narrow strips of natural tugai forests were also preserved in river corridors of the Amu Darya, Syr Darya, Zarafshan, Chirchik and Akhangaran Rivers.

Even though larger areas are officially classified as forest land (i.e. state forest fund land, which includes not only forests per se but also areas potentially suitable for afforestation, currently open areas or pastures), the share of actually afforested areas (in particular of closed-canopy forests) is much lower.

In 2010, the total area of state forest fund land accounted for 9.4627 million ha (21.08 per cent of the country's territory), of which the forested areas occupied 2.9753 million ha (6.63 per cent of the country's territory), including 2.3482 million ha of natural forests and 0.6271 million ha of planted forests (78.92 per cent and 21.08 per cent of forested areas respectively). Since 2010, the area of state forest fund land increased constantly, to 9.6 million ha (21.39 per cent of the country) as at 1 January 2013 and 11.26 million ha (25.09 per cent of the country) as at 1 January 2018. Over the same period, the forested area increased to 3.26 million ha (7.26 per cent of the country) as at 1 January 2018, as a result of reforestation works. As a result, the share of forested areas decreased from 31.44 per cent to 28.95 per cent of the total state forest fund land area. According to FAO estimates, as at 2018, the total growing stock of timber was 26 million m$^3$ (19 million m$^3$ deciduous, 7 million m$^3$ coniferous); however, these data could not be verified in the absence of an updated national forest inventory. Data on trends in the available timber stock (in total and per ha), the mean annual timber/biomass increment or the tree-stand age structure are not available.

The spatial distribution of forests throughout the country is uneven and both the share of the state forest fund land and actual forest cover in the total area of the 12 oblasts and the Republic of Karakalpakstan vary. According to the 2019 Sixth National Report to the CBD, the largest areas of the state forest fund land (as at January 2018) were located in the Republic of Karakalpakstan (5.75 million ha, which accounts for 51.1 per cent of the total) and Navoiy Oblast (almost 3.1 million ha, 27.5 per cent), the smallest were in Andijan (0.008 million ha, 0.07 per cent), Syrdarya (less than 0.009 million ha, 0.08 per cent) and Fergana (less than 0.016 million ha, 0.14 per cent) Oblasts. However, actually afforested areas were most extensive in Navoiy Oblast (1.293 million ha, 39.6 per cent of the total) and the Republic of Karakalpakstan (almost 1.101 million ha, 33.69 per cent). Taking into account the different size of the oblasts, the area forest cover index was the highest for Navoiy (11.7 per cent) and Bukhara (8.3 per cent) Oblasts and the lowest for Syrdarya (0.07 per cent) and Andijan (0.3 per cent) Oblasts.

Due to the scarcity of forest resources and the importance of the multiple ecosystem services provided by forests, the commercial use of forests was prohibited – since the 1960s, only sanitary fellings were allowed. The majority of timber used in the country (as at 2016, approximately 98 per cent of forest raw materials) is imported, while the potential for meeting the demand for wood raw materials through establishing commercial industrial forest plantations of poplar and other fast-growing tree species (e.g. on "reserve lands") is largely limited by the poor availability of water resources and the soil salinity. State forestry units ("leskhozes") acquire a limited amount of timber, fuelwood and brushwood in the course of forest management works, including sanitary felling. In 2010, a total amount of 20,315 m$^3$ was harvested (including 5,450 m$^3$ from sanitary felling); a smaller amount was harvested in 2011 (16,850 m$^3$ with 3,662 m$^3$ from sanitary felling). The complete statistical data on annual timber and firewood is absent in publicly accessible official statistics. According to the State Committee on Forestry, in recent years, the mean annual harvest accounted for 25,278 m$^3$ (including 3,654 m$^3$ from sanitary felling). No data on the volume of illegal logging and fuelwood harvesting are available.

Forest ecosystem services also include the provision of valuable non-timber forest products (NTFPs), e.g. game animals, medicinal, decorative and aromatic plants, nuts (pistachio, almonds, walnuts), mushrooms, berries, honey, hay and fodder plants for livestock husbandry. Specialized state forestry enterprises conduct the harvesting of wild medicinal and fodder plants in the lands of the state forest fund, while concessionary private companies operate in the lands leased from either the forestry enterprises or agricultural farms. Annual quotas for NTFPs harvesting are determined by a special interdepartmental commission set up at the Academy

of Sciences, and usually are not fully used (e.g. in 2018, the quota amounted to 859 tons of wild medicinal plants raw material, while only 617 tons, some 71.8 per cent, were actually harvested). More detailed statistical data on particular NTFP species collection are absent from publicly accessible official statistics. Furthermore, the harvesting and use of wild plants, for example for consumption or sale by the local population, is in practice neither regulated nor controlled; hence, the volume of raw NTFP materials collected by individuals is not known.

According to the 2019 Sixth National Report to the CBD, deforestation processes are most intensive in sub-montane and mountain districts of Tashkent, Surkhandarya, Samarkand and Fergana Oblasts. Forest ecosystems are most threatened by the excessive and uncontrolled livestock grazing and illegal logging and fuelwood harvesting, as well as wrongly planned agricultural and infrastructural developments (e.g. slope ploughing, road construction), which have increased soil erosion and the probability of landslides and mudflows. The degradation of tugai forest ecosystems, caused by unsustainable resource uses (in particular, overgrazing), is further aggravated by adverse changes in hydrological regimes, resulting from water drainage for agricultural purposes and climatic changes.

Uzbekistan undertook various activities aimed at the preservation of tugai forest ecosystems, mainly focused on the conservation of those still present in the Amu Darya River delta, for example by establishing protected areas (PAs). As at March 2019, the State Committee on Forestry is implementing two projects, one aimed at enhancing the natural reproduction of tugai forests in the Amu Darya River delta (supported by the Turkish International Cooperation Agency) and another focused on the preservation of ecosystems in the lower reaches of this river. In 2018, a project on restoration of the tugai forest ecosystem in the designated important bird area IBA UZ036 in the Syr Darya River corridor was completed by the Uzbekistan Society for the Protection of Birds (UzSPB), with the support of local communities and the Van Tienhoven Foundation for International Nature Protection.

Uzbekistan implemented intensive ecosystem restoration and rehabilitation works in forest ecosystems. The size of areas where artificial (e.g. planting and sowing) reforestation and afforestation works were carried out, and where forest management measures enhanced the natural regeneration of tree stands, was constantly increasing, from 42,400 ha in 2010 to 43,200 ha in 2015, 46,900 ha in 2017 and 52,600 ha in 2018, while the scope of afforestation

works planned for 2019 was incomparably higher. Similarly, an increasing trend could be noted in the production of planting stock (tree seedlings) and collection of forest tree seeds, which would allow the intensification of afforestation works.

Available statistical data indicate that, between 2014 and 2018, the share of areas where new forest sowing was undertaken was increasing, from 6,400 ha in 2014 (14.55 per cent of areas under reforestation works) to 20,800 ha in 2018 (44.25 per cent) and the scope of forest planting works was stable (20,000 ha in 2014 and 19,750 ha in 2018), while the size of areas where the natural regeneration of already existing forests was enhanced declined, from 17,600 ha (40.0 per cent) in 2014 to only 6,250 ha in 2018 (13.3 per cent). Species used for forest planting (and sowing) in desert ecosystems include saxaul, kandym and saltwort; those planted in the mountains are juniper, pistachio, almond, walnut and hawthorn seedlings. Planting material for valley areas included poplar, maple, plane, elm and the Caspian locust (*Gleditsia caspica*), as well as some fast-growing (including alien) or fruit tree species, while poplar, willow and Persian olive tree seedlings were planted in tugai floodplain areas. Statistical data on, for example, seed germination success rate, tree seedlings survival rate or the use of wildlife repellents to protect planted seedlings are not available.

## 11.2    Performance of biodiversity monitoring networks and gaps in biodiversity monitoring and research

According to the Law on the Protection and Use of Flora and the Law on the Protection and Use of Fauna (both issued in new editions in 2016), monitoring of the animal and plant world shall be an integral part of state environmental monitoring.

In 2016, the Government approved the Programme of Environmental Monitoring for the period 2016–2020, containing provisions on the monitoring of biological diversity. The geographical scope of biodiversity monitoring in the period 2016–2020 is limited solely to eight state strict nature reserves (SSNRs or "zapovedniks"), two national nature parks (NNPs), one state biosphere reserve (SBR), the Species Breeding Centre (SBC) "Jeyran" and 20 other selected locations (including PAs) in the Republic of Karakalpakstan.

According to 2019 Sixth National Report to the CBD, in late 2018, the methodology for biodiversity data collection and analysis for the integrated monitoring system was in the development and testing phase, the final selection of subjects (species and ecosystems)

was still pending and the integrated system that could link and combine different databases was under development. The work on the procedures for ecosystem monitoring inside SSNRs was most advanced.

Consequently, as at March 2019, an integrated biodiversity monitoring system, which could provide comprehensive and regularly updated information on the current state of ecosystems and habitats and trends in populations of flora and fauna species, was still not operational in Uzbekistan.

As at March 2019, the monitoring of selected key Red Book-listed fauna species was carried out on a regular basis only in some PAs, in particular those of legal entity status that employed research staff and field inspectors (rangers), with the support of the Academy of Sciences. The local populations of the Tien-Shan brown bear were regularly monitored in Ugam-Chatkal SBR, Gissar SSNR and Kitab SSNR; of the Turkestan lynx in Ugam-Chatkal SBR, Chatkal state biosphere strict nature reserve (SBSNR) and Gissar SSNR; of the Przewalski's horse, goitered gazelle and Asiatic wild ass in the SBC "Jeyran"; of the snow leopard, Turkestan white stork and Central Asian cobra (*Naja oxiana*) in Gissar SSNR; of the Bukhara urial and Bukharan markhor in Surkhan SSNR; of the argali sheep (*Ovis ammon ssp. severtzovi*) in Nurata SSNR; of the Bukhara deer in the Lower Amu Darya SBR and Kyzylkum SSNR; and of the cinereous vulture (*Aegypius monachus*) and black stork in Kitab SSNR. Gissar SSNR also carried out the monitoring of plant species.

According to the Academy of Sciences, beginning from 2018, the populations of some rare and threatened Red Book species were also monitored outside PAs.

Furthermore, since 2005, Uzbekistan has been involved in the long-term International Waterbird Census (IWC), collecting data on waterfowl populations and the state of their habitats in wintering grounds. Uzbekistan contributed to the IWC by carrying out a regular annual census of waterfowl in nine of the 52 IBAs identified in the country, on Lakes Chimkurgan, Dengizkul, Hadicha, Kattakurgan, Kuymazar, Talimardzhan, Tudakul, Tuyabuguz and Zekra.

As for flora, the Institute of Botany carried out the long-term (10-year) regular monitoring of 19 populations of four *Lagochilus* species (included in the Red Book) in the lowland areas of the Kyzylkum Region and on the Nurata Ridge. A four-year programme of biodiversity monitoring on the Ustyurt Plateau was conducted under the UNDP/GEF/SCEEP project "Integrating biodiversity conservation principles into the oil and gas sector of Uzbekistan" (2010–2014).

State forestry units carry out regular (annual) biodiversity monitoring covering, for example, selected species of mammals, birds (including geese, ducks, partridges and sandpipers), reptiles (including lizards and non-venomous snakes), amphibians and invertebrates (scorpions, spiders, scolopendra and wasps). However, in 2018, the area of the state forest fund accounted for only some 24–25 per cent of the country, which means that similar data are not available for the remaining part of the territory.

Hunters' and fishers' societies report annually on the size of populations of game species of mammals, birds and fish. For obvious reasons, the game species census is focused on potential targets of hunting or fishing activities, and hence provides little information on the populations of protected rare and threatened animal species. The annual census of game species is rarely performed outside the officially designated hunting grounds and is effectively carried out only in a certain part of the hunting grounds. According to official statistics for 2017, the area of hunting grounds in Uzbekistan accounted for 4.7971 million ha (including 4.0691 million ha in the Republic of Karakalpakstan, over 84.8 per cent of the total), while the wildlife census was performed on an area of 2.0528 million ha (i.e. in only some 42.8 per cent of the hunting grounds' total area). Hence, the game species populations occurring outside the PAs, state forest fund lands or hunting grounds are not monitored.

Moreover, the quality of data acquired through wildlife censuses carried out in hunting grounds may also be impaired by the small number of employees involved. In 2017, there were 298 persons employed in hunting grounds (including only 16 hunting specialists), which translated statistically into one hunting ground employee for more than 16,000 ha or one hunting specialist for almost 300,000 ha of the area included in the census.

The UNDP/GEF/SCEEP project "Sustainable natural resource and forest management in key mountainous areas important for globally significant biodiversity" (2017–2022) implemented in the highland ecosystems of the Western Tien-Shan and Pamir-Alay Mountains aims at the development and launching of the Biodiversity Conservation Information Management System (BCIMS), for the collection, processing and storage of biodiversity data.

### State Cadastres of Flora and Fauna

Works on the census and the maintenance of state cadastres of flora and fauna should be funded from the state budget. The Government funds the research on biodiversity on the basis of research grants, disbursed on a competitive basis.

Due to there being only limited resources, cadastral studies have so far been conducted in only some administrative regions of the country. The Academy of Sciences carried out cadastral projects concerning both vascular plant and vertebrate animal species (most often with a focus on Red Book-listed species) in Tashkent and Surkhandarya Oblasts (2012–2013), Jizzakh Oblast (2013–2014), the Republic of Karakalpakstan and Khorezm Oblast (2014–2015), Samarkand Oblast (2015–2016) and Kashkadarya Oblast (2016–2017). Resulting data include the number and status of populations (at the time of inventory) and their spatial distribution (including GIS maps). In the course of the above projects, the first complete lists of flora species for Jizzakh, Kashkadarya and Samarkand Oblasts were elaborated. Moreover, cadastral works on rare and endangered vascular plant species were carried out in the Kyzylkum Mountains (2015–2017). Outcomes of research by the Academy of Sciences are provided to SCEEP for inclusion in the national cadastral database. Other important sources of biodiversity data are the outcomes of monitoring conducted (mostly on a project basis) by environmental NGOs, in particular UzSPB. In 2018, a bird (in particular, waterfowl) species census was carried out three times (during the spring migration, summer nesting and autumn migration periods) on the coast of Lake Dengizkul, in its north-western bay and in adjacent areas.

In 2018, cadastral works on flora were launched for Navoiy and Bukhara Oblasts, as well as a project on mapping the occurrence of flora species of the western spurs of the Zarafshan range, and identification of key botanical territories. According to the 2019 Sixth National Report to the CBD, as at 2018, the research on flora was carried out in the Kyzylkum Desert, Fergana Valley, Baisyn Mountains and Ustyurt Plateau. However, a large part of the country had not yet been sufficiently studied; for example, updated information on the flora of Sangardak and Tupalang River basins, the middle part of the Syr Darya River corridor, and the Gissar, Babatag and Zirabulak-Ziadin mountain ranges is largely unavailable. Also in 2018, the Institute of Zoology launched a three-year project titled "Inventory and assessment of the current state of the fauna of vertebrate animals of the Tashkent Oblast as the basis for creating a bioresources monitoring system".

According to the 2019 Sixth National Report to the CBD, the existing cadastres are updated on a regular basis; however, this information could not be verified.

