



# The Disaster Riskscape across North and Central Asia

KEY TAKEAWAYS FOR STAKEHOLDERS

## Asia-Pacific Disaster Report 2019

PATHWAYS FOR RESILIENCE, INCLUSION  
AND EMPOWERMENT

## About the report

*The Disaster Riskscape Across Asia-Pacific: Pathways for Resilience, Inclusion and Empowerment. Asia-Pacific Disaster Report 2019 (APDR 2019)* captured a comprehensive picture of the complexity of disaster risk landscape ('riskscape') in the Asia-Pacific region. The full-length publication is available at <https://www.unescap.org/publications/asia-pacific-disaster-report-2019>. This sub-regional report presents the key findings for North and Central Asia.

Following the release of the APDR at the sixth session of the ESCAP inter-governmental Committee on Disaster Risk Reduction in August 2019, the report was customized for each of the five ESCAP subregions, namely North-East Asia, Central Asia, South-East Asia, South and South-West Asia and the Pacific. The current report highlights the key takeaways for North and Central Asia.

## Acknowledgements

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*The Disaster Riskscape Across North and Central Asia: Key takeaways for Stakeholders* is a joint publication of the United Nations ESCAP ICT and Disaster Risk Reduction Division and the ESCAP North and Central Asia Subregional Office. It was prepared by Armita Behboodi, Jiwon Seo and Madhurima Sarkar-Swaigood, under the technical supervision of Sanjay Srivastava, Chief, Disaster Risk Reduction Section, ICT and Disaster Risk Reduction Division, ESCAP and with the overall guidance of Tiziana Bonapace, Director, ICT and Disaster Risk Reduction and Nikolay Pomoshchnikov, Officer-in-Charge, Subregional Office for North and Central Asia with support from Elvira Mynbayeva, Programme Officer, ESCAP Subregional Office for North and Central Asia. Anoushka Ali served as the editor. Daniel Feary provided the design and graphic services. Armita Behboodi coordinated the editing, lay-out and printing. Chonlathon Piemwongjit and Narada Kalra provided administrative assistance during the production stage.

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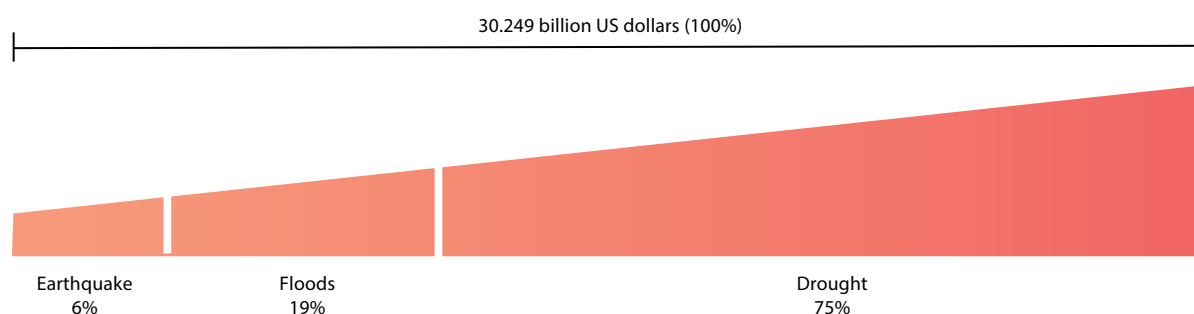
United Nations, Economic and Social Commission for Asia and the Pacific (ESCAP) (2020). *The Disaster Riskscape Across North and Central Asia: Key Takeaways for Stakeholders*. ST/ESCAP/2881.

# Annualized economic losses in North and Central Asia (NCA) more than double when slow-onset disasters are added to the riskscape for the subregion.

**Agricultural drought AAL in North and Central Asia accounts for 61 per cent of the total AAL for the subregion.**

For the first time, the annualized economic losses are presented, which include not only losses due to intensive risk, but also those due to extensive risk, indirect losses and slow-onset disasters. By including these additional sources of risk, the Average Annual Losses (AAL) are exponentially higher than previous estimates, reaching \$30.249 billion. This is presented as a sub-regional 'riskscape', which captures the absolute AAL in US dollars based on each hazard type (Figure 1). Without the inclusion of the AAL for agricultural drought, the sub-regional AAL accounts for 0.6 per cent of the subregion's GDP. However, this significantly changes to 1.5 per cent when including the AAL for agricultural drought (Table 1).

**FIGURE 1 North and Central Asia sub-regional riskscape (average annual losses) – volumetric analysis**



Source: ESCAP based on probabilistic risk assessment.

Note: Volumetric analysis is a measurement by volume (impacted population, geographical area and economic losses).

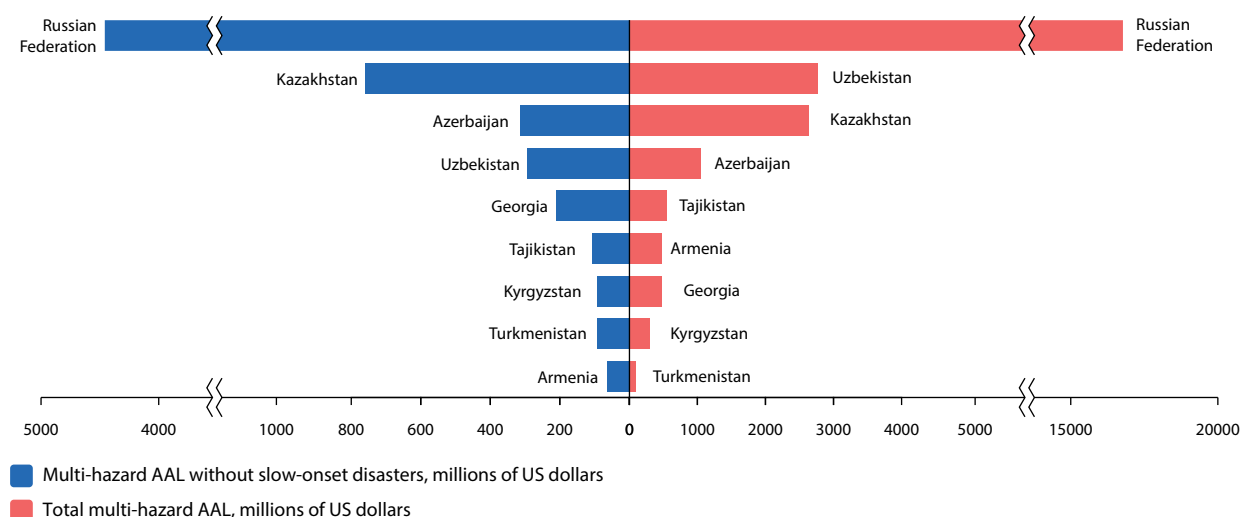
**TABLE 1 Disaster Risk in North and Central Asia (AAL, millions of US dollars)**

SOURCE OF RISK	AAL (BILLIONS OF US DOLLARS)	PROPORTION OF SUB-REGIONAL GDP (PERCENTAGE)
Intensive risk - multi-hazard AAL	6,369	0.3
Extensive risk - multi-hazard AAL	8,281	0.4
Extensive risk - multi-hazard AAL including indirect losses	11,592	0.6
Agricultural drought AAL	18,657.38	0.9
Total - including intensive, extensive, direct and indirect losses, and agricultural drought	30,249.38	1.5

Source: ESCAP, based on probabilistic risk assessment.

Countries can also be ranked in terms of multi-hazard AAL. On this basis, the countries at greatest risk of rapid-onset disasters are The Russian Federation, Kazakhstan, Azerbaijan, Uzbekistan, and Georgia followed by Tajikistan, Kyrgyzstan, Turkmenistan and Armenia. However, the picture slightly changes when slow-onset disasters are added. The new order is led by The Russian federation, followed by Uzbekistan, Kazakhstan, Azerbaijan, Tajikistan, Armenia, Georgia, Kyrgyzstan and Turkmenistan (Figure 2). The inclusion of slow onset disasters, therefore, substantially changes the understanding of the geography of risk in the subregion.

**FIGURE 2 Riskscape in numbers (AAL, millions of US dollars)**



Source: ESCAP, based on probabilistic risk assessment.

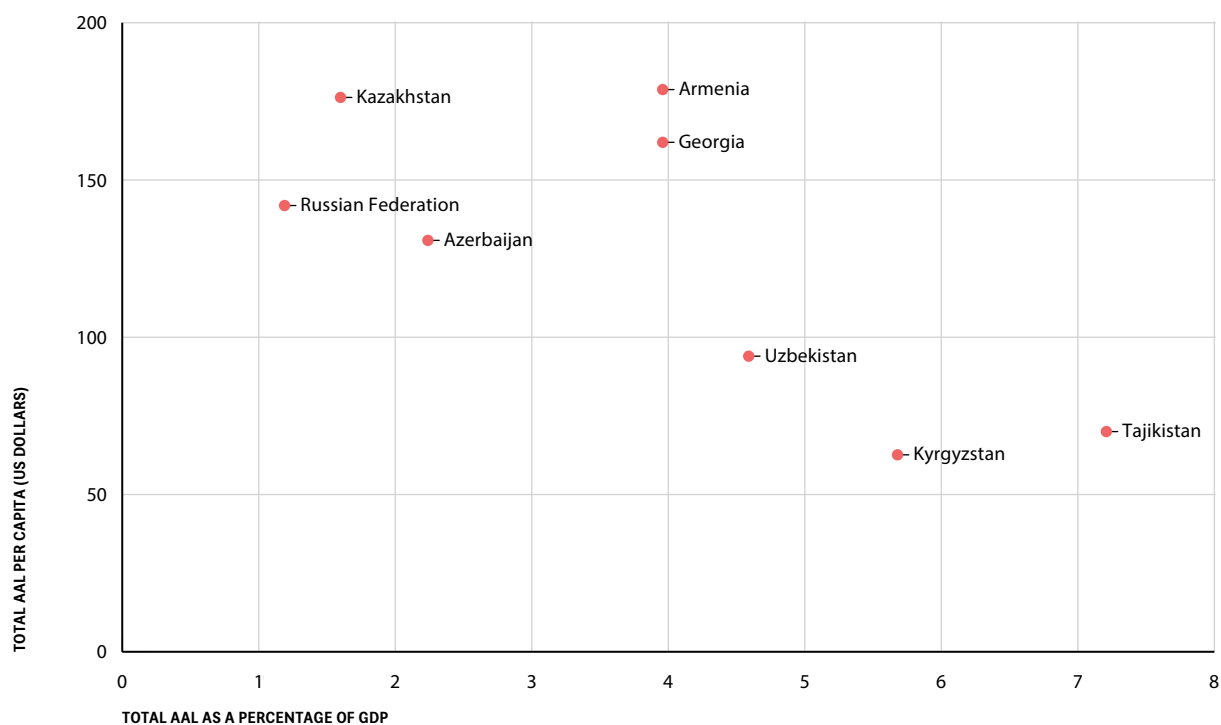
The riskscape also captures the uneven geographical distribution of AAL in the subregion; 87 per cent of the subregion's total multi-hazard AAL is concentrated in three countries, namely, The Russian Federation, Uzbekistan, and Azerbaijan. The Russian Federation alone accounts for 67 per cent of the sub-regional multi-hazard AAL.

### On average, countries in North and Central Asia are losing 4 per cent of their GDP, creating at risk populations and economies.

Figure 3 demonstrates the total AAL as a percentage of GDP and the total AAL per capita of countries across North and Central Asia, representing the at-risk populations and economies. Tajikistan has the highest AAL as a percentage of GDP in the subregion and the ninth highest in all of Asia and the Pacific, at 7 per cent. Armenia, Azerbaijan, Georgia, Kazakhstan, and The Russian Federation are in the high AAL per capita and low AAL as a percentage of GDP quadrant, while Tajikistan, Kyrgyzstan and Uzbekistan are in the quadrant of low AAL per capita, and high AAL as a percentage of GDP.



**FIGURE 3**      **Distribution of AAL per capita and as a percentage of GDP**



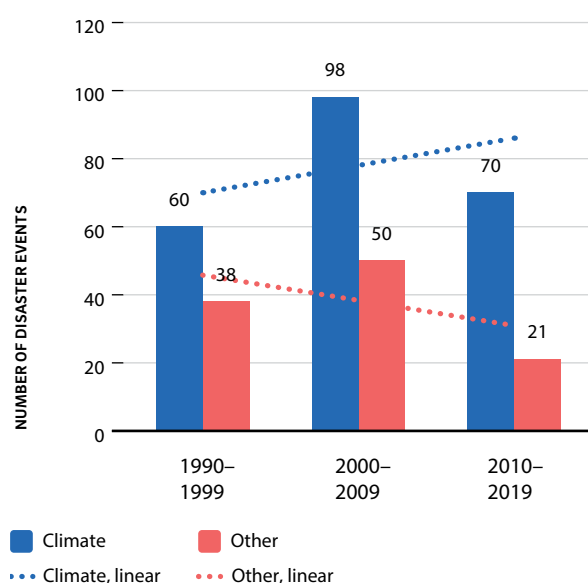
Source: ESCAP, based on probabilistic risk assessment, GDP and population data of ESCAP from 2017.