Cadastral works on flora and fauna carried out to date are mainly limited to field inventory works (often "one-off surveys") undertaken in sequence in selected administrative regions (usually over a period of two years in each region). Hence, once the data acquired from the research ongoing in 2019 (e.g. recently undertaken in Navoiy and Bukhara Oblasts) becomes available, the similar data previously acquired from cadastral works completed for other administrative regions (e.g. in 2012–2013 for Tashkent and Surkhandarya Oblasts) would already be outdated.

Moreover, the findings acquired in a particular region are not verified in the following years, while the monitoring itself means a systematic review, requiring continuous collection and updating of information. Although inventory works undertaken provide a valuable reference point and the basis for the establishment of the cadastral database, the proper maintenance of cadastres (and the planned development of an integrated biodiversity monitoring system) requires undertaking similar efforts, regularly repeated in the subsequent periods.

The continuity of long-term research on wild species of flora and fauna (in particular, rare and threatened species) is the prerequisite for the successful implementation of CBD Article 7, requiring the monitoring of the components of biological diversity by the parties, with particular attention being paid to those requiring urgent conservation measures.

### State Cadastre of Protected Natural Territories

No information is available on the full thematic scope of data currently stored in the State Cadastre of Protected Natural Territories.

## 11.3    Trends in development and management of protected areas

The 2004 Law on Protected Natural Territories (amended in 2014 and 2017) constitutes the legal basis for the designation of PAs. The Law defines seven national PA categories and mentions several other PA types that do not fall under those categories. Some of the national categories are not harmonized with the IUCN PA management categorization system. According to SCEEP (2019), the introduction of a new, revised PA categorization system is planned. The Law provides also for the establishment of PA external buffer zones. The designation of ecological corridors, which could link existing PAs and ensure the

ecological continuity and connectivity of their network, is not mentioned in the Law.

*Protected areas*

National category I protected areas:
State strict nature reserves

The national category I PAs are state reserves of national importance (also called "zapovedniks", following the former USSR categorization system), established in order to preserve and facilitate research on ecosystems, flora and fauna, and each designated for an indefinite period as a "state nature conservation and research institution" by the Cabinet of Ministers. The entire area of state reserve is assigned the highest, strictly protective regime, limiting human interference and excluding economic uses of the area. Only scientific research, monitoring (obligatory in state reserves) and fire protection activities are allowed, while tourist visitation of the area requires special permits issued by the PA administration. Therefore, the national category I is equivalent to the IUCN PA management category Ia (Strict Nature Reserve), assigned to wilderness areas in which natural conditions and ecological processes are exceptionally well preserved, and where human interference or use is seriously restricted. Due to the above, state reserves designated in Uzbekistan can better be described as state strict nature reserves, which term better reflects their highest protective regime.

As at March 2019, there are seven SSNRs in Uzbekistan, together encompassing a total area of 188,335 ha, which accounts for only 0.42 per cent of the country's territory. Most SSNRs stretch over an area of 10,000–27,000 ha, with the exception of the smallest (Kitab, 3,938 ha) and the largest (Gissar, 80,986 ha) (table 11.1).

National category II protected areas:
Complex landscape reserves

The national category II includes complex (landscape) reserves (CLRs), defined as "complex (landscape) zakazniks" (another term of the USSR categorization system, although its use for category II might be misleading). CLRs are established (simultaneously with their external buffer zones) in order to preserve natural objects and complexes of particular ecological values in their natural state. CLRs are each designated as a "state nature conservation institution" by the Cabinet of Ministers. Neither the Law on Protected Natural Territories nor the 2016 Resolution of the Cabinet of Ministers No. 238 indicates the validity period of CLRs' designation.

The CLR protective regime prohibits activities other than scientific research, monitoring and recreation. However, haymaking, livestock grazing and collection of NTFPs by the CLR personnel and area residents for their own needs are allowed in specially appointed areas extending along a CLR's border and not exceeding 0.001 per cent of its total area. Hence, national category II corresponds to IUCN category Ib (Wilderness Area) for areas protected and managed in order to preserve their natural condition, which allows local communities to use the available resources in ways compatible with the conservation objectives.

As at March 2019, Uzbekistan has one CLR, Saygachiy, designated in the Republic of Karakalpakstan on the Ustyurt Plateau, adjacent to the state border with Kazakhstan. It encompasses 628,300 ha (1.4 per cent of the country's territory), with an external buffer zone of 219,800 ha. CLR Saygachiy (which name derives from the CE saiga antelope, the "flagship" species of this region), designated in 2016 and the largest PA in Uzbekistan, replaced the former Saygachiy "zakaznik" (of lower national category V), established in 1991 on an area of 1,000,000 ha.

National category III protected areas:
National nature parks

The national category III PAs are defined as nature parks, established to protect natural objects and complexes of particular ecological, cultural and aesthetic values and used for nature conservation, recreational, scientific and cultural purposes. Nature parks can be of either national or local importance and are designated as a "state nature conservation institution" by either the Cabinet of Ministers or local government authorities accordingly. The nature park designation validity period is not determined by the 2004 Law on Protected Natural Territories.

Once designated, a nature park area should be divided into different functional zones: the strictly protected zone (with the same management regime as an SSNR), and zones of recreational, economic and other uses (the latter could include the designation of a health spa zone, with the same management regime as in such zones of national category VI). The management regime of a nature park recreational zone depends on the state of preservation of its natural objects and complexes. The management regime of a nature park economic and other uses zone allows for permanent human habitation. In general, all activities that could threaten the natural values of the nature park area (e.g. logging, activities that could cause the degradation of flora and fauna) are either restricted or prohibited. Hence, the national category III corresponds to IUCN

category II (National Park), and thus, nature parks are further referred to as national nature parks (NNPs).

As at March 2019, there are three NNPs of different sizes, encompassing a total area of 558,173.6 ha (1.243 per cent of the country's territory), including the vast Ugam-Chatkal NNP (531,637 ha, the second largest PA in Uzbekistan), medium-sized Zaamin NNP (24,110 ha) and small Zarafshan NNP (2,426 ha). The latter replaced the former Zarafshan SSNR ("zapovednik"), of the highest national category I, which was established in 1979 on an area of 2,352 ha.

### National category IV protected areas: Nature monuments

PAs of the national category IV are state nature monuments, protecting natural objects of unique ecological, scientific, cultural, and aesthetic values, designated by state authorities at the local level. Depending on the kind of natural object subject to conservation, state nature monuments are further divided into hydrological (protecting wetlands, lakes, rivers or other water bodies), botanical (protecting flora species), geomorphological (protecting natural relief forms), palaeontological (preserving fossil objects), as well as geological and mineralogical (protecting geological and mineralogical formations). All activities that could threaten the values of the preserved natural object are prohibited. As the national category IV corresponds to IUCN category III (Natural Monument or Feature), state nature monuments are further referred to as nature monuments (NMs). The responsibility for ensuring the protective regime and undertaking conservation measures is delegated to the legal entities or individuals owning the land protected as the NM or renting and using it for religious purposes.

As at March 2019, Uzbekistan has 10 NMs, jointly encompassing a total area of 3,760.1 ha (0.008 per cent of the country's territory). Six NMs cover less than 100 ha each, the smallest being Varahsha (7 ha), while the largest are Mingbulak (1,000 ha) and Yaz'yavan Steppe (1,962.9 ha).

### National category V protected areas: State reserves, nature nurseries and fishery zones

According to the Law on Protected Natural Territories, the national category V includes several types of PAs designated for the conservation, reproduction and recovery of individual natural objects and complexes: state reserves (called "zakazniks", as in the USSR categorization system), nature nurseries and fishery zones. Therefore, the conservation objective of the

national category V is similar to IUCN category IV (Habitat/Species Management Area).

National category V state "zakaznik" reserves (further referred to as state reserves, SRs) are designated for the conservation, reproduction and restoration of individual natural objects and complexes. Four types of SRs are defined by the Law on Protected Natural Territories: biological (botanical, zoological), protecting rare and endangered flora and/or fauna species, as well as their migration routes, palaeontological, hydrological, and geological and mineralogical. SRs of national importance are designated by the Cabinet of Ministers and SRs of local importance by the state authorities at the local level, for either an indefinite period or a period not shorter than 10 years. SRs can be established as a legal entity (which would then imply the presence of an own management body and personnel) or without such legal status, and be either publicly or privately owned. In general, all activities that could threaten the values of natural objects and complexes protected in SRs are either prohibited or restricted (on either a permanent or temporary basis); however, the territories of SRs without legal entity status are not withdrawn from their economic use. As the "zakaznik" term was also used for CLRs, the Law emphasizes the difference in protective regimes of "complex (landscape) zakazniks" (CLRs) and "zakazniks" (SRs).

As at March 2019, there are 12 SRs, with a total area of 572,404 ha (1.275 per cent of the country's territory). Two SRs are of less than 5,000 ha each (including the smallest, Omonkuton, at 1,515 ha), nine SRs are between 11,300 ha and 63,300 ha, while Mubarek (the third-largest PA in Uzbekistan) encompasses 264,469 ha (46.2 per cent of the SRs' total area).

National category V nature nurseries (further referred to as species breeding centres, SBCs) are designated by the state authorities at the local level, with the purpose of facilitating the preservation, reproduction and restoration of particular wild flora or fauna species. SBCs can be established as a legal entity or without such legal status and be either publicly or privately owned. The protective regime prohibits activities that could threaten the species subject to conservation in a particular SBC. As at March 2019, three SBCs are in operation in Uzbekistan, encompassing a total area of 17,222 ha (0.038 per cent of the country's territory). The biggest, the SBC "Jeyran" (16,522 ha) in Bukhara Oblast, is protecting large herbivorous mammals (Przewalski's horse, goitered gazelle, Asiatic wild ass, Bukhara urial and Bukharan markhor). The other two, much smaller

SBCs (300 ha and 400 ha), are established in Bukhara and Navoiy Oblasts for breeding the houbara bustard.

National category V fishery zones are designated on water bodies by the Cabinet of Ministers as protected natural areas with the objective to preserve, reproduce and restore rare and endangered species of fish and other aquatic organisms. Moreover, besides the conservation functions, fishery zones are also used for fishery activities. No data on the total number and area of fishery zones are available.

<div align="center">National category VI protected areas:<br>Protected landscapes</div>

The national category VI of PAs is defined as protected landscapes, and again includes several types of PAs: natural health spa zones (NHSZs), recreational zones, water protective zones, coastline belts, sanitary protection zones of water bodies, and surface and groundwater formation zones. Protected landscapes of the national category VI, the main objective of which is the protection of natural resources (e.g. ensuring water quality) should not be confused with the IUCN PA management category V (Protected Landscape/Seascape), assigned to areas of high or distinct scenic quality, with significant associated habitats, flora and fauna, and associated cultural features.

National category VI NHSZs are areas protected for their therapeutic and curative properties (e.g. areas harbouring mineral water springs, rich in therapeutic mud deposits and being of favourable climatic conditions). NHSZs of national importance are designated by the Cabinet of Ministers, and those of local importance by the state authorities at the local level. NHSZs are further divided into three functional zones, each having its special protective regime: the first zone consisting of therapeutic resources, the second zone including territories of sanatoria, etc., and the adjacent third zone serving as a buffer zone, where some activities (e.g. the use of pesticides, waste storage and several industries) are forbidden. No data on the total number and area of NHSZs are available. NHSZs cannot be perceived as typical PAs in the common understanding of the term, as the purpose for the designation of an NHSZ is different from the preservation of biological and landscape diversity.

Another PA type of the national category VI are recreational zones, designated by the state authorities at the local level, for tourist and recreational purposes. Recreational zones can be divided into areas of different protective regimes (e.g. similar to the third zone of an NHSZ). No data on the total number and area of recreational zones are available. Again, due to the purpose of designation, recreational zones cannot be perceived as typical PAs.

Similarly to NHSZs, national category VI water protective zones, coastline belts, sanitary protection zones of water bodies, and surface and groundwater formation zones are designated (either by the Cabinet of Ministers or state authorities at the local level) with the primary purpose to protect natural resources (e.g. ensure water quality, maintain a favourable water regime), and, to a much lesser extent, biological and landscape diversity. However, the protection of such areas (adjacent to river corridors, lake and water reservoir coastlines, canals or water collectors) from pollution, the use of pesticides and the felling trees and shrubs, for example, is of vital importance for the maintenance of wildlife habitats and migration routes. As at March 2019, water protective zones, coastline belts and sanitary protection zones of water bodies encompassed a total area of 155,416 ha (0.346 per cent of the country's territory) and the surface and groundwater formation zones a further 269,949 ha (0.601 per cent).

<div align="center">National category VII protected areas:<br>Territories for the management of individual natural resources</div>

The Law on Protected Natural Territories defined the national category VII of PAs as territories for the management of individual natural resources, namely, the state forest fund lands (including forests of high conservation values) and the lands used for hunting farms, intended for the rational use of flora and fauna. The Law does not determine the body authorized to designate territories for the management of individual natural resources. The protective regime prohibits the intentional introduction of non-native species, and any other activities that could threaten the flora and fauna in such territories, while the use of flora and fauna species (including hunting, which could directly threaten the fauna) is regulated by other laws. Therefore, the national category VII could correspond to IUCN management category IV (Habitat/Species Management Area), assigned to protected areas designated to maintain, conserve and restore species and habitats (also semi-natural ones, like the vast majority of forests in Uzbekistan), which might require undertaking regular and active management interventions.

As at March 2019, territories for the management of individual natural resources encompassed as much as 11,121,567.2 ha (24.776 per cent of the country's territory) – an area almost equal to the whole territory of the state forest fund (11.26 million ha, as at 1 January 2018), which implies that almost all state

forest fund lands and lands of hunting farms are classified as PAs of the national category VII. It should be remembered that, as at 1 January 2018, the share of forested areas accounted for only 28.95 per cent of the total state forest fund land area, while the share of natural forests (in particular, high conservation value forests) was much lower. Hence, the majority of PAs of the national category VII are in fact other state forest fund lands (e.g. forestry plantations, areas under afforestation and open areas potentially suitable for afforestation) and lands of hunting farms, which can hardly be perceived as typical PAs, even of the IUCN category IV.

### Non-categorized protected areas: State biosphere reserves, national parks and inter-State protected natural territories

State biosphere reserves (SBRs) are designated by the Cabinet of Ministers with the purpose of fostering sustainable economic and social development aimed at the preservation of biological diversity and rational use of natural objects and complexes. SBRs can be nominated as biosphere reserves under the UNESCO Man and the Biosphere (MAB) Programme. SBRs are divided into the strictly protected zone (of the same protective regime as in SSNRs), the buffer zone serving for the preservation but also reproduction and restoration of natural objects and complexes (where activities that could threaten the protected zone are prohibited) and the transitional zone (the management regime of which allows activities that do not harm natural objects and complexes of the SBR).

As at March 2019, there are two SBRs in Uzbekistan, encompassing a total area of 111,670.6 ha (0.249 per cent of the country's territory): Lower Amu Darya (68,717.8 ha), encompassing complexes of tugai forests and floodplain ecosystems, and Ugam-Chatkal (42,952.8 ha), including mountain forests and highland ecosystems. Ugam-Chatkal SBR, in particular the core zone Bashkyzylsay, also bears two international designations, as the UNESCO MAB Biosphere Reserve "Mount Chatkal" (since 1978)[24] and as part of the Western Tien-Shan transnational World Heritage property (2016). Although the Law on Protected Natural Territories does not determine the SBR legal entity status, both these SBRs have their own management bodies and personnel.