# The intensification and changing geography of disaster risks signal a new climate reality in North and Central Asia.

## Climate change is amplifying disaster risk and creating deeper uncertainties.

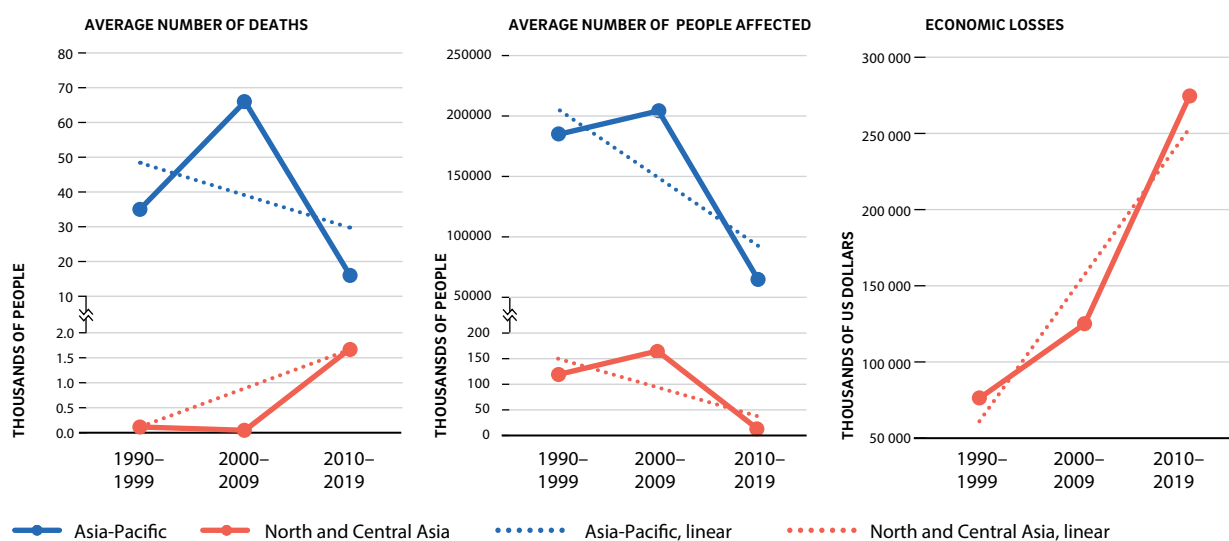
Recent developments and diagnostic analysis suggest a series of major trends in disaster risk in North and Central Asia. As indicated in Figure 4, in the last three decades, climate-related disasters and the related environmental degradation, have maintained an upward trend while the other disasters in the subregion are on a downward trend. These climate-related disasters range anywhere from drought to extreme weather, floods and storms, and pose significant risks to the social and economic developments of the subregion. As these risks are increasingly unpredictable using historical trends and previously used technology, it is necessary to upgrade early warning systems to keep up with the complexity of the hazards.

**FIGURE 4** Disaster events in North and Central Asia – total per decade



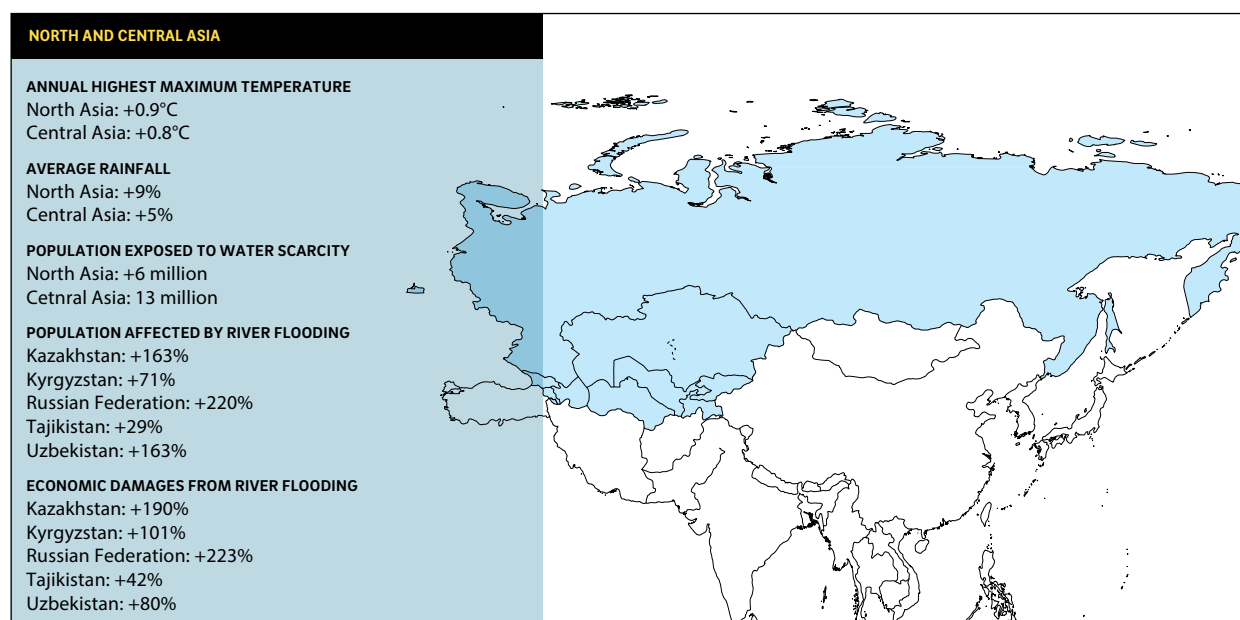
Source: ESCAP, based on EM-DAT (Accessed on 30 May 2019).

Climate change and its associated extreme weather events have added a complexity to disasters that is creating deep uncertainties. This new climate reality is translating into deepened socio-economic consequences of such disasters. The number of fatalities, people affected and economic losses due to disasters have been on an upward trend since the 1990s in North and Central Asia. The trends of average death rates and number of people affected in the North and Central Asia subregion differs from the trends in the Asia-Pacific region. While the region, as a whole, has seen a decreasing trend for both number of fatalities and people affected since 1990, North and Central Asia has an increasing trend, signalling deeper and more complex disaster risks in the subregion (Figure 5).

**FIGURE 5** Average number of deaths, people affected and economic losses from disasters

Source: ESCAP, based on EM-DAT (Accessed on 30 May 2019).

The Intergovernmental Panel on Climate Change (IPCC) has reported that an increase in global temperature of 1.5°C above pre-industrial levels is likely between 2030 and 2052.<sup>1</sup> The potential impacts of this increase for North and Central Asia are presented in Figure 6. The semi-arid and arid regions of North and Central Asia will be the most impacted with a complex sequence of climate and weather disasters such as drought, sand and dust storms, desertification and floods. The associated decrease in soil moisture will increase the frequency and intensity of sand and dust storms throughout the subregion, creating many socio-economic impacts.