According to the Law on Protected Natural Territories, national parks (NPs) are designated by the Cabinet of Ministers as protected areas aimed at the preservation, reproduction and sustainable use of unique and valuable plant species (including decorative ones) for conservation, recreational, scientific and cultural purposes. Even though the legal entity status is not mentioned, the Law determines that NPs are to be managed by their own directorates, established by the Cabinet of Ministers. The protective regime of NPs prohibits activities that could harm the flora (the Law also mentions the fauna inhabiting the NP territory, but only as an integral part of the ecosystem), while external buffer zones can be designated in adjacent areas, to protect both the flora and fauna of the NP. The NP inner territory can be divided into functional zones, not further detailed by the Law.

As at March 2019, the only NP in the country is Durmen (32.4 ha), designated in 2014 in Tashkent Oblast, established on the basis of a village park zone. NPs do not belong to any national PA category. Despite the similarity of the term, NPs in Uzbekistan should not be confused with IUCN category II areas (National Parks), as the latter are designated with the purpose of protecting the whole complexity of native species and ecosystems and ensuring the continuity of ecological processes, usually encompass large-scale natural areas of sufficient size and ecological quality to maintain ecological functions and processes, and rarely require intensive management interventions.

In contrast to the above, according to the Law on Protected Natural Territories, NPs in Uzbekistan have a clear focus solely on the protection of flora species, and can be "created through the restoration and reproduction of flora", including the application of complex agrotechnical measures (hence, their establishment does not necessarily require the presence of natural areas of high ecological qualities and conservation values). The 2014 Resolution of the Cabinet of Ministers No. 144 on the designation of Durmen NP, among the tasks set for its Directorate, explicitly mentions carrying out complex agrotechnical measures, the maintenance of artificial irrigation systems and "measures to further green the territory with valuable plant species". Last, but not least, the size of Durmen NP (less than 33 ha, and thus smaller than most NMs in the country) is definitely not sufficient to protect an ecosystem, or viable fauna populations. However, it can serve as a nursery area for rare plant species, function as a local botanical garden and be used for scientific and educational purposes.

The Law on Protected Natural Territories also mentions the possibility of designation of inter-State protected natural territories, encompassing PAs of two

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[24] Only Bashkyzylsay – the core zone of Ugam-Chatkal SBR – has World Heritage status.

or more neighbouring countries, established on the basis of international agreements. As at March 2019, no inter-State protected natural territories are designated in Uzbekistan; however, a Memorandum of Cooperation between SCEEP and relevant authorities of the Republic of Kazakhstan and the Kyrgyz Republic on the management and protection of the Western Tien-Shan transnational World Heritage property was signed in 2019. This trilateral transnational World Heritage site encompasses seven PAs with a total area of 528,177.6 ha (including 35,724 ha in Chatkal SBSNR and the core zone Bashkyzylsay of Ugam–Chatkal SBR in Uzbekistan), with a buffer zone of 102,915.8 ha.

### *Buffer zones*

The Law on Protected Natural Territories provides for the designation of external buffer zones, adjacent to the territories of several types of PAs (SSNRs, CLRs, SRs, NMs and NPs) and determines that part of the SSNR buffer zone may be transferred to the SSNR managing body for the organization of ecological tourism activities, establishing nurseries for breeding rare and threatened native flora and fauna species and other SSNR needs. This Law does not provide for the designation of NNP buffer zones, probably due to the fact that, in addition to the strictly protected zone, their territories obligatorily include zones of recreational, economic and other uses. In general, the protective regime of a buffer zone either prohibits or restricts activities that could adversely influence related PAs.

According to the Law, the protective regime and size of a buffer zone are to be determined simultaneously with the designation of the PA concerned. However, this general rule was not always applied, as the designation of Durmen NP was not accompanied by the establishment of its external buffer zone, for example. Furthermore, according to SCEEP (2019), buffer zones are not yet established for several SSNRs (Chatkal, Gissar, Kyzylkum, Nurata and Zaamin). The designation of buffer zones for Chatkal and Gissar SSNRs is planned under the UNDP/GEF/SCEEP project "Sustainable natural resource and forest management in key mountainous areas important for globally significant biodiversity" (2017–2022). Information on external PA buffer zones is generally not available.

### *Trends in development of protected area system*

Between 2010 and 2018, a few new PAs were established in Uzbekistan, most often on the basis of previously existing ones:

- Lower Amu Darya SBR in the Republic of Karakalpakstan (2011 Resolution of the Cabinet of Ministers No. 242) with an area of 68,717.8 ha (which included the former Badai-Tugai SSNR, established in 1971 on 6,400 ha);
- Durmen NP covering 32.4 ha in Tashkent Oblast (2014 Resolution of the Cabinet of Ministers No. 144);
- Saygachiy CLR in the Republic of Karakalpakstan (2016 Resolution of the Cabinet of Ministers No. 238), as at March 2019 the largest PA in the country, encompassing an area of 628,300 ha, with an external buffer zone of 219,800 ha (replacing the former Saygachiy SR of national category V, established in 1991 on 1,000,000 ha);
- Zarafshan NNP in Samarkand Oblast covering 2,426 ha, established in 2018 (2018 Resolution of the Cabinet of Ministers No. 82) on the basis on the former Zarafshan SSNR;
- Ugam-Chatkal SBR on 42,952.8 ha in Tashkent Oblast (2018 Resolution of the Cabinet of Ministers No. 367), which replaced the former Ugam-Chatkal SR (established in 2016).

As at March 2019, works on the designation of Saykhun SR in Syrdarya Oblast are ongoing.

According to official statistics, the national PA system of Uzbekistan (even without taking into account PAs of the national category VI) on 1 January 2019 encompassed 13.2 million ha, 29.4 per cent of the country's territory. This is above the minimum threshold set by the CBD Aichi Target 11, which stipulates that, by 2020, at least 17 per cent of terrestrial and inland water areas shall be included in effectively and equitably managed, ecologically representative and well-connected systems of protected areas.

However, the predominant part of the above total area (84.24 per cent, over 11.1 million ha) comprises PAs of the national category VII: state forest fund lands (of which only 28.95 per cent were actual forests, while the remaining 71.05 per cent were, for example, forestry plantations and areas under afforestation works, as well as pastures and open areas potentially suitable for afforestation) and the lands of hunting farms. Hence, PAs, in the common understanding of the term, together cover less than 2.1 million ha (some 15 per cent of the national protected area system), which accounted for only 4.63 per cent of the country's territory (map 11.2).
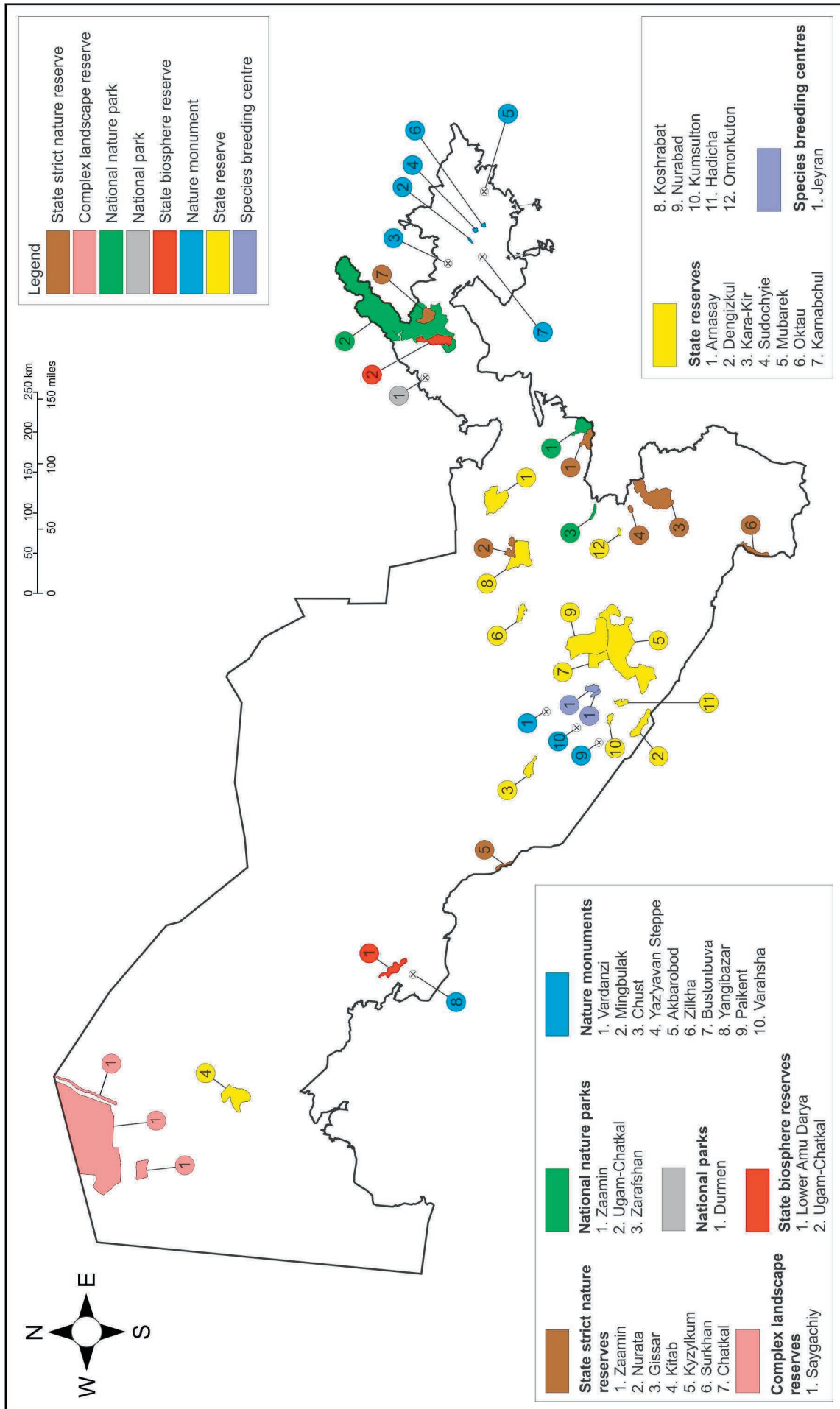
**Table 11.1: Protected areas as at 1 January 2019**

| Protected area type | PA category National | IUCN correspondence | PA name | Year of designation | Area (ha) | Approx. % of country's territory* | Remarks |
|---|---|---|---|---|---|---|---|
| **State strict nature reserve** | **I** | **Ia** | | | **188 335.0** | **0.42** | **"zapovednik"** |
| | | | Zaamin | 1960 | 26 840.0 | | Originally established in 1926. Mountain forest/highland ecosystems. Pamir-Alay, Turkestan Ridge |
| | | | Chatkal | 1947 | 24 706.0 | | Mountain forest/highland ecosystems. West Tien-Shan, Chatkal Ridge |
| | | | Kyzylkum | 1971 | 10 311.0 | | Tugai forest, desert ecosystems, Amu Darya floodplain |
| | | | Nurata | 1975 | 17 752.0 | | Arid lowland, low mountain ecosystems. Pamir-Alay, Nurata Ridge |
| | | | Kitab | 1979 | 3 938.0 | | Geological/paleological monument, low mountain forest ecosystem. Pamir-Alay, Zarafshan Ridge |
| | | | Gissar | 1983 | 80 986.0 | | Mountain forest/highland ecosystems. Pamir-Alay, Gissar Ridge |
| | | | Surkhan | 1987 | 23 802.0 | | Low mountain, mountain forest/highland ecosystems. Pamir-Alay, Kugitang Range |
| **Complex landscape reserve** | **II** | **Ib** | | | **628 300.0** | **1.40** | **"complex landscape zakaznik"** |
| | | | Saygachiy | 2016 | 628 300.0 | | State Reserve 1991–2016. Desert ecosystems. Ustyurt Plateau |
| **National nature park** | **III** | **II** | | | **558 173.6** | **1.24** | |
| | | | Zaamin | 1976 | 24 110.0 | | Mountain forest/highland ecosystems. Pamir-Alay, Turkestan Ridge |
| | | | Ugam-Chatkal | 1990 | 531 637.2 | | Mountain forest/highland ecosystems. West Tien-Shan, Chatkal Ridge |
| | | | Zarafshan | 2018 | 2 426.4 | | Tugai forest/wetland ecosystems. Zarafshan floodplain. Incl. former SSNR (zapovednik) established in 1979 |
| **National park** | **none** | **none** | | | **32.4** | **0.00** | |
| | | | Durmen | 2014 | 32.4 | | Flora species. Tashkent Oblast. |
| **State biosphere reserve** | **none** | **none** | | | **111 670.6** | **0.25** | |
| | | | Lower Amu Darya | 2011 | 68 717.8 | | Tugai/floodplain ecosystems. Amu Darya River basin. Incl. former Badai-Tugai SSNR (zapovednik) |
| | | | Ugam-Chatkal | 2018 | 42 952.8 | | Mountain forest/highland ecosystems. West Tien-Shan, Chatkal Ridge. World Heritage/UNESCO MAB Biosphere Reserve |

| Protected area type | PA category National | IUCN correspondence | PA name | Year of designation | Area (ha) | Approx. % of country's territory* | Remarks |
|---|---|---|---|---|---|---|---|
| **Nature monument** | **IV** | **III** | | | **3 760.1** | **0.01** | |
| | | | Chust | 1990 | 96.0 | | |
| | | | Mingbulak | 1991 | 1 000.0 | | |
| | | | Yaz'yavan Steppe | 1994 | 1 962.9 | | |
| | | | Vardanzi | 1997 | 124.0 | | |
| | | | Akbarobod | | 39.5 | | |
| | | | Zilkha | | 22.2 | | |
| | | | Bustonbuva | | 8.5 | | |
| | | | Yangibazar | 2003 | 470.0 | | |
| | | | Paikent | 2010 | 30.0 | | |
| | | | Varahsha | 2010 | 7.0 | | |
| **State reserve** | **V** | **IV** | | | **572 404.0** | **1.28** | **"zakaznik"** |
| | | | Dengizkul | 1973 | 50 000.0 | | Ramsar site (2001) |
| | | | Arnasay | 1983 | 63 300.0 | | Ramsar site (2008) |
| | | | Sudochyie | 1991 | 50 000.0 | | |
| | | | Kara-Kir | 1992 | 30 000.0 | | |
| | | | Nurabad | 1992 | 40 000.0 | | |
| | | | Oktau | 1997 | 15 420.0 | | |
| | | | Karnabchul | 1998 | 25 000.0 | | |
| | | | Koshrabat | 1998 | 16 500.0 | | |
| | | | Mubarek | 1998 | 264 469.0 | | |
| | | | Kumsulton | 2010 | 4 900.0 | | |
| | | | Hadicha | 2010 | 11 300.0 | | |
| | | | Omonkuton | | 1 515.0 | | |
| **Species breeding centre** | **V** | **IV** | | | **17 222.0** | **0.04** | |
| | | | Jeyran | 1976 | 16 522.0 | | |
| | | | Bukhara houbara | 2007 | 400.0 | | In Peshkunsky district/Bukhara Oblast |
| | | | Navoiy houbara | 2008 | 300.0 | | In Karmana district/Navoiy Oblast |
| **Forest management area** | **VII** | **IV** | | | **11 121 567.2** | **24.78** | |
| **Water protection zone** | **VI** | **none** | | | **155 416.0** | **0.35** | Zones along rivers, irrigation channels and collectors |
| **Water source protection zone** | **VI** | **none** | | | **269 949.0** | **0.60** | Surface/groundwater source protective zones |
| **Total** | | | | | **13 626 829.9** | **30.36** | |

*Source*: State Committee on Ecology and Environmental Protection (2019); 2019 Sixth National Report to the CBD; 2015 Fifth National Report to the CBD; ECE Secretariat calculations.