**FIGURE 6** Impact of Global Warming of 1.5°C in North and Central Asia

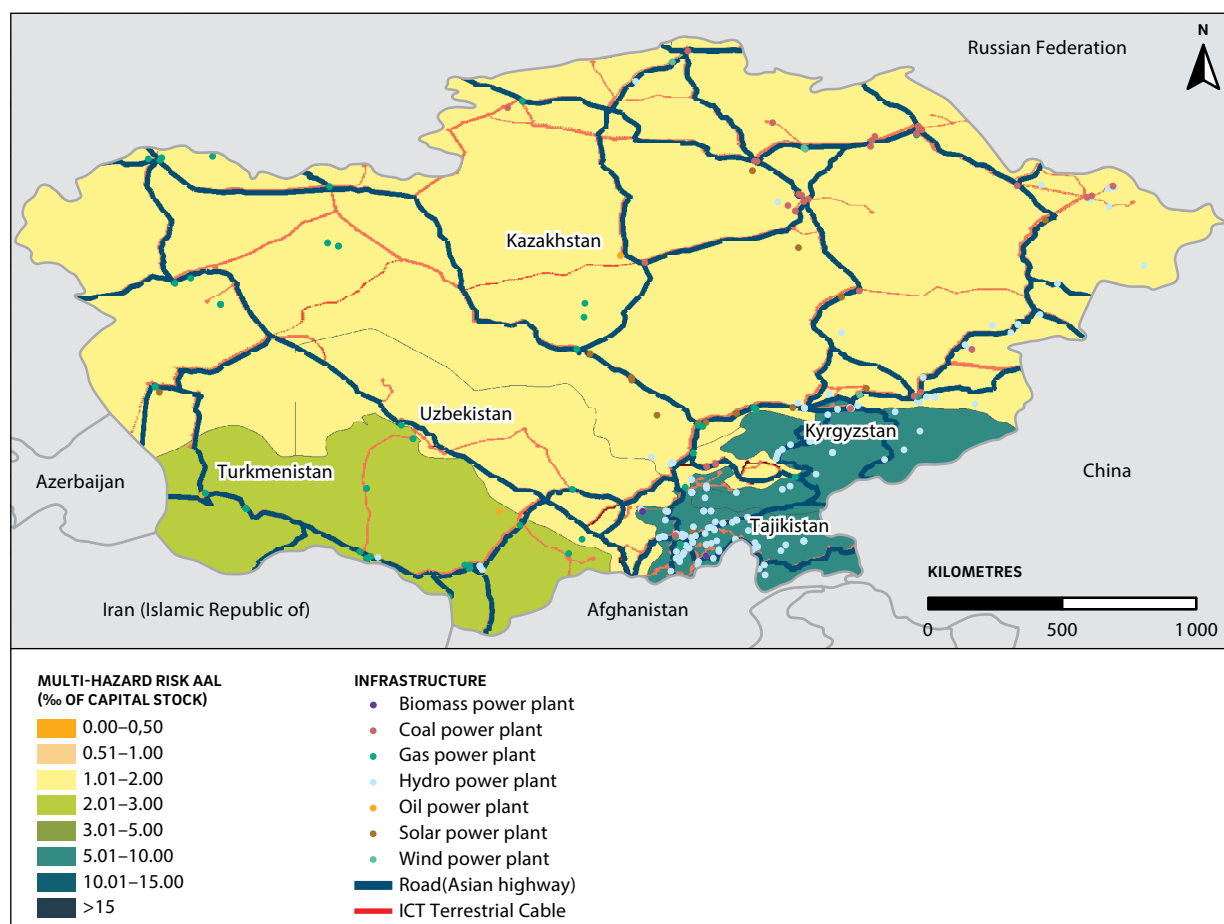
Source: ESCAP, based on IPCC, 2018.

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Dotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.

## Disaster risks are converging with critical socio-economic vulnerabilities making North and Central Asia a hotspot of exposed infrastructure.

Drawing from these new normal trends, the complex and diverse climate risks, for this subregion, create critical infrastructure exposure as seen in Figure 7. Especially in the emergency phases of a disaster, well-functioning road networks, airports and ports are essential for evacuations and distribution of supplies. Energy failure, in particular, can have cascading impacts, for health services and ICT.

**FIGURE 7 Multi-hazard AAL and infrastructure risk across Central Asia**



Sources: ESCAP based on probabilistic risk assessment, Asia Information Superhighway 2018, ESCAP Asia-Pacific Energy Portal 2018 and ESCAP Transportation Data 2018.

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Parts of North and Central Asia are at the centre of the Ring of Fire and the Sand and Dust storm risk corridor, which are two of the four disaster hotspots in the Asia-Pacific region. The Ring of Fire has critical infrastructure vulnerabilities such as tectonic plates, creating 90 per cent of the world's earthquakes and landslides. Armenia, Azerbaijan and Georgia are particularly threatened by these fault lines creating a great deal of ICT infrastructure exposure. These risks expand beyond ICT infrastructure to energy resources and transportation threatening the economic and social development of these countries (Figure 8).

**FIGURE 8** Ring of Fire and sand and dust storm risk hotspots

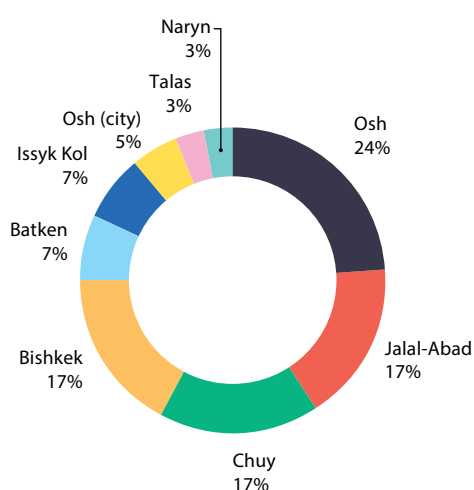
HOTSPOT	RING OF FIRE	HOTSPOT	SAND AND DUST STORM RISK CORRIDORS
	Earthquake, landslide and tsunami, typhoon tracks, North and East Asia, South-East Asia		Sand and dust storms, drought and floods, South Asia, South-West and Central Asia)
Population exposure	High (disproportionate impact on poor)	Population exposure	High (mostly poor)
Economic stock exposure	Very high	Economic stock exposure	High
Infrastructure: energy	Very high	Infrastructure: energy	Moderate
Infrastructure: transport	High	Infrastructure: transport	Moderate
Infrastructure: ICT	Moderate	Infrastructure: ICT	Low

**Very high** Approximately over 75 per cent are exposed to hazards  
**High** Approximately 51–75 per cent are exposed to hazards  
**Moderate** Approximately 25–50 per cent are exposed to hazards  
**Low** Approximately less than 25 per cent are exposed to hazards

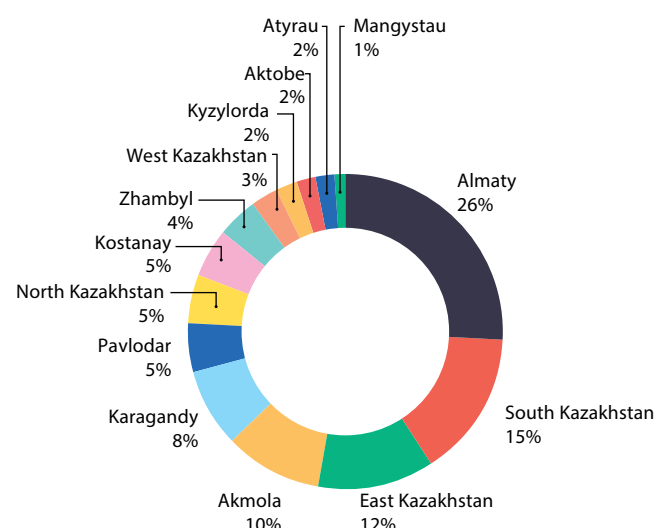
Source: ESCAP, based on Global Assessment Report on Disaster Risk Reduction (GAR) Risk Atlas, 2015; Global Risk Data Platform, 2013; ESCAP, Asia Information Superhighway, 2018(b); ESCAP Asia-Pacific Energy Portal 2018(a); ESCAP Transportation Data 2018(d); Muhs, and others, 2014.

The sand and dust storm risk corridor transverses the environmentally fragile areas of North and Central Asia. These storms are a consequence of land degradation, desertification, climate change and unsustainable land and water use. The highest dust storm frequencies in the subregion occur in the plains of Afghan-Turkestan and the Registan Desert. Dust from these areas are then transported north to other Central Asian countries. Large-scale sand and dust storms disrupt economic flows by damaging multi-modal transport infrastructure.<sup>2</sup>

For the land-locked countries of Central Asia, connectivity is a key driver of economic growth and socio-economic development. For countries such as Kyrgyzstan and Kazakhstan, there is a significant exposure of economic stock to current and future hazards (Figure 9 and Figure 10).

**FIGURE 9** Percentage of exposed economic stock per province in Kyrgyzstan

Source: A. Maskrey and others (2019).

**FIGURE 10** Percentage of exposed economic stock per province in Kazakhstan

Source: A. Maskrey and others (2019).

To determine the losses from future hazards in infrastructure for example, and to provide a risk assessment geared towards future investments, ESCAP is piloting the downscaling of the global average annual loss (AAL) methodology in Central Asia focusing on Kyrgyzstan and Kazakhstan. The downscaled AAL demonstrates the significant impact of disasters on capital stock and infrastructure.



## I. Kyrgyzstan

The total absolute multi-hazard Average Annual Loss (AAL), associated with earthquakes and riverine floods for Kyrgyzstan is US\$ 92.68 million, which represents 0.06 per cent of the total multi-hazard risk for the ESCAP region. Earthquakes contribute to 67.5 per cent of the AAL and riverine floods account for the remainder. The AAL for Kyrgyzstan represents 0.5 per cent of the capital stock of the country. Accounting for extensive risks and indirect losses, the AAL in the country rises to US\$ 168.68 million representing 2.23 per cent of the country's GDP.

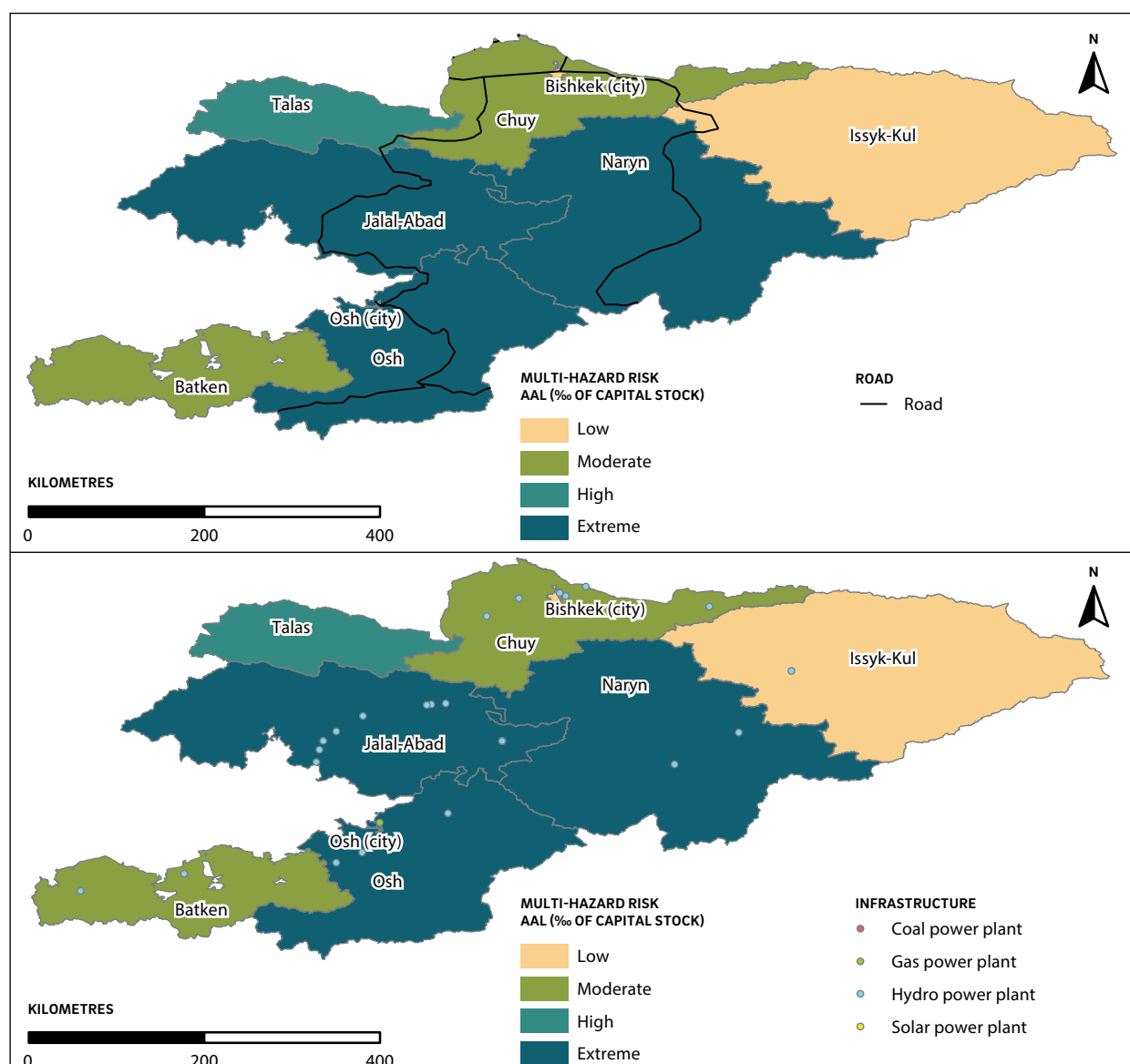
The province with the highest multi-hazard AAL is Osh (US\$ 26.75 million) which represents 28.86 per cent of the total multi-hazard risk for the country. However, Naryn has the highest relative multi-hazard risk (1.2 per cent) followed by Osh and Jalal-Abad (0.6 per cent). Likewise, Osh concentrates the major part of the losses associated to earthquakes with an earthquake AAL of US\$ 17.88 million, which represents 28.56 per cent of the total earthquake AAL for the country, followed by Jalal-Abad (17.48 per cent) and Chuy (15.86 per cent). In relative terms the region with the highest earthquake risk is also Osh (4.02 per cent), followed by Naryn (3.94 per cent) and Osh (city) (3.49 per cent).

Regarding floods, the losses are highly concentrated in the provinces of Osh (US\$ 8.86 million) and Jalal-Abad, which represents 29.48 per cent and 26.76 per cent of the total flood AAL, respectively. However, Naryn has the highest relative flood risk, with a value by far exceeding the other provinces (8.44 per cent), followed by Talas (2.8 per cent) and Jalal-Abad (2.53 per cent).

Disaster risk also represents an opportunity cost for sustainable development. Where the AAL represents a high proportion of a country's capital expenditure, that country will have difficulties in maintaining or increasing its capital investment, and thus will have difficulty in achieving the infrastructure related Sustainable Development Goals. The multi-hazard AAL for Kyrgyzstan represents 3.90 per cent of the gross fixed capital formation. At the downscaled provincial level, AAL is highest for the province of Osh, followed by Jalal-Abad and Chuy.

This suggests that in these provinces, there needs to be additional investments for infrastructure to be resilient to future hazards. For example, currently, 59 per cent of energy infrastructure and 71 per cent of transport infrastructure in the country is at high risk from future losses from multiple hazards (Figure 11).