*Note*: * 44,889,240 ha.

**Map 11.2: Protected areas**

Legend

- State strict nature reserve
- Complex landscape reserve
- National nature park
- National park
- State biosphere reserve
- Nature monument
- State reserve
- Species breeding centre

N
W — E
S

0   50   100   150   200   250 km
0    50    100    150 miles

**State strict nature reserves**
1. Zaamin
2. Nurata
3. Gissar
4. Kitab
5. Kyzylkum
6. Surkhan
7. Chatkal

**Complex landscape reserves**
1. Saygachiy

**National nature parks**
1. Zaamin
2. Ugam-Chatkal
3. Zarafshan

**National parks**
1. Durmen

**State biosphere reserves**
1. Lower Amu Darya
2. Ugam-Chatkal

**Nature monuments**
1. Vardanzi
2. Mingbulak
3. Chust
4. Yazyavan Steppe
5. Akbarobod
6. Zilkha
7. Bustonbuva
8. Yangibazar
9. Paikent
10. Varahsha

**State reserves**
1. Arnasay
2. Dengizkul
3. Kara-Kir
4. Sudochyie
5. Mubarek
6. Oktau
7. Karnabchul
8. Koshrabat
9. Nurabad
10. Kumsulton
11. Hadicha
12. Omonkuton

**Species breeding centres**
1. Jeyran

In 2016–2017, the Government increased the share of PAs of the highest protective regime through the redesignation of the former Saygachiy SR and the former Zarafshan SSNR. However, in the case of the former Saygachiy SR, the redesignation resulted in a decrease in the area of the protected territory by almost 37.2 per cent. In the case of the former Zarafshan SSNR, a strictly protected zone of the Zarafshan NNP (1,777 ha) was made almost one quarter (24.4 per cent) smaller than that in the SSNR.

### *Protected area management*

The development of PA management plans, mentioned in the 2004 Law on Protected Natural Territories, is further regulated by the 2012 Order of the Chairperson of the State Committee for Nature Protection No. 3. The Order served as the basis for the preparation of management plans for the period 2014–2018 for eight SSNRs, two NNPs, the Lower Amu Darya SBR and the SBC "Jeyran". As at March 2019, management plans for the period 2019–2023 are still in preparation.

In general, provisions of PA management plans concerning the application of prescribed nature conservation measures, conducting scientific research and carrying out environmental education and awareness-raising activities are successfully implemented, while the originally planned capacity-building measures (e.g. concerning the construction of facilities, visitor centres, purchase of equipment, etc.) are either abandoned or progressing much more slowly, due to the limited available funding.

As for human resources, which are indispensable for the implementation of adopted management plans, the increase in the total area placed under legal protection in Uzbekistan was not accompanied by an increase in the number of PA personnel. Even though the publicly available statistical data on employment in PAs is incomplete, a negative trend is observed. The total number of employees in SSNRs and NNPs initially increased from 550 in 2011 to 557 in 2012 and 567 in 2015, but later decreased to 526 in 2017. Similarly, the number of SSNR and NNP scientific employees increased from 65 in 2011 to 73 in 2012, then stabilized at 70 in the period 2013–2015, but later decreased to only 49 in 2017. The latter negative trend is most alerting, as the decreasing number of scientific personnel might further limit the capacities for carrying out regular biodiversity monitoring in PAs. Statistical data that could demonstrate employment trends in institutions managing types of PAs other than SSNRs and NNPs are not available.

The most effective protection of biological and landscape diversity is ensured only in PAs granted legal entity status, which have their own managing body and field personnel (including rangers), that is, PAs of national categories I (SSNRs) and II (CLRs), and also in strictly protected zones of NNPs (national category III) and of non-categorized SBRs. As at March 2019, the total area encompassed by the above PA types (given the unavailability of data on the exact functional zonation of NNPs and SBRs, including NNP zones of recreational, economic and other uses, as well as SBR buffer and transitional zones), accounted for only 1,486,479.2 ha, or 10.9 per cent of the total area of the national PA system (including PAs of the national category VI) and only 3.31 per cent of the country's territory.

The extensive Saygachiy CLR constitutes over 42 per cent of the area of the most effective PAs (628,300 ha, 4.61 per cent of the whole PA system and 1.4 per cent of the country's territory). However, the full achievement of the main conservation objective for its designation is largely dependent on progress in transboundary cooperation with Kazakhstan, which could reopen the southward cross-border winter migrations of saiga antelope of the Ustyurt herd into Saygachiy CLR. Furthermore, seven SSNRs, designated to preserve natural ecosystems, habitats and species diversity, and therefore PAs that best serve as reference areas for scientific research and monitoring and ensure the highest legal protective regime, jointly encompassed 188,335 ha (1.38 per cent of the PA system and 0.42 per cent of the country's territory).

Other "typical" PAs are either established with management objectives that differ from the conservation of the whole complexity of native species and ecosystems and of the continuity of natural ecological processes, or have much less effective management. For instance, SBCs, which jointly occupy a small area (17,222 ha, 0.038 per cent of the country's territory), mainly serve for the preservation and reproduction of selected "flagship" rare mammal and bird species. The twelve "zakaznik" SRs (572,404 ha in total, 1.275 per cent of the country's territory) are supervised and patrolled rather than actively managed by the regional SCEEP branches, while eight of the 10 NMs (3,760.1 ha in total, 0.008 per cent of the country's territory), managed by local authorities, are too small to protect much more than a single natural phenomenon.

### *Gaps in the protected area system in terms of ecosystem coverage and species conservation*

As at March 2019, a striking disparity in the PA geographical distribution among particular regions of Uzbekistan is visible (map 11.2). For instance, very

few PAs are designated in western (Republic of Karakalpakstan) and central (e.g. Navoiy Oblast) parts of the country, and the PA system is also underdeveloped in the most southern (e.g. Khorezm, Surkhandarya) and eastern (Syrdarya, Andijan, Fergana, Namangan) oblasts. Furthermore, almost all PAs of the highest protective regime (SSNRs and NNPs) are concentrated in the south-eastern part of the country, with the exception of the only CLR recently established in the Republic of Karakalpakstan, in the northernmost corner of the country.

According to CBD Aichi Target 11, the PA network should be ecologically representative, including all main representative landscapes and ecosystems, as well as protecting the diversity of flora and fauna species, in particular endemic, rare and threatened species. As at 2019, this was not yet the case in Uzbekistan.

As at 2016, only 3.5 per cent of desert landscapes and ecosystems (including desert and foothill habitats), which encompass a large part of the country and are therefore highly representative of Uzbekistan, and only 3 per cent of floodplain forests were included in the PA system. On the contrary, 14 per cent of mountain landscapes and ecosystems (which cover some 13 per cent of the country) were best preserved by the PA system, as the majority of SSNRs and all three NNPs had been designated with the objective to protect high mountain and montane forest ecosystems with their unique flora and fauna. However, the valuable ecosystems of the mountain massifs located in the central part of the Kyzylkum Desert are not yet protected.

Furthermore, PAs are not only unevenly distributed among the geographical regions, landscape and ecosystem types and administrative regions of the country but also among botanical and zoological regions, and therefore the PA system does not encompass the full geographical ranges of occurrence and habitats of several rare, endemic and threatened species; consequently, it preserves neither the whole phytocenotic and floristic nor zoological diversity.

According to the Institute of Botany, as at 2019, only 157 (48.9 per cent) of 321 higher plant species listed in the 2009 Red Book of Uzbekistan (RB), and only 131 of 350 national endemics are protected in SSNRs and NNPs, providing for effective flora species protection. According to estimates presented in the 2019 Sixth National Report to the CBD, some 180 RB plant species (56 per cent) occur in PAs of national categories I–IV (SSNRs, CLR, NNPs, NMs), and in SBRs. However, the coverage of the above rare plant species by the whole PA network cannot be properly assessed, as no field inventory works on flora had been conducted to date in PAs of management categories other than SSNRs and NNPs. As for geographical gaps concerning the protection of RB plant species, most noticeable is the absence of PAs in other important areas of their concentration, e.g. in the Baysun Mountains (76 RB plant species), Tupalang River basin (40), western spurs of the Gissar Range (32), Babatag Ridge (22), Sangardak River basin (20) and Shakhimardan enclave (15 species), and in the residual lowlands of Kuldzhuktau, Tamdytau and Bukantau (respectively, 16, 10 and 8 RB plant species).

As for fauna species conservation within the PA system, the 2019 Sixth National Report to the CBD estimates that 88–90 per cent of bird species, 68–75 per cent of mammal species, 72.2 per cent of RB fish species and 63–71.4 per cent of reptile species occurred in SSNRs, CLR, NNPs, NMs and SBRs. SSNRs, which provide the most strict and effective species protection, are reported as harbouring some 50 per cent of all vertebrate animal species, and 43 per cent of those listed as rare and threatened (including 56 per cent of RB mammal and 38.5 per cent of RB bird species). However, the existing PAs cover only parts of their habitats and do not provide protection for several migrating fauna species during their full life cycle. The majority of SSNRs (except for Gissar) are too small to provide for adequate protection for target ecosystems, or the individual fauna species whose presence justified their designation. Furthermore, a proportion of rare and threatened species, in particular reptile and bird species, occurs only inside NMs and "zakaznik" SRs, which provide a lower protective regime. SRs are estimated to protect some 40 per cent of rare and threatened vertebrate species (in particular, waterfowl).

*Planned extension of the protected area system*

In 2012, the UNDP/GEF/SCEEP project "Strengthening sustainability of the national system of protected areas by focusing on strictly protected areas" developed the Recommendations for expansion of the system of protected areas in Uzbekistan. PA network gap assessment was conducted, with the use of landscape, botanical and zoological criteria and GIS techniques. As a result, 29 sites suitable for the extension of existing PAs or designation of new ones were recommended, including seven that simultaneously meet all three types of criteria. The recommendations were the basis for the elaboration of the draft programme for the expansion of the network of protected natural territories for 2014–2023, which was not officially adopted.

In early 2019, the President approved the Roadmap for the development of the protected area system for the period 2019–2022 (2019 Resolution of the President No. 4247), based on the proposal jointly submitted by SCEEP, the State Committee on Forestry and the Academy of Sciences. According to the Roadmap, five PAs with a total area of some 2.3–3 million ha are to be designated in the Republic of Karakalpakstan in 2019–2022: the new Southern Ustyurt SSNR with its own administrative body and personnel and four new SRs, each with a legal entity status. Two of four new SRs are planned to be designated for the purpose of landscape conservation.

In terms of area, Southern Ustyurt SSNR is expected to extend over some 1.4 million ha (which would make it the largest PA in the country) of territories adjacent to the existing Gaplangyr SSNR in Turkmenistan and planned Mangystau State Preserved Zone in Kazakhstan, which could then provide for the emergence of a coherent trilateral transboundary protected area.

Furthermore, Resolution No. 4247 provides for the establishment of buffer zones for six SSNRs (Chatkal, Gissar, Kyzylkum, Nurata, Surkhan and Zaamin) and Lower Amu Darya SBR.

## 11.4 Ecological networks

### *National ecological network*

The CBD Aichi Target 11 emphasizes that the national PA system should be well connected, which requires the presence of ecological corridors linking PAs (serving either as core biodiversity conservation areas or species migration stepping stones) to ensure the integrity, ecological continuity and connectivity of the ecological network, both in-country and with neighbouring States. However, the concepts of the ecological network and of ecological corridors are, in practice, absent from the Law on Protected Natural Territories. No information on field research activities aiming at inventorying and mapping of the mainstays, priority connecting corridors and migratory routes of rare and endangered fauna species protected by the national legislation of Uzbekistan is available. Hence, the possible designation of ecological corridors would require prior scientific research.

The national PA system of Uzbekistan is still not a "network" in the common meaning of the term, mostly due to the scattered spatial pattern of PA distribution. Despite this, some positive examples of ecological connectivity on a local scale can be mentioned, including:

- Three SRs (Karnabchul, Nurabad and Mubarek) adjacent to each other, located at the conjunction of administrative boundaries of Navoiy, Kashkadarya and Samarkand Oblasts;
- The linkage between Koshrabad SR (Jizzakh Oblast) and Nurata SSNR (Samarkand Oblast);
- The ecological continuity of the two well-protected PAs situated in the Turkestan Ridge (Zaamin SSNR and Zaamin NNP);
- The connectivity of several PAs of different management categories at both in-country and transboundary levels within the Western Tien-Shan transnational World Heritage property.

Nevertheless, in-country ecological corridors are lacking, despite the fact that around one quarter (24.16 per cent, as at 2018) of the country's territory is classified as "reserve land" (table 16.4).

### *Ramsar network*

Two sites are designated as wetlands of international importance (Ramsar sites), together encompassing an area of 558,400 ha.

"Lake Dengizkul" Ramsar site (31,300 ha), designated in 2001, is located in Bukhara Oblast, entirely protected in Dengizkul SR (50,000 ha); it encompasses the large saline water body, fed by irrigation run-off. It is situated in the Kyzylkum Desert, on the route of bird migrations from Western Siberia and Kazakhstan to Indo-Pakistani wintering grounds. It is also a crucially important habitat for several threatened waterfowl species, e.g. a mainstay of over 1 per cent of the world population of the EN white-headed duck (*Oxyura leucocephala*).

The "Aydar-Arnasay Lakes system" Ramsar site (527,100 ha), designated in 2008, is located in Jizzakh and Navoiy Oblasts, and partly protected in Arnasay SR (63,300 ha). It extends over the largest freshwater reservoirs of Uzbekistan, located in the Kyzylkum Desert and Golodnaya Steppe at the crossroads of the Afro-Eurasian and Central Asian flyways. The site provides wintering and nesting habitats for more than 100 bird species, including the CR sociable lapwing (*Vanellus gregarious*), EN Pallas's Fish-eagle (*Haliaeetus leucoryphus*) and white-headed duck, VU red-breasted goose (*Branta ruficollis*) and lesser white-fronted goose (*Anser erythropus*) and NT Dalmatian pelican (*Pelecanus crispus*).

In 2013, SCEEP, with the financial support of the Government of Sweden, prepared the nomination dossier of "Tudakul and Kuymazar Water Reservoirs" (the latter is a natural wetland) to be designated as a new Ramsar site, located in the south-western part of

the Kyzylkum Desert in Navoiy Oblast. These two wetlands are fed with waters of the tributary of the Amu Darya River and provide a refuge for numerous nesting and wintering water bird species, including the EN white-headed duck, VU lesser white-fronted goose and NT Dalmatian pelican. The Government submitted the Information Sheets on Ramsar Wetlands (RIS) to the Ramsar Convention Secretariat with a designation letter for "Tudakul and Kuymazar Water Reservoirs" in 2016 and was then asked to revise the RIS with additional information for designation. As at mid-2019, no revised RIS had been submitted.

Neither the two existing Ramsar sites, nor Dengizkul and Arnasay SRs (overlapping with the territories of the above Ramsar sites), have management plans.