**FIGURE 11 Exposure of energy and transport infrastructure to multi-hazard disaster losses in Kyrgyzstan**



Source: A. Maskrey and others (2019).

## II. Kazakhstan

The total absolute multi-hazard Average Annual Loss (AAL), associated with earthquakes and riverine floods for Kazakhstan is US\$ 750.46 million, which represents 0.5 per cent of the total multi-hazard risk for the ESCAP region. Earthquakes contribute to 51.6 per cent of the AAL and riverine floods account for the remainder. The relative multi-hazard AAL for Kazakhstan is 0.1 per cent of the capital stock. Accounting for extensive risks and indirect losses, the AAL in the country rises to US\$ 1,365 million representing 0.86 per cent of the country's GDP.

Almaty is the province with the highest multi-hazard AAL (US\$ 272.4 million) which represents 36.3 per cent of the total multi-hazard risk for the country. However, it is Atyrau the province with the highest relative multi-hazard risk (2.01 per cent) followed by West Kazakhstan (1.90 per cent) and Almaty (1.41 per cent).

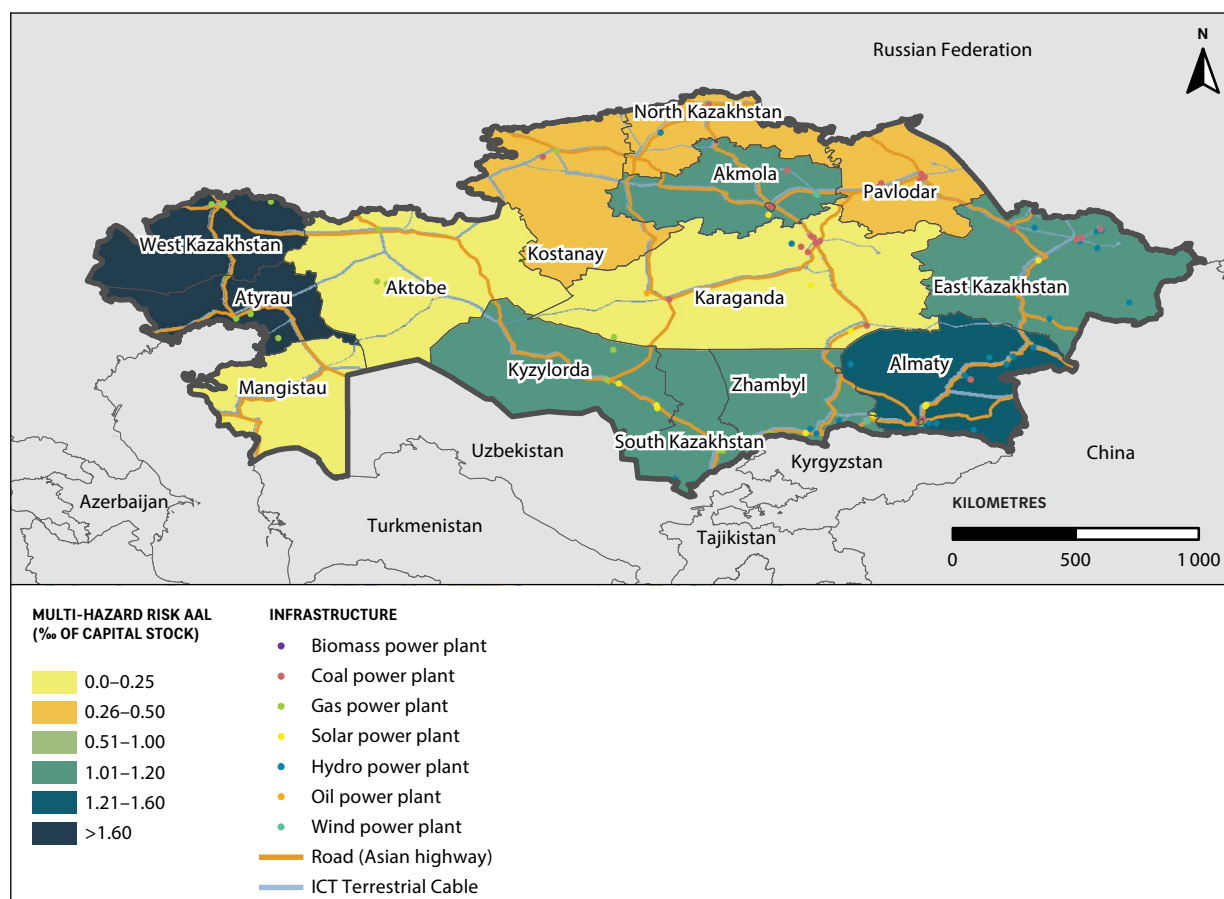
A major part of the losses associated with earthquakes is concentrated in the province of Almaty, which has an earthquake AAL of US\$ 249.7 million, which represents 64.47 per cent of the total earthquake AAL for the country, followed by South Kazakhstan (18.9 per cent) and East Kazakhstan and Zhambyl with a similar contribution of close to 7 per cent.

Regarding floods, the losses are more distributed among the different provinces. The province with the highest flood AAL is Akmola with losses of US\$ 78.7 million, that is, the 21.67 per cent of the total floods AAL, followed by East Kazakhstan (20.3 per cent) and South Kazakhstan (13.06 per cent). The province with the highest relative flood risk is West Kazakhstan (1.8 per cent) followed by Akmola and Kyzylorda (1.08 per cent and 1.07 per cent, respectively).

Multi-hazard AAL for Kazakhstan is almost 1.73 per cent of the gross fixed capital formation, given that disasters and their impacts will have significant consequences to current and future infrastructure investments. At the downscaled provincial level, losses from disasters are the highest for the province of Almaty, followed by South and East Kazakhstan.

Thus, in these provinces, there needs to be additional investments for infrastructure to be resilient to future hazards. For example, currently, 73 per cent of energy infrastructure, 56 per cent of ICT infrastructure, and 57 per cent of transport infrastructure in the country is at high risk from future losses from multiple hazards (Figure 12).

**FIGURE 12 Multi-hazard AAL and infrastructure risk within Kazakhstan**



Source: A. Maskrey and others (2019).

# Disasters can widen inequalities in outcomes and opportunities, and disempower at-risk communities in some North and Central Asian countries.

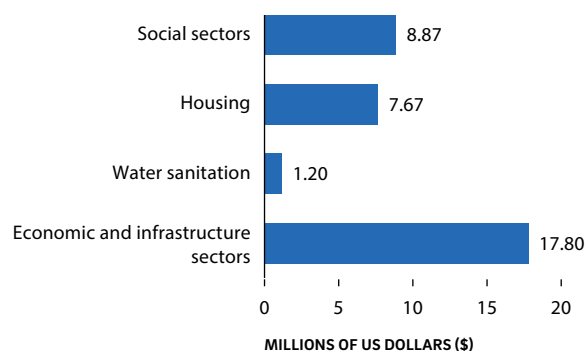
These infrastructure risk hotspots can intersect with populations that have heightened socio-economic vulnerabilities, which can then have significant impacts on inequality. A rapid sequence of disasters can outpace people's resilience, disempowering the poor and marginalized, leaving them vulnerable to future disasters. Livelihoods and coping capacities are repeatedly eroded, inequalities of income and opportunities are exacerbated, transmitting poverty over generations and threatening long-term development gains.