### *Important bird area network*

Until 2018, Uzbekistan implemented the Important Bird Areas of Uzbekistan (IBAUz) Programme, which allowed the identification and description of 52 IBAs with a total area of 2,230,186 ha (4.97 per cent of the country's territory) as globally important for the conservation of threatened bird species, confirmed by the BirdLife International and included in the IBA network. Termez IBA was considered the most important site from the international perspective, and was included in the Network of areas for the Siberian crane and other semiaquatic birds of West and Central Asia. The IBA network in Uzbekistan includes all landscape types representative of the country: 9 IBAs (1,133,365 ha) identified in desert ecosystems, 15 IBAs (373,910 ha) in wetland areas, 9 IBAs (371,631 ha) in desert-lake complexes, 12 IBAs (315,826 ha) in mountain areas, 3 IBAs (19,002 ha) in desert lowlands and 4 IBAs (16,452 ha) ranging over tugai forests.

However, only 17 of the 52 IBAs either partially or entirely overlap existing PAs, while the remaining 35 IBAs are not under any legal protection. Moreover, only nine IBAs are regularly monitored.

### *Key biodiversity areas network*

The identification of key areas for the preservation of biological diversity in Uzbekistan began in 2012 under the UNDP/GEF/SCEEP project "Strengthening sustainability of the national system of protected areas by focusing on strictly protected areas", and was continued in 2016–2017 in the framework of the joint initiative of the Critical Ecosystem Partnership Fund (CEPF) and Zoï Environment Network, "The Mountains of Central Asia Biodiversity Hotspot", with the involvement of UzSPB, the Academy of Sciences (Institute of Botany and Institute of Zoology) and the

NGO Union for the Defence of the Aral Sea and Amu Darya.

As a result of the latter initiative, 36 key biodiversity areas (KBAs) with a total area of 2,683,000 ha (5.98 per cent of the country's territory) were identified within the Uzbek part of the mountainous area defined as the Biodiversity Hotspot. Thirteen KBAs were considered important for the conservation of faunal diversity, including five defined by the CEPF as priority areas in need of basic scientific research. Two KBAs, UZB04 Akbulak River Basin and UZB05 Bashkyzylsay River Basin, are key for the preservation of the globally threatened VU snow leopard (*Panthera uncia*) and Menzbier's marmot (*Marmota menzbieri*), UZB24 Nuratau Ridge is a refuge for more than 90 per cent of the world population of the NT local subspecies of the argali sheep (*Ovis ammon ssp. severtzovi*), while, during the autumn migration season, the transborder Uzbek–Turkmen KBA (UZB30 Talimarjan Reservoir/TKM2 Tallymerjen) harbours more than 30 per cent of the world population of the CR sociable lapwing (*Vanellus gregarious*).

However, only 12 of the 36 KBAs either partially or entirely overlap existing PAs. Moreover, the CEPF–Zoï initiative, implemented solely in the Pamir and Tien-Shan Mountains, did not cover the predominant non-mountainous part of the territory of Uzbekistan. Hence, other potential KBAs remain to be identified in the remaining 87 per cent of the country's territory.

### *World Heritage sites*

The only "natural" World Heritage site of Uzbekistan is Western Tien-Shan (designated in 2016), a trilateral transnational property with a total area of 528,177.6 ha and a buffer zone of 102,915.8 ha; it is shared by Uzbekistan, Kazakhstan and Kyrgyzstan, encompassing seven PAs in the three countries, including 35,724 ha in Chatkal SBSNR and the core zone Bashkyzylsay in Ugam–Chatkal SBR in Uzbekistan.

Between 1996 and 2008, Uzbekistan considered a further 30 areas for nomination to the World Heritage List, including six properties inscribed on the Tentative List by Uzbekistan in 2008: three under the "mixed" (cultural and natural) criterion (Ancient Termiz, Boysun and Sarmishsay) and three under the "natural" criterion (Gissar, Shokhimardon and Zaamin Mountains).

In July 2018, the National Commission for UNESCO started the updating and revision process concerning the Tentative List of Uzbekistan. Some sites inscribed

under the "natural" criterion could be proposed as new transnational properties: Gissar Mountains (including Gissar SSNR in Kashkadarya Oblast, and geological Kitab SSNR as its cluster) could become a joint nomination with Tajikistan, and Shokhimardon (located in Fergana Oblast) could become a joint nomination with Kyrgyzstan (which would then require including both sites in the Tentative Lists of the respective countries). Work on the preparation of a nomination dossier for Gissar Mountains had been scheduled for 2019–2020.

*World Network of Biosphere Reserves*

As at March 2019, Uzbekistan had one area included in the UNESCO World Network of Biosphere Reserves under the UNESCO Man and the Biosphere (MAB) Programme – Chatkal Biosphere Reserve (BR), which includes Chatkal SBSNR and Ugam-Chatkal SBR, with a total area of 35,724 ha in the core zone, 5,197.6 ha in the buffer zone and 27,920.8 ha in transition area in Ugam-Chatkal SBR, encompassing part of the Chatkal Ridge of the western Tien-Shan Mountains, which was nominated in 1978 on the basis of the Chatkal SBSNR.

It should be noted that the BR concept has evolved, and, since 1995, BRs (originally designated for strict nature conservation and scientific research purposes) aim at reconciling biodiversity conservation in core and buffer zones with sustainable development and use of natural resources in the surrounding transition area (which is not required to have a legal protective status). The designation of Ugam–Chatkal SBR in 2018 allowed for the establishment of the buffer zone and transition area for the Bashkyzylsay section, while, in 2019, work is ongoing to establish the buffer zone for the Maydantal section, which would also connect parts of the core zone.

As at March 2019, work was also ongoing on preparation of the nomination of the Lower Amu Darya SBR for inclusion in the UNESCO World Network of Biosphere Reserves.

**11.5 Pressures on species and ecosystems**

*Land uptake*

According to the 2019 Sixth National Report to the CBD, natural landscapes, ecosystems and habitats had largely been transformed into anthropogenic zones in some 18 per cent of the country's territory, mainly as a result of land uptake for agricultural purposes, but also due to urban development, mineral resources mining and infrastructure development. Regions where natural ecosystems were heavily degraded as a result of land uptake for agriculture are, for example, the Fergana Valley, Zaravshan, Kashkadarya and Surkhandarya River valleys, Khorezm and Tashkent oases and Golodnaya Steppe. One of the main factors was the growing demand for pastures (due to the increasing livestock populations and ongoing degradation of current, overgrazed pastures), which caused degradation of natural ecosystems, decline of biological diversity and loss of wildlife habitats. Land uptake for the construction of industrial facilities, mining and corresponding technical infrastructure, hydro construction works and transport infrastructure accounts for only some 2 per cent of the country's territory. However, the ongoing development of the mineral resource extraction sector has adverse effects on ecosystems, causing irreversible landscape transformations, water pollution and soil contamination, which all threaten the stability of ecosystems and survival of wild species populations on a much broader spatial scale.

*Development of energy infrastructure*

As at early 2019, the development of energy installations and infrastructure did not pose major threats to biodiversity (except for accidental bird mortality on high voltage power lines), with the exception of hydroelectric power plant construction and operation, which could further alter the conditions for the water-dependent riverine and wetland ecosystems and species.

However, the recent developments proposing Lake Tuzkan, part of the Aydar-Arnasay Lake System, as a site for location of the planned nuclear power plant may well result in significant risks and pressures from the energy sector on biodiversity (chapter 12).

*Habitat fragmentation and human-made barriers for migratory species*

As the density of transport (railway and road) networks is rather low (at least for a country the size of Uzbekistan) and fenced highways are practically non-existent, these cannot seriously impede in-country wildlife migrations. Habitats are not highly fragmented in the predominant part of the territory, with the exception for the easternmost oblasts (which are densely populated, and intensively used for agricultural purposes), as the concrete barriers set along roads (and separating lanes), coupled with linear agricultural technical infrastructure (e.g. elevated half-pipelines distributing water for irrigation purposes), may impede migrations of larger wild mammal species. However, the presence of anthropogenic barriers on transboundary wildlife migration routes is a major problem in border areas (as a result of state

border fencing). Another example is the rapid decline of the CR saiga antelope population in Uzbekistan caused by the construction and operation of the Beyneu–Shalkar railway on the Kazakhstan side, which has prevented the winter migration of the Ustyurt herd since 2017.

### *Logging and deforestation*

Deforestation processes are ongoing in sub-montane and mountainous regions of the country, predominantly caused by the excessive and uncontrolled livestock grazing, which destroys the forest undergrowth and prevents the natural forest regeneration (in particular, in the case of slow-growing archa/juniper mountain forests). Another factor causing deforestation is the illegal felling of trees and bushes for firewood and construction timber, resulting from the increasing demand for wood, which could not be met by sanitation fellings. No data on the volume of illegal logging and fuelwood harvesting is available to allow proper assessment of the intensity of this pressure.

Furthermore, sub-montane and montane forests are affected by wrongly planned agricultural and infrastructural developments (e.g. slope ploughing, road construction), while tugai forests are also threatened by adversely changing hydrological regimes, resulting from water drainage for agricultural purposes and water salinization. Another threat to forest ecosystems is forest fires, the occurrence of which would be further aggravated by ongoing climatic changes and desertification processes.

The ongoing deforestation automatically translates into the degradation and vanishing of forest plant communities and wildlife populations. However, the scale of deforestation, anthropogenic impact and pressures on forests, and their influence on biodiversity, cannot properly be determined in the absence of the national forest inventory and of an integrated biodiversity monitoring system.

### *Pressures on aquatic ecosystems*

Aquatic ecosystems are highly threatened due to the general scarcity of water resources, which is further aggravated by unsustainable methods of agricultural land irrigation and excessive surface water intake for irrigation purposes, resulting in increasing salinization and declining water quantity in rivers, lakes and wetlands, contamination by pesticides, eutrophication as a result of livestock husbandry waste discharges, and cumulation of pollutants in water bodies and wetlands, threatening the viability of fish, amphibian and reptile populations (which further affects the viability of predatory bird and mammal populations).

### *Desertification*

The ongoing desertification process is one of the major threats to biodiversity in Uzbekistan. As at 2019, desert and steppe ecosystems encompass as much as 85 per cent of the country's territory. The most striking example is the Aral Sea region, where almost the entire marine ecosystem and a large part of coastal and wetland ecosystems were gradually replaced by the sandy-salty desert ecosystem (the so-called Aralkum Desert, of more than 5.5 million ha, including over 3.3. million ha in Uzbekistan). However, all other regions of the country are also threatened by desertification (in particular the Ustyurt Plateau, Kyzylkum Desert and mountainous and sub-montane regions), partly due to climatic changes but also due to unsustainable surface water withdrawal for agricultural irrigation purposes. Tugai floodplain forests are among the most affected ecosystems, as the discontinuity of annual flooding prevents their natural regeneration. Water and wind erosion and the increasing salinization of soils reduce the productivity of ecosystems, which limits the nutrition base for both livestock and wild ungulates (prey for wild carnivorous mammal and bird species populations). Adverse effects of desertification were further enhanced by unsustainable agricultural practices, in particular livestock husbandry, as the transhumance and seasonal pasture rotation practices had been mostly abandoned, which resulted in overgrazing and degradation of pastures. Furthermore, desertification increases the threat of steppe and forest fires, with immediate effects on overall biodiversity.

### *Intensified agriculture*

Unsustainable farming and animal husbandry practices had the strongest impact on the natural ecosystems, habitats and wild flora and fauna species of Uzbekistan, mainly as a result of water withdrawal for agricultural irrigation causing changes in the water regime, excessive land uptake for agricultural purposes, contamination of water bodies by pesticides, eutrophication of aquatic ecosystems due to uncontrolled animal husbandry waste discharges, damage to forest ecosystems resulting in deforestation and pasture land degradation caused by overgrazing. One of the factors is the growing share of cattle in the livestock composition. Between 2010 and 2018, cattle numbers increased by 45 per cent (figure 13.3).

According to the 2019 Sixth National Report to the CBD, the vast majority (almost 92.5 per cent, 19 million ha) of all pastures are concentrated in four administrative regions: Navoiy Oblast (8,759,900 ha),

the Republic of Karakalpakstan (4,780.7 ha), Bukhara Oblast (2,576.2 ha) and Kashkadarya Oblast (1,455.6 ha). However, the predominant desert pastures (which account for more than 80 per cent) are, by regulation, designed only for sheep grazing, while pastures suitable for cattle grazing are located in semi-deserts (12 per cent), mountain steppes (5 per cent) and high mountains (2 per cent). Nevertheless, in 2017, some 52.2 per cent of cattle were grazing in unsuitable desert pastures, which illustrates the pressure of cattle husbandry on desert ecosystems. Simultaneously, the remaining 47.8 per cent of cattle were using the remaining 19 per cent of available pastures. This resulted in the disappearance of several rare and endemic plant species, the transformation of grassland communities species composition, competition for forage with wildlife and the infection of wildlife species with ecto- and endoparasites, which had adverse effects on the populations of globally threatened animal species populations, including the VU snow leopard, Bukhara urial, goitered gazelle and Menzbier's marmot, and NT Bukharan markhor and Severtsov argali sheep.

### *Hunting and fishing*

Despite the fact that complete statistical data are not available on trends in population numbers of game species, annual quotas set for hunting and fishing and the use of quotas, some game mammal populations (boar, badger, hare) have tended to increase in numbers, which means that their annual hunting quotas were kept at sustainable levels. This was not the case for some game bird species (the LC chukar partridge and common pheasant). No data is available on hunting on other game mammals and birds.

Reportedly, uncontrolled hunting of the grey wolf (the status of which is not regulated, allowing for hunting without any limits or permits) led this "outlaw" species to the risk of extinction in Uzbekistan, despite its regulatory functions in the ecosystem, which are also favourable for the natural regeneration of the forest.

According to the 2019 Sixth National Report to the CBD, the fish resources in natural water bodies are overused and declining. Furthermore, poaching was determined to be one of the reasons for the decline in populations of some 69 per cent of game mammal species, as well as 56 per cent of rare and threatened protected mammal species, which were killed either for subsistence purposes or for the highly profitable illegal trade in wild animals, their parts and derivatives (e.g. for traditional medicine).

No data on poaching and illegal procurement are available, but different sources indicate that the target species include the CR Tien-Shan brown bear, VU Bukhara urial, Menzbier's marmot and goitered gazelle, NT Bukharan markhor, as well as boar, stone marten, porcupine, cobra and different lizard and turtle species; at the same time, catching birds of prey and singing birds is traditional in mountain regions of Uzbekistan. Furthermore, some predatory mammal species (e.g. snow leopard, lynx, bear, wolf, fox) are subject to retaliatory killing by livestock herders.

### *Collection of non-timber forest products*

Statistical data on the collection of wild medicinal plants, and other non-timber forest products (NTFPs) are not available. Specialized state forestry enterprises and concessionary private companies obey the annual quotas set for NTFPs harvesting, but intensive harvesting of NTFPs by local communities (e.g. picking of medicinal herbs, flowers, wild onions and garlic, rhubarb, rosehip, pistachio, walnut, almonds) for subsistence purposes and trade is common and practically uncontrolled.

### *Tourism*

Tourist visitation pressure is still relatively low in most natural areas of Uzbekistan, due in part to the fact that the majority of foreign tourists are more tempted to visit destinations famous for unique historical and cultural monuments or the Aral Sea environmental disaster area than much less accessible countryside. However, the growing trend in domestic tourism can be noted, including visits to more accessible natural areas (in particular the Chatkal and Nurata Mountains) for outdoor recreation purposes, automatically resulting in the growing demand for the development of recreational and tourist facilities and infrastructure, as well as the increasing number of misdemeanours against nature conservation laws and PA visitation rules, and growing anthropogenic pressure on natural ecosystems and wildlife habitats. The 2019 Sixth National Report to the CBD mentions the decrease in the EN Egyptian vulture population in Chatkal Ridge as the result of uncontrolled visitation of its nesting sites.

### *Climate change*

Global climate changes pose a major threat to all natural ecosystems and the overall biodiversity of Uzbekistan. Most noticeable are the adverse effects of desertification, coupled by water shortages, increasing water and soil salinity, wind erosion and exposure to extreme temperatures during prolonged drought seasons. Decreased precipitation has an adverse

impact on environmental conditions in plant communities, including habitats of rare and endangered plant species, and limits the potential for the regeneration of the vegetation and the productivity of ecosystems, both natural and semi-natural (e.g. pastures). Periodic fluctuations in water level and salinity affect all aquatic, coastal (e.g. tugai forests) and wetland ecosystems, while the increasing scarcity of water resources threatens the survival of both resident and migratory wildlife populations, leading to competition for water between wildlife populations and local people and livestock. Last, but not least, not all flora and fauna species are resilient to rapid climatic changes.

### *Use of genetically modified organisms*

The influence of genetically modified organisms (GMOs) on biodiversity could not be determined due to the general absence of data on the use of GMOs.

### 11.6    Biodiversity-related measures in the Aral Sea area

The Aral Sea environmental disaster resulted in the shrinkage or partial disappearance of both the sea itself and lakes in the Amu Darya delta, vanishing of marine habitats as a result of still-increasing water salinization, deterioration of habitats (in particular tugai forests and wetlands, which were nesting sites for many aquatic bird species) and degradation of native plant communities, as well as a rapid decline in biodiversity of the Aral Sea region, including the disappearance of the whole marine ichthyofauna (34 fish species) and regional extinction of numerous plant and animal species.

Uzbekistan implements numerous measures and activities to improve the environmental, social and economic situation in the Aral Sea basin. Biodiversity-related measures can be divided into three areas:

- Protection of biodiversity that survived the disaster;
- Rehabilitation of aquatic and wetland ecosystems in the Amu Darya River delta;
- Prevention and mitigation of effects of the resulting "secondary disaster" of salinization of adjacent regions.

The implementation of various conservation measures was preceded by scientific field research and mapping works, resulting in, for example, the development of the "Map of vegetation of the southern dried part of the Aral Sea" (scale 1:500,000), followed by scientific recommendations on the selection of the proper, most promising species for the stabilization of the shifting

sands on a dried sea bottom. According to the 2019 Sixth National Report to the CBD, such species include *Salsola richterii, Ammodendron conollyi, Calligonum setosum, Astragalus villosissimus, Krascheninnikovi aeversmanniana* and *Artemisia ferganensis*.

In 2011, the Cabinet of Ministers (2011 Resolution No. 242) designated the Lower Amu Darya SBR in the Republic of Karakalpakstan (encompassing 68,717.8 ha, but located further upstream from the former coast of the Aral Sea), and, in 2016 (2016 Resolution No. 238), designated the large-scale Saygachiy CLR (628,300 ha, with an external buffer zone of 219,800 ha). The Roadmap for the development of the protected area system for the period 2019–2022 (2019 Resolution of the President No. 4247) provides for the designation of five new PAs in the Republic of Karakalpakstan, including four new SRs situated in the Aral Sea basin: Sudochyie Lake System (designation planned in 2019), Beltau (2020), Akpetki (2021) and Akdariya-Kazakhdariya Mezhdureche (2022). Establishment of the new PAs will largely enhance the conservation of biological and landscape diversity of the Aral Sea region.

However, the scarcity of water resources is still the major challenge, not only for the survival and recovery of flora and fauna species populations but also for the survival and economic activities of the human inhabitants of the Aral Sea basin. As the water inflow into the region is limited, and humidity evaporation is intensified as a result of ongoing global climate changes, the requirement to store water in reservoirs along the former sea coastline and in the Amu Darya River delta is an immediate task, in order to improve the overall ecological situation in the region.

This is why the measures carried out by the Agency of the International Fund for Saving the Aral Sea (IFAS) in Uzbekistan were of crucial importance for the provision of water into the ecosystems and stabilizing the water regime in the region. IFAS activities included engineering works aimed at landscaping the Amu Darya River delta for the restoration of aquatic and wetland ecosystems, which includes works on numerous natural water bodies and artificial water reservoirs (Dzhiltyrbas, Mezhdurechensk, Muinak and Rybachye reservoirs and Lakes Dumalak, Ilenkul, Makpalkol and Mashankul). These works were funded by the Government of Uzbekistan. The next phase of the proposed IFAS project "Creation of the system of local water lakes, reservoirs and wetlands in the Amu Darya River delta and dried part of the Aral Sea" provides for the establishment of polders in the dried bed of the Aral Sea, capable of harbouring the potential future inflow of waters exceeding the

capacity of reservoirs in the Amu Darya River delta. The expected results include not only the restoration of nesting habitats of numerous aquatic bird species but also the accommodation of some 3.3 km³ of water resources (for which the annual inflow of at least 5 km³ per year is required), which would then allow the recovery of vegetation and fish stock.

**Photo 11.5: Water outlet, Rybachye Reservoir**



*Photo credit:* Agency of IFAS in Uzbekistan

**Photo 11.6: Muynak Canal Head at Mezhdurechensk Reservoir**



*Photo credit:* Agency of IFAS in Uzbekistan

Last, but not least, Uzbekistan undertook costly large-scale measures aimed at land reclamation and stabilization of soils of the dried bottom of the Aral Sea, in order to prevent and mitigate the adverse effects of frequently occurring storms, carrying salt, sand and dust, which also enhanced desertification processes in other regions. Land reclamation works include afforestation and planting desert vegetation, fixing moving sand of the seabed and absorbing salt. Since 2000, these efforts received external financial support provided by Germany (GIZ), IFAS, the Japan Fund for Global Environment (JFGE) and France. In recent decades, afforestation works were carried out on a total area of 740,000 ha of the Aral Sea region (including 310,000 ha of the dried Aral Sea bottom).

According to the State Committee on Forestry, between 2010 and 2018, forest plantations were established on 144,691 ha of the exposed seabed. The annual scope of afforestation works on the dried sea bottom was initially slow (between 15,000 and 16,000 ha per year), then increased constantly in the period 2014–2018. The statistical data indicate 16,800 ha of seabed afforested in 2014, 18,000 ha in 2015, 18,200 ha in 2016, 18,800 ha in 2017 and 19,040 ha in early 2018 (as afforestation in this region can be successful only in the early spring months, ensuring the optimal soil humidity). However, the tree seedlings' survival rate varied over time from 44 per cent in 2013, 2015 and 2016 to 41 per cent in 2014 and only 37 per cent in 2017.

According to expert estimates, some 1 million ha of the Southern Aral Sea region is suitable for afforestation works. Following the initiative of the President of Uzbekistan voiced at the IFAS Summit of August 2018 to plant 1 million ha of forest vegetation, the Government decided to plant over 500,000 ha of forest vegetation in the period 2019–2021. In December 2018, preparatory field works for massive afforestation works of the seabed were launched, with the use of heavy machinery. By the end of March 2019, an area of 720,000 ha had been prepared for planting, and some 400,000 ha of forest plantations had been established. Uzbekneftegaz allocated 100 billion sum for seabed afforestation works in 2019 in line with the 2019 Resolution of the Cabinet of Ministers No. 132.

## 11.7 Legal, policy and institutional framework

### *Legal framework*

The 1992 Law on Nature Protection mentions the preservation of diversity of species, ecosystems and landscapes among the main objectives of nature conservation. The obvious shortcoming of the Law is

that Article 28, concerning the state environmental monitoring system, does not explicitly mention the need for monitoring biodiversity. Furthermore, this Law is very general; it neither introduces nor regulates the basic conservation concepts (e.g. the differentiation between passive conservation and active nature protection) that could serve the implementation of its provisions.

The 2004 Law on Protected Natural Territories provides the legal basis and general legislative framework for the planning, designation and management of PAs in Uzbekistan. It lists different PA categories and determines their management objectives and related protective regimes, legal status, ownership and, in some cases, also their functional zonation, and the period of their designation. It contains provisions for the establishment of external buffer zones for some PA categories, the development of the PA cadastre, PA management plans and on sources for financing PA operations. The innovative aspect is that the Law provides for the establishment of privately managed PAs and, in general, for more active involvement of local communities and private entrepreneurs in the designation and management of PAs and PA external buffer zones. No privately managed PAs exist as at March 2019.

However, the Law on Protected Natural Territories does not sufficiently regulate PA governance, which would require the determination of a specialized *central* governmental administrative body, other than the Cabinet of Ministers, with responsibility for the supervision of PA management. It states that the state administration of PAs shall be carried out by the Cabinet of Ministers, local government bodies and specially authorized state bodies, but such authorized state bodies are not defined and neither is the division of duties, rights and responsibilities among the three levels of governance mentioned above.

Furthermore, even though the Law on Protected Natural Territories determined that PAs could be designated by either the Cabinet of Ministers or local government bodies, such designation procedure was not further explained. Similarly, neither the procedures for the "reorganization" (change in protective category) and termination (degazetting) of PAs nor the bodies authorized to conduct such procedures are determined. The validity period of designation is not determined for some PA categories (CLRs, NNPs). The categorization of fishery zones is misleading, defining them as PAs of the national category V instead of placing them in the national category VII. The relevant Article 34 contains an internal contradiction, by prohibiting all activities that could threaten the conservation, reproduction and

restoration of fish and other aquatic organisms, simultaneously stating that fishery zones could also be used for fishery needs, while further provisions that could regulate the economic use of a fishery zone to make it sustainable are lacking.

Moreover, the Law on Protected Natural Territories also determines categories of PAs (e.g. NHSZs) for which the original purpose for designation is either different from the preservation of biological and landscape diversity or contradictory to biodiversity conservation objectives, namely, hunting farms under PA national category VII. Furthermore, PAs categorized by this Law include territories planned for the management of a still-absent individual natural resource (the case of extensive open areas potentially suitable for afforestation, but not yet afforested, included in the state forest fund land area, categorized as PAs of the national category VII). Last, but not least, the concepts of the ecological network and ecological corridors are absent from the Law.

Two other legal acts constitute the basis for flora and fauna species conservation: the 1997 Law on the Protection and Use of Flora and the 1997 Law on the Protection and Use of Fauna, both issued in new editions in 2016. The new editions of both Laws define a much more detailed division of duties, rights and responsibilities between the central state administration bodies (Cabinet of Ministers, SCEEP, State Committee on Forestry and, in the case of flora, the State Plant Quarantine Inspectorate under the Cabinet of Ministers) and local government bodies. Both Laws contain detailed provisions for the involvement of the Academy of Sciences, local self-governments, NGOs and citizens in measures for the conservation and sustainable use of flora or fauna. Both Laws define the protective measures, grant legal protective status for the rare species threatened by extinction that are included in the relevant Red Books, and determine the manner of sustainable use of flora and fauna. However, none of these Laws determines methods and procedures for flora and fauna species monitoring, which task is delegated to the Cabinet of Ministers. The Law on the Protection and Use of Fauna regulates the determination of annual hunting quotas and also contains the basic provisions concerning hunting and fishing. These activities are further regulated by the Rules of hunting and fishing, approved by the 2006 Order of the Chairperson of the State Committee for Nature Protection No. 27.

Another legal act relevant to biodiversity conservation is the 1999 Law on Forests, issued in a new edition in 2018, which regulates the protection, sustainable use and restoration of forests. It determines 19 protective categories of forests. The Law in practice prohibits timber harvesting in areas other than commercial plantations, except for the thinning of forests and sanitary cuttings. The 2019 Resolution of the Cabinet of Ministers No. 132 envisaged the creation in 2019 of protective forests on the dry bottom of the Aral Sea on an area of 500,000 ha at the expense of local budgets, charity funds and Uzbekneftegaz funds.

The 2019 Law on Pastures imposes the general obligation on pasture users to obey the seasonal pasture rotation principle, and observe rules, norms and standards (including the maximum permissible load on the pasture) aimed at pasture conservation, determined on the basis of the inventory of pastures and the geobotanical survey of pastures. These measures could largely enhance the natural regeneration of natural ecosystems degraded by overgrazing.

Due to the general and framework character of the national legislation related to biodiversity conservation issues, a large number of more detailed by-laws and secondary legislative acts is required and has been adopted for implementation of the laws.

*Policy framework*

First NBSAP

The First National Biodiversity Strategy and Action Plan (NBSAP) (1998 Resolution of the Cabinet of Ministers No. 139, no longer in force), adopted for the 10-year period 1998–2007/2008, determined five priority strategic national targets (STs), which included the improvement and further development of the representative PA network, expected to encompass at least 10 per cent of the country's territory by 2002 (ST1), as well as the development and implementation of regional (for the Republic of Karakalpakstan) and local (oblast or district level) action plans, in order to address specific regional and local circumstances, requirements, demands and challenges (ST4). These two STs have not yet been met, since, as at March 2019, the system of PAs (excluding protected landscapes of the national category VI and state forest fund lands of the national category VII) encompassed only 4.63 per cent of the territory of Uzbekistan. Furthermore, no regional or local action plans on biodiversity were developed.

NBSAP for the period 2019–2028

Since 2008, with the expiration of the validity of the First NBSAP, Uzbekistan had no national biodiversity strategy and action plan in force for a decade, despite this being a requirement under the CBD. A new NBSAP of Uzbekistan was adopted only in June 2019

(2019 Resolution of the Cabinet of Ministers No. 484) as the Strategy for the Conservation of Biological Diversity for the period 2019–2028.

The new NBSAP does not define general national targets, which could directly correspond to the CBD Strategic Plan for Biodiversity 2011–2020, including the Aichi Biodiversity Targets (adopted in 2010 for the 2011–2020 period), but sets more detailed national priorities, as follows:

• Expansion of the area of protected natural territories to 12 per cent of the country's territory by 2028;
• Afforestation of the dried bottom of the Aral Sea to increase the afforested area up to 1.2 million ha by 2028;
• Breeding gazelles in the Bukhara specialized SBC "Jeyran", with the objective to increase its population numbers to 1,000 individuals;
• Creation of a unified system for monitoring the components of biodiversity with the central component – the reference ecosystems of SSNRs;
• Creation of a unified information database of state monitoring and state cadastre on biodiversity based on modern geo-information technologies (GIS technology);
• Annual geobotanical survey of vegetation in natural pastures and hayfields in the amount of 2 million ha;
• Integrating biodiversity conservation issues into all sectors of the economy.

The above priorities are explicitly listed in Resolution No. 484, while the Strategy itself also lists some additional targets and indicators, e.g. breeding and release into the wild of 1,000 individuals of houbara bustard per year, conducting annual censuses of game waterfowl species, and the submission of nomination dossiers for two new Ramsar sites.

Furthermore, the 2019 Strategy defines the four strategic objectives, to be achieved by 2029, as follows:

• Integration of biodiversity issues in the activities of state authorities and administration, and of the whole society;
• Reduction of direct pressures on biological diversity, and sustainable use of its components in productive landscapes;
• Development of the protected area system, increasing the volume of benefits provided by ecosystem services;
• Improvement of the conservation and sustainable use of biological diversity through planning,

capacity-building and the development of financing mechanisms.