**Records of major disasters in the North and Central Asia show that the social and economic sectors suffer impacts that can perpetuate inequalities of opportunity.**

Not only do disasters have critical impacts on the development of economic sectors, but increasingly, they have begun affecting the social sectors such as health, housing and sanitation, which impact the wellbeing of populations. ESCAP has assessed the impact of disasters on these development sectors by analysing post-disaster needs assessment (PDNA). For example, the analysis of the PDNA for the Georgia floods, that occurred in 2015, demonstrate that 25 per cent of the losses were in social sectors (Figure 13).

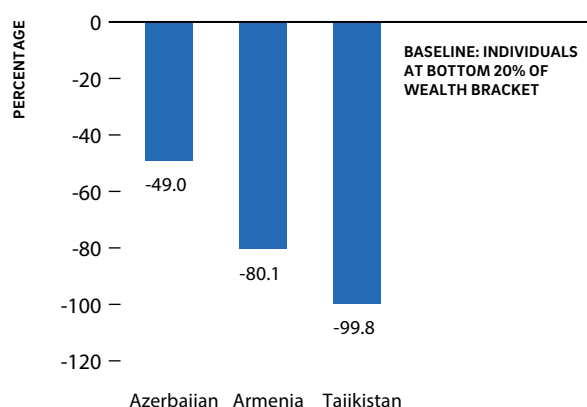
Not only are the impacts of disasters greater for poorer communities, but poor populations are often the most exposed to disasters as they do not have the means to protect their assets and avoid living in areas often hit by disasters (Figure 14). Tajikistan, for example, has the highest discrepancy between the wealthy and the poor living in high disaster risk areas in the Asia-Pacific region. The World Bank notes that despite Tajikistan's sustained economic growth in the past few years, and the country's notable achievements, poverty and low standards of living remain a pressing problem;<sup>3</sup> poorer populations, who have higher odds of residing in high disaster risk areas, can continuously lose wealth and assets which push them deeper into poverty.

**FIGURE 13** Sectoral impacts of Georgia floods, 2015



Source: ESCAP, based on GFDRR, PDNA reports.

**FIGURE 14 Odds of the wealthiest 20 per cent living in high-multi-hazard risk areas**



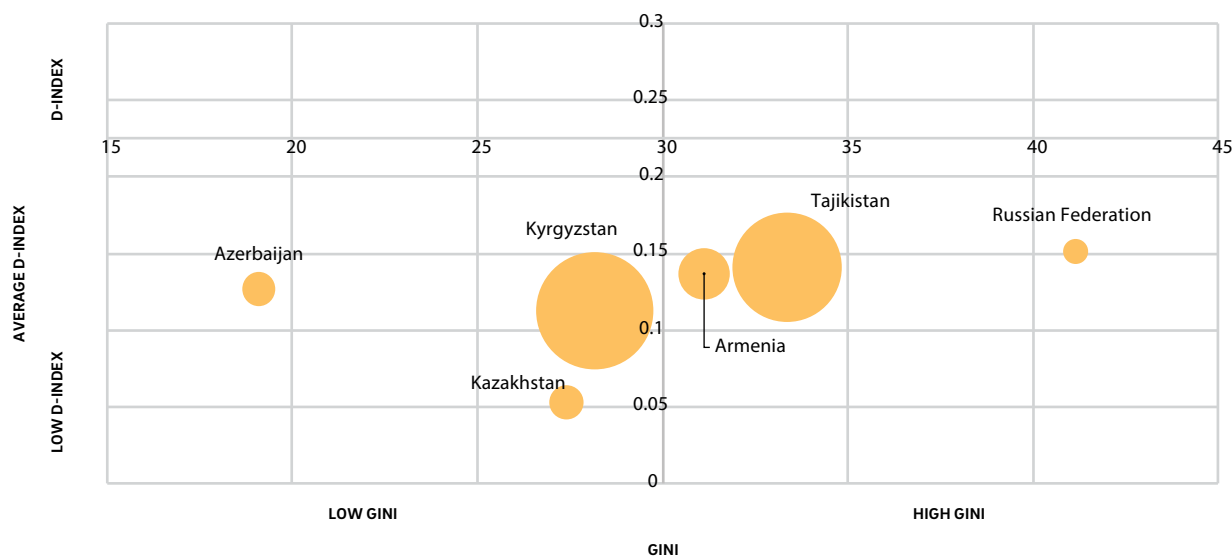
Source: ESCAP calculations based on DHS surveys, latest data and multi-hazard data from Global Assess Report, 2015.

Note: Results are based on country-specific logistic regressions. Only countries with statistically significant coefficients and odds-ratios are shown.

### Disasters contribute to and are drivers of income inequality and poverty in the subregion.

Inequality of income refers to how income generated in the production of goods and services is unequally distributed across a population. The best-known measure is the Gini coefficient.<sup>4</sup> Inequality of opportunities is measured by the D-index,<sup>5</sup> that refers to access of education, childhood nutrition and household access to basic services. Figure 15 shows the overlaps of inequalities of income and disaster risk. North and Central Asian countries are all in the low D-index quadrant, but Armenia, the Russian Federation and Tajikistan have high Gini scores. The bubble size indicates annual average losses as a proportion of GDP.

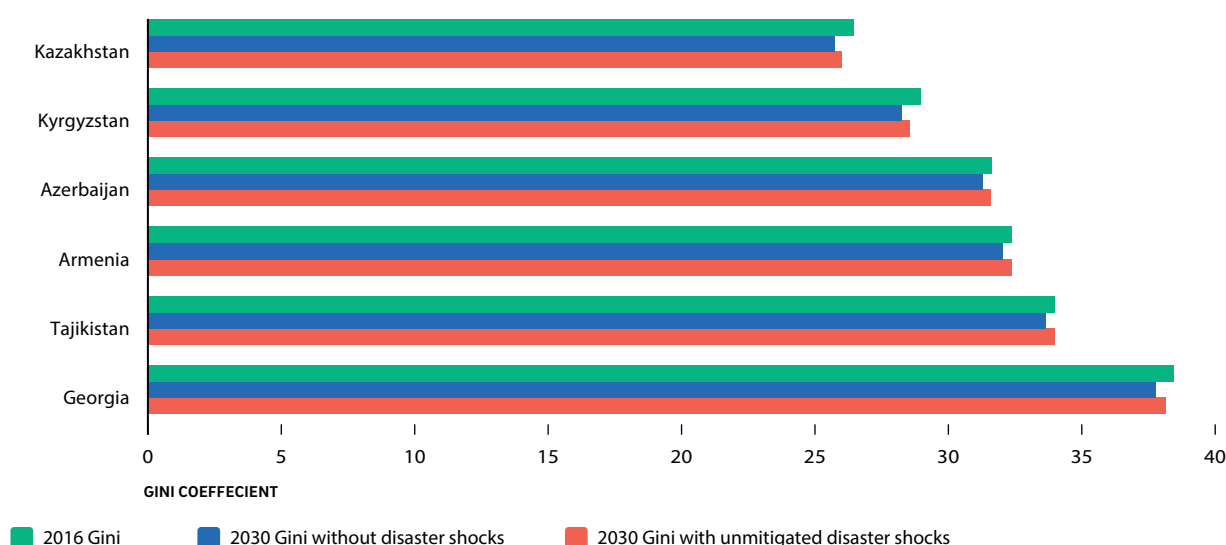
**FIGURE 15 Overlaps of inequalities of income and disaster risk for select countries**



Source: ESCAP calculations for GINI, ESCAP calculations for Average annual loss, ESCAP calculations for Dissimilarity Index (D-Index) from ESCAP theme study "Inequality in Asia and the Pacific in the era of the 2030 Agenda for Sustainable Development."