The main shortcoming of the 2019 NBSAP is its incoherence, as the two components (Strategy and Action Plan) are not fully harmonized. As a result, not all national priorities and objectives defined in the Strategy are followed by corresponding provisions in the Action Plan. Furthermore, the 2019 NBSAP determines that its implementation will be divided into two phases – in the first phase (2019–2023), only the work on the improvement of the legislative framework and the establishment of five new PAs in the Republic of Karakalpakstan are planned (both mentioned solely in the Strategy, but absent in the Action Plan), while the achievement of all other indicators is planned in the next phase of implementation (2024–2028).

The achievement of some indicators might not be feasible; for example, the national strategic priority concerning the extension of the PA system to cover 12 per cent of the country's territory by 2029 is not included in the Action Plan, which provides solely for drafting a Resolution of the Cabinet of Ministers on the approval of a new state programme on the creation and expansion of the system of protected natural territories for the period up to 2028, while no measures on the actual extension of the PA system are included in the Action Plan. No additional funding necessary for the establishment of new PAs (including those planned in the Republic of Karakalpakstan in the first phase of NBSAP implementation) and ensuring their operationality is provided for in the document.

Other policy documents

The 2019 Concept on Environmental Protection until 2030 includes the target to increase PAs of national categories I–V to 12 per cent by 2030. It also provides for an increase in the state forest fund lands covered by forests to 4.5 million ha.

As for the PA network, in March 2019, the President adopted the Roadmap for the development of the protected area system for 2019–2022 (2019 Resolution of the President No. 4247). According to the 2019 NBSAP, the state programme on the creation and expansion of the system of protected natural territories for the period up to 2028 is planned to be drafted by August 2020.

Few rare and threatened species are currently covered by single species conservation plans, which are most often developed and implemented on an international scale under the Convention on the Conservation of Migratory Species of Wild Animals (CMS) and its Central Asian Mammals Initiative (CAMI), for the

conservation of, for example, the saiga antelope, Bukhara deer, Asiatic wild ass, Severtsov argali sheep, goitered gazelle and snow leopard. Some other single species conservation programmes and plans were developed on a national scale, including the Programme and Action Plan for the Conservation of the Snow Leopard in the Republic of Uzbekistan for 2019–2029 (prepared under the UNDP/GEF/SCEEP project "Sustainable natural resource and forest management in key mountainous areas important for globally significant biodiversity"), and the 2014 National Action Plan on conservation of stiff tail in Uzbekistan, concerning protection of the white-headed duck (*Oxyura leucocephala*).

As at March 2019, two other policy instruments are under development: the concept of a state programme for forestry development until 2030 (as the validity period of the State Programme for Forestry Development in 2015–2018 has already expired), and the new national action plan on combating desertification and droughts.

The country does not have a national wetland policy or programme for wetland conservation.

*Sustainable Development Goals and targets relevant to this chapter*

When developing the national Sustainable Development Goals and targets (2018 Resolution of the Cabinet of Ministers No. 841), Uzbekistan changed the wording of the globally adopted indicators under targets 15.4, 15.7 and 15.8, and interpreted targets 15.8 and 15.9 differently.

In some cases, such modifications could well be justified; for example, adding another national indicator 15.5.2 "The number of species listed in the national Red Book" under target 15.5 was necessary,

as the global indicator 15.5.1 "Red List Index" was inappropriate for Uzbekistan (box 11.1).

However, some other modifications brought counter-productive results, incompatible with the original intention for adopting an indicator on a global scale. For example, Uzbekistan changed the global indicator 15.4.1 "Coverage by protected areas of important sites for mountain biodiversity" to national indicator 15.4.1 "Proportion of protected mountain ecosystems in their total area", which changed its original meaning and objectives. The original wording could require undertaking scientific research aimed at the identification of all areas important for the conservation of mountain biodiversity, including those not yet protected (e.g. non-protected parts of KBAs, IBAs or migratory routes of rare and endangered fauna species). Results of the above could then justify and guide the necessary extension of the PA system. Contrary to this, the modified indicator requires a simple comparison of the total area of mountain ecosystems with the total area of existing PAs located in mountain ecosystems, without the exact determination of mountain areas that should become legally protected.

The absence of the global indicator 15.1.2 (Proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type) among the national indicators of Uzbekistan cannot be explained or justified.

While one can understand that, not being a party to the Nagoya Protocol, Uzbekistan has not nationalized target 15.6 (on benefits sharing), it is not possible to explain why target 15.b (on resources to finance sustainable forest management) was not nationalized, except for the reason that its global indicator 15.b.1 repeats the global indicator 15.a.1.

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**Box 11.1: Target 6.6. and selected targets under Goal 15 of the 2030 Agenda for Sustainable Development**

**6** CLEAN WATER AND SANITATION

**Goal 6: Ensure availability and sustainable management of water and sanitation for all**
**Target 6.6: By 2020, protect and restore water-related ecosystems, including mountains, forests, wetlands, rivers, aquifers and lakes**

Global target 6.6 was nationalized by Uzbekistan with the change of the time horizon to 2030 instead of 2020.

Not enough data are available to properly assess the value of indicator 6.6.1 (Change in the extent of water-related ecosystems over time), also due to the fact that target 6.6 refers not only to typical aquatic, riverine or riparian ecosystems, but also to mountains and forests. The ongoing processes of shallowing and dessication of the remains of the Aral Sea, shrinkage or disappearance of lakes in the Amu Darya delta, and the still-increasing water salinization, further enhanced by the global climatic changes, caused the vanishing of marine habitats and deterioration of water-related ecosystems on an unprecedented scale. Hence, the achievement of target 6.6 is well beyond the capacity of Uzbekistan, in particular if acting alone. However, the above could not explain the absence of a national wetland policy and of the corresponding programme for wetlands conservation.

**Goal 15: Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss**
**Target 15.1: By 2020, 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**

The value of indicator 15.1.1 (Forest area as a proportion of total land area) increased from 6.63 (2010) to 7.26 (as at 1 January 2018), mostly as a result of intensive reforestation works, while the share of the total area of the state forest fund land increased from 21.08 per cent to 25.09 per cent of the country's territory. The proportion of important sites for terrestrial and freshwater biodiversity that are covered by protected areas, by ecosystem type (indicator 15.1.2) cannot be properly assessed, due to the lack of data. The coverage of different natural ecosystem types by PAs is uneven, and several key ecosystems are considerably underrepresented in the PA system. The "Aydar-Arnasay Lakes system" Ramsar site is only partly protected in Arnasay SR, while the planned "Tudakul and Kuymazar Water Reservoirs" Ramsar site would also require territorial protection granted by national legislation. Furthermore, only 17 of the 52 IBAs, and 12 of the 36 KBAs (the latter so far identified solely in the mountain regions) partially or entirely overlap existing PAs. The achievement of target 15.1 would require the further extension of the PA system in order to sufficiently include all natural ecosystems representative of Uzbekistan, in particular, desert and floodplain forest ecosystems.

**Target 15.2: By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally**

All forests in Uzbekistan are perceived as providing important ecosystem services and classified as protective; hence, they are well protected and sustainably managed. No commercial timber harvesting is allowed, except for sanitary fellings. Furthermore, Uzbekistan successfully halts the deforestation process and conducts intensive works on afforestation, in particular, in the dried bottom of the Aral Sea. However, progress towards sustainable forest management (indicator 15.2.1) cannot precisely be assessed due to the general lack of data on forest resources, in the absence of the national inventory of forests (last carried out in 1987).

**Target 15.4: By 2030, ensure the conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for sustainable development**

Compared with other main ecosystem types, as at 2019, mountain ecosystems are the best conserved, with 14 per cent included in PAs of national categories I and III (SSNRs, NNPs), except for the mountain massifs of the Kyzylkum Desert. However, existing PAs encompass only 12 of the 36 KBAs identified in the Western Tien-Shan Mountains. As no scientific assessments indicating areas most important for mountain diversity in the whole of Uzbekistan are available, the value of indicator 15.4.1 (Coverage by protected areas of important sites for mountain biodiversity) cannot be calculated. Nevertheless, the need for the further extension of the PA system in mountain regions is well justified by the outcomes of the two projects (carried out jointly by UNDP and SCEEP, and by Critical Ecosystem Partnership Fund and Zoï Environment Network in 2012–2017) aimed at the identification of key areas for the preservation of biological diversity in Uzbekistan.

The value of indicator 15.4.2 (Mountain Green Cover Index) for 2017 amounted to 54.81 per cent (below the average value of 64 per cent for Central Asia and Southern Asia). It should also be noted that many of the mountain forests of Uzbekistan are not close canopy forests (particularly not the coniferous archa/juniper forests), which might not have been taken into account during the calculation of the Mountain Green Cover Index.

**Target 15.5: Take urgent and significant action to reduce the degradation of natural habitats, halt the loss of biodiversity and, by 2020, protect and prevent the extinction of threatened species**

The value of the IUCN Red List Index (indicator 15.5.1), aggregating change in extinction risk across groups of species, cannot be calculated, as it would require the elaboration of at least two editions of national Red Lists with the use of IUCN criteria, while the national Red Books of Uzbekistan continue to use a different threat categorization system.

This is why Uzbekistan introduced a national indicator 15.5.2, "The number of species listed in the national Red Book", which, according to the 2009 fourth edition of the Red Book, were 321 vascular plants, 60 arthropod, 48 bird, 24 mammal, 17 fish, 16 reptile, 14 mollusc, 3 fungi and 3 annelid species. The planned fifth edition of the Red Book is expected to include only 313 vascular plants and the same number of fungi, annelid, mollusc and fish species, but already recorded are 66 arthropod, 52 bird, 30 mammal and 21 reptile species. According to IUCN global assessments, as many as 46 animal species and 16 plant species occurring in Uzbekistan are globally threatened by extinction, which clearly indicates priorities for conservation. The adoption of special national conservation programmes for these species would largely facilitate the achievement of target 15.5 by Uzbekistan.

**Target 15.8: By 2020, introduce measures to prevent the introduction and significantly reduce the impact of invasive alien species on land and water ecosystems and control or eradicate the priority species**

Uzbekistan's national indicator 15.8.1 encompasses the adoption of the relevant national legislation but omits the national allocation of resources towards the prevention or control of invasive alien species, when compared to the global indicator 15.8.1.

In 2018, Uzbekistan compiled the first list of non-indigenous (alien), introduced or invasive plant species naturalized in the country. However, as Uzbekistan has not yet adopted relevant national legislation, indicator 15.8.1 has not yet been achieved. The implementation of state monitoring and research programmes on invasive alien species is an indispensable next step towards the achievement of target 15.8.

**Target 15.9: By 2020, integrate ecosystem and biodiversity values into national and local planning, development processes, poverty reduction strategies and accounts**

Uzbekistan interpreted Sustainable Development Goals target 15.9 differently and replaced the original indicator 15.9.1 with a nationally elaborated one, "Number of national, sectoral and regional strategies and programmes that take into account the value and safety of biodiversity and ecosystems". Nevertheless, as at 2019, no positive examples of such integration of ecosystem and biodiversity values can be quoted. Relevant measures are planned in the 2019 NBSAP.

### *Institutional framework*

The State Committee on Ecology and Environmental Protection (SCEEP) is the central state administrative body responsible for the development, coordination and implementation of national policies and state programmes for biodiversity conservation and sustainable use of natural resources. Additionally, SCEEP performs control (environmental inspection) and supervisory functions, which include supervision of the PA management carried out by other state agencies, regional and local state administrations. SCEEP is also the CBD National Focal Point for Uzbekistan. In October 2018, the former Inspectorate for Control in the field of Protection and Use of Biodiversity and Protected Areas was included in SCEEP's Inspectorate for Control in the field of Ecology and Environmental Protection.

The State Committee on Forestry, established in May 2017, on the basis of the Main Department of Forestry of the Ministry of Agriculture and Water Management, is the central state administrative body responsible for the implementation of the national forest policy, forestry operations (including afforestation), sustainable use of forest resources and management of the state forest fund land. The State Committee is also responsible for the management of PAs located on the state forest fund land, and the supervision of NTFPs collection and hunting activities carried out on the state forest fund land.

As at 2019, there is still not a single central administrative body responsible for the planning and management of all PAs of different national categories (as recommended by the First EPR), which is an impediment for the implementation of a coordinated policy for biodiversity conservation in PAs, and for the effective management of the national PA system. Moreover, the responsibility for the management of particular PAs often shifted according to the current circumstances, on the basis of resolutions of the Cabinet of Ministers or decrees of the President, mainly between the former State Committee for

Nature Protection (or SCEEP since April 2017) and the State Committee on Forestry.

The most recent change took place in late March 2019, when the President decided (2019 Resolution of the President No. 4247 on measures to improve the state administration system in the sphere of protected natural territories) on the establishment of the Chief Department of Biodiversity and Protected Areas within the organizational structure of SCEEP Central Office. The Resolution transferred to SCEEP the responsibilities for the management of four SSNRs (Kyzylkum, Nurata, Surkhan and Zaamin), the Lower Amu Darya SBR and Chatkal SBSNR, previously managed by the State Committee on Forestry. Furthermore, the five new PAs planned for designation in the Republic of Karakalpakstan in the period 2019–2022 will also be managed by SCEEP.

Another example of such frequent reorganizations and shifting responsibilities is the current Ugam-Chatkal SBR. Simultaneously with the designation of the Ugam-Chatkal SR and the inclusion into this SR of the former part of Chatkal SBSNR, Bashkyzylsay in Tashkent Oblast (with preservation of the protection regime), and of some lands of forestry enterprises Parkent, Buchmulla and Shovozsoy, in December 2016, this territory was transferred for "permanent use" to JSC "O'zbekiston temir yo'llari" (Uzbekistan Railways). This was done mainly because of better funding opportunities, which created favourable conditions for undertaking biodiversity conservation measures and also resulted in higher remuneration of the SR personnel. Sixteen months later (in May 2018) the area was redesignated as a state biosphere reserve (SBR), which remained under the management of the JSC Uzbekistan Railways, but the SBR staff were granted the status, rights and benefits of state inspectors for ecology and environmental protection in accordance with the legislation.

Taking into account that SCEEP was already responsible for the management of the Gissar SSNR, Saygachiy CLR, all three SBCs and all 12 SRs (the latter supervised by local SCEEP branches), as a result

of the 2019 Resolution of the President No. 4247, the majority of the large-scale PAs in Uzbekistan are now managed (or supervised, in the case of SRs) by the Chief Department of Biodiversity and Protected Areas, recently established within the SCEEP organizational structure (figure 1.2). However, the Resolution left the management responsibilities for all three NNPs (Ugam-Chatkal, Zaamin and Zarafshan) with the State Committee on Forestry (until 2017, Ugam-Chatkal NNP was managed by the Tashkent Oblast Khokimiyat).

The management of Kitab SSNR remains under the responsibilities of the State Committee on Geology and Mineral Resources. All 10 NMs are managed by oblast administrations (khokimiyats).

Other central state administrative bodies relevant for biodiversity conservation and PA management issues are the State Committee on Land Resources, Geodesy, Cartography and State Cadastre (responsible for coordinating the implementation of land use and land management legislation and programmes, as well as maintenance of the national land cadastre) and the National Security Service's Committee for State Border Protection, responsible for border security (which includes patrolling the border areas; hence, it is important for the control of illegal activities, such as poaching and smuggling of wild flora and fauna species, their parts and derivatives across the state border).

The Academy of Sciences, and its Institute of Botany and Institute of Zoology, are the key scientific institutions for biodiversity research, monitoring and conservation planning activities. The Academy of Sciences, based in Tashkent, also has two regional branches (Karakalpak Department of the Academy of Sciences and Khorezm Mamun Academy). Within the reporting period, the Institute of the Gene Pool of Plants and Animals of the Academy of Sciences, which previously carried out scientific research on plant and animal genetics, species populations, habitats and ecosystems, and invasive alien species, was reorganized and ceased to exist.

Other important academic and research institutions include the five main universities of Uzbekistan: the National University named after Mirzo Ulugbek, located in Tashkent, as well as Karaklpak, Bukhara, Samarkand and Namangan Universities.

Other important stakeholders directly involved in biodiversity monitoring (e.g. wildlife census) and conservation activities are environmental NGOs, e.g. the Ecological Movement of Uzbekistan, UzSPB, Uzbek Zoological Society, Union for the Defence of the Aral Sea and Amu Darya, NGO Zarafshan and "Ekomaktab".

*Regulatory, economic and information measures*

Regulatory measures

Quotas for hunting game mammal and bird species, fishing and collecting wild plants are determined by SCEEP, based on the opinion of the Academy of Sciences, approved by a specially authorized Interdepartmental Commission. Permits for the "special use" of fauna are issued by SCEEP, within the limits of approved annual quotas. However, hunting of some species (e.g. the wolf) is not regulated. Permits for the collection of wild plants (e.g. medicinal and food plant species) are issued either by SCEEP (for the collection of plants in areas beyond the state forest fund land) or by the State Committee on Forestry (for the collection of plants in areas of the state forest fund land) (chapter 2).

The State Committee on Forestry regulates the use of forest resources, and also determines limits concerning the use of pastures within the state forest fund land. Forestry authorities at oblast level issue permits (forestry tickets) and collect fees for the use of forest resources (including NTFPs).

Financing

According to the 2004 Law on Protected Natural Territories, SSNRs, CLRs, NNPs and SBRs are to be financed by the state budget, by the Fund for Ecology, Environmental Protection and Waste Management, from the revenues from research and educational activities, revenues from compensation payments and fines, and charitable donations. Moreover, CLRs, NNPs and SBRs can collect entrance fees and fees for the use of natural resources. NPs are to be financed by the state budget and charitable donations. Activities in SRs and NMs are to be financed by the relevant local government authorities.

In practice, the administration and management (including monitoring and implementation of protective measures) of PAs is predominantly financed from state budget allocations. However, state budget funding is insufficient to implement effective nature conservation. Furthermore, the level of available funding to some extent depends on the subordination of a particular PA to a particular state administrative body. Reportedly, PAs subordinate to the State Committee on Geology and Mineral Resources (Kitab SSNR) and the Tashkent Oblast Khokimiyat (until 2017, Chatkal SBSNR and also Ugam-Chatkal NNP),

were better resourced than PAs subordinate to SCEEP or the State Committee on Forestry. Furthermore, according to the assessment undertaken by UNDP, the state budget allocations to PAs were determined regardless of the size of their territories, presence or absence of management challenges and level of threat to biodiversity, and not always in relation to the scope of activities required for their effective management. In the common opinion, PAs are generally perceived as draining the scarce financial resources of national, regional and district government budgets and, hence, it is not worth investing significant funds in their management.

As a result, the needs for the development, maintenance or simple replacement of ageing infrastructure, provision of contemporary outdoor equipment, off-road vehicles, etc. accumulated over time. Furthermore, the remuneration of PA staff (both for highly qualified scientific employees and field rangers/inspectors) is still comparatively low (despite the significant salary level increase in 2018). However, the situation in PAs that receive no direct state budget funding is even worse.

According to UNDP, the state budget allocation for all SSNRs in 2015 was estimated at approximately US$1.2 million, of which some 71.5 per cent comprised staff costs (salaries and associated taxes), 27 per cent recurrent operational costs, and infrastructure, equipment and capital costs the remaining 1.5 per cent. In the same year, the state budget allocation for the administration and management of the state forest fund was estimated at approximately US$6 million, of which about 82 per cent comprised staff costs, 16 per cent recurrent operational costs and 2 per cent infrastructure, equipment and capital costs. Several legal acts related to biodiversity (the 1997 Law on the Protection and Use of Flora, 1997 Law on the Protection and Use of Fauna, 1999 Law on Forests, 2004 Law on Protected Natural Territories) provide the legal basis for the collection of various fees for the use of natural resources, e.g. forest resources (forestry tickets), PAs (entrance fees) and flora and fauna species (fees for collection of plants, procurement of NTFPs, hunting and fishing). However, additional self-generated revenues of SSNRs, derived from collected fines and penalties, were estimated at only some US$21,000 per year.

Contrary to PAs, the forestry sector (managing some 25.09 per cent of the country's territory) can substantially supplement the state budget allocation with additional self-generated revenues (e.g. income from forest land lease fees, sales of timber and firewood, services and fines). Payments made by users

of forest resources are income of the State Committee on Forestry. The revenues are an important supplement to the limited state budget allocations for financing the sustainable management of forest ecosystems. In 2015, the own income of the State Committee from use of forest resources amounted to some 25 per cent of its total budget. The fact that, in general, the state budget allocations for forest management are insufficient to finance expenditures on the maintenance and renewal of equipment and alleviate infrastructure constraints puts pressure on forest enterprises to raise their own incomes in order to strengthen the financial resources of the State Committee. These revenue-raising activities include leasing of land for pastures, sale of food plants and fruits, medicinal plants and self-harvested timber, which may divert human resources from activities related to forest conservation, preventing illegal cuttings of plants and preventing and/or detecting poaching.

### Information measures

As at March 2019, an integrated biodiversity information system is not operational in Uzbekistan. According to the 2019 Sixth National Report to the CBD, the integrated biodiversity data management system (the national Clearing House Mechanism, CHM) had already been prepared in the period 2013–2015, under the UNDP/GEF/RUz project "National biodiversity planning to support the implementation of the CBD 2011–2020 Strategic Plan in Uzbekistan". The CHM was expected to include available thematic databases and integrate these into a national biodiversity information system, accessible online. But the internet portal (publicly accessible at cbd.uz) developed under the above project, which was initially fed with basic information on the biodiversity of Uzbekistan and relevant international agreements and maintained and kept operational at the expense of SCEEP for some period after the project completion, was later abandoned, due to the ongoing reforms in the country, including the reorganization of SCEEP.

The development and launch of the Biodiversity Conservation Information Management System (BCIMS) for the collection, processing and storage of biodiversity data is one of the objectives of the ongoing (2017–2022) UNDP/GEF/SCEEP project "Sustainable natural resource and forest management in key mountainous areas important for globally significant biodiversity".

As at March 2019, information on biodiversity, PAs and forestry management is practically absent in the publicly available statistics. The State Committee on Statistics issues an annual bulletin on the main

indicators of environmental protection, rational use of natural resources, forestry and hunting but solely for distribution among selected public authorities. Information on forestry and hunting in this publication is very limited. Furthermore, the publicly available information on biodiversity and protected areas is not always up to date and comprehensive. In the past, the former State Committee for Nature Protection periodically published the national report on the state of natural environment and use of natural resources, but the 2008-2011 edition was the last available (chapter 4). In this situation, the official website of SCEEP remains one of the few available information sources on biodiversity.

<u>Red Books</u>

Four subsequent Red Book editions (1983 Fauna, 1984 Flora, 1998, 2006, 2009) were published. In 2016–2017, following the results of scientific research, the updated list of animals and plants was prepared for inclusion in the next Red Book. According to the 2018 Resolution of the Cabinet of Ministers No. 1034, the Red Book system of categories (threat status) will be changed to make the categories identical with those of the Red Book of the Russian Federation. Hence, the Red Book of Uzbekistan would continue to be incompatible with the IUCN standards.

## 11.8    Assessment, conclusions and recommendations

### *Assessment*

Uzbekistan successfully preserved the abundance of wild native species of flora and fauna, including 16 plant and 46 fauna species categorized by the IUCN as globally threatened by extinction, as well as numerous regionally rare and endangered species, inscribed in the national Red Book. The populations of widespread wild animal species are either stable or growing in numbers, as hunting for the majority of game species is kept at a sustainable level. However, decreasing trends in populations of several globally threatened or locally endemic fauna species are observed.

All natural ecosystems in Uzbekistan (where deserts and steppe ecosystems encompass 85 per cent of the country's territory) are exposed to, and seriously threatened by, the global climate changes, further exacerbating desertification, habitat degradation, increased threat of steppe and forest fires, increasing salinization of water and scarcity of water resources. The most striking example of the degradation of natural ecosystems, habitats and species diversity is the environmental disaster in the Aral Sea region.

However, numerous other pressures continue to threaten the viability of ecosystems and species populations, in particular the land uptake for mining and agricultural purposes and the unsustainable use of pastures (also in mountain forest ecosystems).

In order to mitigate the adverse effects of such pressures and prevent further biodiversity loss and land degradation, Uzbekistan implements extensive and costly protective and restorative measures, in particular the afforestation of the dried bed of the Aral Sea, restoration of aquatic and wetland ecosystems in the Amu Darya River delta, establishment of rare and threatened species breeding centres and designation of new PAs.

However, the development and implementation of state policies on biodiversity conservation is seriously hampered by the unavailability of reliable data. An integrated biodiversity monitoring system is not in place. The monitoring of key Red Book species is carried out only in some PAs, while sporadic field inventories of flora and fauna species populations have so far been conducted only in some administrative regions of the country.

As at 1 January 2019, the PA system (excepting areas of the national category VI) encompassed 13.2 million ha, which equals 29.4 per cent of the country's territory. However, the state forest fund lands (less than 29 per cent of which are covered by actual forests) constituted the predominant part (over 84 per cent) of the above. Typical PAs together covered less than 2.1 million ha, only 4.63 per cent of the country's territory, while the most effective protection of biological and landscape diversity was ensured only in PAs granted legal entity status, the total area of which accounted for less than 1.5 million ha – less than 11 per cent of the total PA system or only 3.31 per cent of the country's territory.

### *Conclusions and recommendations*

<u>Biodiversity monitoring and research</u>

The availability of reliable, comprehensive and up-to-date information on biodiversity is a prerequisite for the proper formulation of national policies, ecosystem and species conservation action plans and PA management plans, as well as for the proper setting of hunting quotas. As at 2019, an integrated biodiversity monitoring system is not operational in Uzbekistan and no forest inventory has been conducted since 1987, while the 2009 national Red Book, which should indicate the most urgent priorities for species conservation, is outdated and incompatible with the IUCN global assessment methodology and criteria.

Moreover, the integrated biodiversity monitoring system, once in operation, will not be able to perform its planned policy support tool functions unless it is continuously provided with good quality and continuously updated information derived from biodiversity monitoring, field inventory works and scientific research. The lack of access to reliable and updated information on biodiversity is an impediment for progress in achieving the Sustainable Development Goals targets 15.1, 15.2 and 15.5. The continuity of long-term research on wild species of flora and fauna (in particular rare and threatened species) is the prerequisite for the successful implementation by the parties of CBD Article 7.

*Recommendation 11.1:*
*The Cabinet of Ministers should:*

*(a)*      *Based on a proposal from the State Committee on Ecology and Environmental Protection, adopt the revised and updated Red List of rare and endangered flora, fungi and fauna species, paying due account to the globally applied IUCN methodology and criteria, and ensure the publication of the next edition of the Red Book;*

*(b)*      *Based on a proposal from the State Committee on Ecology and Environmental Protection, adopt the list of priority biodiversity monitoring and research programme topics, with a special focus on both rare and threatened, and locally endemic flora, fungi and fauna species, plant communities and ecosystems, game species and invasive alien species;*

*(c)*      *Adopt and ensure the implementation of a long-term state biodiversity monitoring and research programme, as part of the integrated system of state environmental monitoring, in cooperation with the Academy of Sciences, other relevant public academic and scientific research institutions and environmental NGOs;*

*(d)*      *Mobilize adequate resources to ensure the continuation of state support for biodiversity monitoring and research in the long run;*

*(e)*      *Support the State Committee on Forestry and mobilize adequate resources for carrying out the national forest inventory and long-term systematic research on forest ecosystems and habitats;*

*(f)*      *Ensure the establishment and operation of an efficient biodiversity information system, utilizing contemporary techniques for digitalized data acquisition, storage, retrieval, processing and dataset harmonization, with the objective to gather,*

*store and share results of biodiversity monitoring, research programmes and projects carried out with the support of public funding, and provide access to this system (with differentiated access and data administration levels) for all stakeholders involved in biodiversity conservation initiatives.*

Biodiversity policy instruments

In 2019, the United Nations General Assembly declared 2021–2030 the United Nations Decade on Ecosystem Restoration. The integrity of almost all natural ecosystems in Uzbekistan is currently threatened, due partly to ongoing climatic changes but also to growing anthropogenic pressures. The biodiversity loss continues, and populations of several rare species continue to decline in size. This means that management approaches applied to date have not provided for effective biodiversity conservation. The recent adoption of the 2019 National Biodiversity Strategy and Action Plan (NBSAP) is a step forward. However, only a few rare and threatened fauna species, and no flora species, are currently covered by single species conservation plans. The same applies to the most vulnerable ecosystems, rare plant communities and habitats. No national wetland policy is in place.

Therefore, undertaking additional efforts aimed at the achievement of the globally adopted biodiversity-related Sustainable Development Goals, and Aichi Target 12 ("By 2020 the extinction of known threatened species has been prevented and their conservation status, particularly of those most in decline, has been improved and sustained") is urgently required, for example, through the development, adoption and implementation of new national policies, strategies and action plans, in particular concerning ecosystems, habitats and species not yet adequately covered.

*Recommendation 11.2:*
*The Cabinet of Ministers should:*

*(a)*      *Ensure implementation of the 2019 National Biodiversity Strategy and Action Plan;*

*(b)*      *Adopt and ensure implementation of the national wetland policy and corresponding programme for wetlands conservation;*

*(c)*      *Adopt and ensure implementation of ecosystem and species action plans and programmes;*

*(d)*      *Mobilize adequate resources for the implementation of all biodiversity-related policy documents in the long run.*

Establishment of the national ecological network

The current PA system does not yet adequately safeguard the biodiversity values, as some main natural ecosystems are underrepresented, while some rare and threatened species do not occur inside current PAs. Furthermore, the national PA system of Uzbekistan is still not a "network" in the common meaning of the term, as the concepts of the ecological network and ecological corridors are absent from the national legislation, policy framework and conservation practice.

The achievement of globally adopted Aichi Target 11, and relevant targets under the Sustainable Development Goals (15.1, 15.4 and 15.5) requires the further extension of the PA system and redesigning it into a functional network.

*Recommendation 11.3:*
*The Cabinet of Ministers should:*

*(a)*    *Adopt amendments to the 2004 Law on Protected Natural Territories, incorporating the concepts of the ecological network and ecological corridors;*
*(b)*    *Designate external buffer zones surrounding or adjacent to the territories of relevant categories of protected areas;*
*(c)*    *Extend the territories of existing protected areas and designate new protected areas, paying due account to the need to provide adequate coverage of all main ecosystem types representative of Uzbekistan and the sufficient inclusion of mainstays and habitats of rare and threatened species, and to ensure the ecological connectivity and continuity of the protected area network by linking core areas with ecological corridors, covering migration routes of rare and threatened terrestrial and aquatic wildlife species;*
*(d)*    *Mobilize adequate resources in order to ensure the proper functioning of the national ecological network in the long run.*