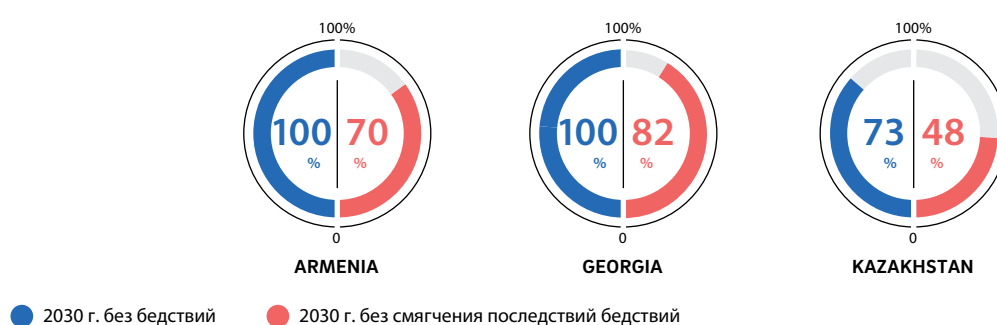
Note: The size of the bubble indicates the extent of risk from multiple hazards

Comparative static computable general equilibrium model (CGE) can be used to project the impact of disaster shocks on income inequality. Figure 16 shows how the Gini coefficient is modelled to change by 2030, with and without disaster shocks. All countries can expect inequality to fall by 2030, but the decrease is lower in countries hit by disasters.

**FIGURE 16** Projected Gini in 2030, with and without unmitigated disaster shocks

Source: ESCAP calculations based on CGE model.

On average, without disaster shocks, countries in North and Central Asia will have 0.6 per cent lower Gini Coefficients however, that number is halved with unmitigated disaster shocks with a 0.3 per cent decrease. Increased disaster risk mitigation efforts can therefore help countries in North and Central Asia to reduce inequalities and promote inclusive economic growth. Similar trends can be seen with CGE projections of impact of disaster shocks on poverty levels. Armenia and Georgia could achieve a 100 per cent poverty reduction by 2030 but, with unmitigated disasters this significantly decreases; Armenia is projected to only achieve a 70 per cent reduction, which is a difference of 30 percentage points (Figure 17).

**FIGURE 17** Percentage reduction in extreme poverty rates in 2030 with and without disasters in selected countries (Baseline poverty rate=2016)

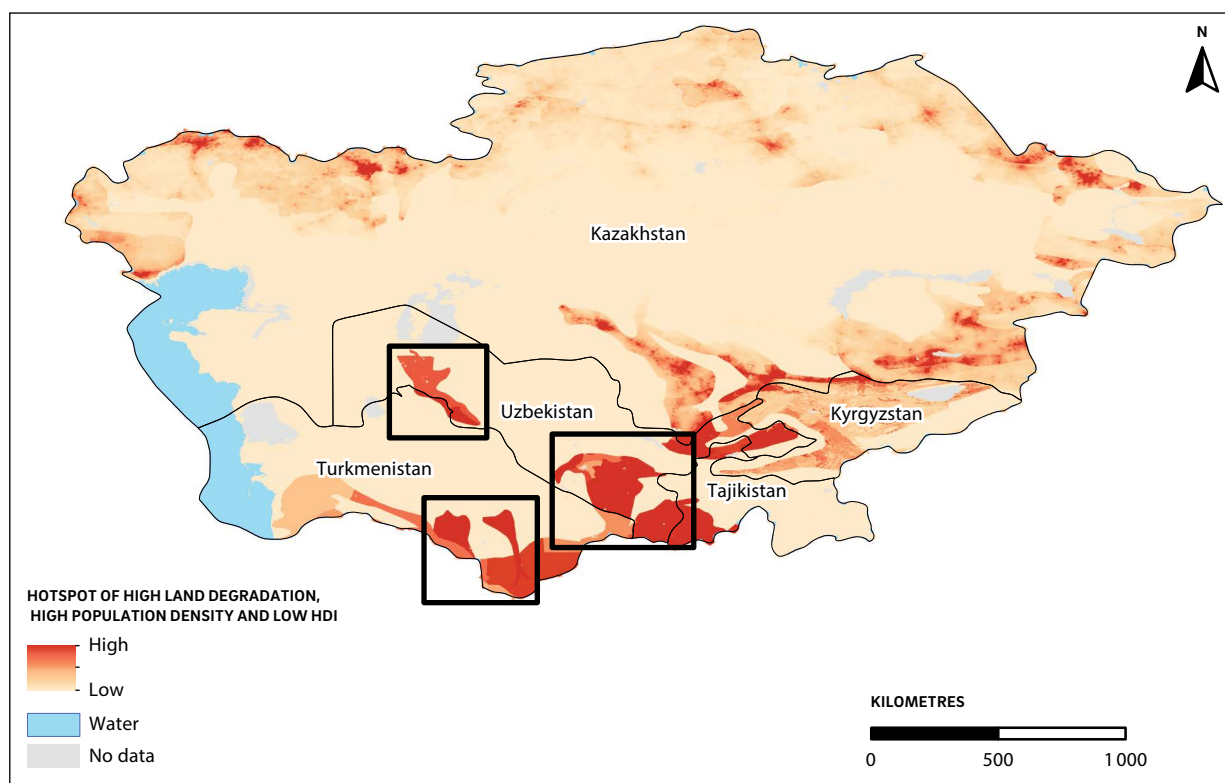
Source: ESCAP calculations based on CGE model.

### Hotspots of deprivation and disaster risk overlap in North and Central Asia.

The following section identifies the geographical location, where poverty, population density, along with low human development and disaster risk areas converge in North and Central Asia. Figure 18 shows that the highest concentration of people combined with low HDI, and high hazard risk in Central Asia are in Turkmenistan and Tajikistan. The figure amalgamates the index of high population, low HDI and high-hazard risk or high land degradation.



**FIGURE 18** Hotspots of low HDI and land degradation in Central Asia



Sources: Calculations by ESCAP based on (1) sub-national HDI data from UNDP, (2) Population statistics from WorldPop, (3) and land degradation data from the Global Assessment of human-induced soil degradation (UNEP).

Disclaimer: The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

# Investing to outpace disaster risk

Governments can shift their strategies from addressing only disaster impacts to addressing the fundamental drivers of vulnerability, that make people susceptible to the impacts of disasters and climate change, through a comprehensive portfolio of risk-informed investments and pro-poor disaster risk reduction interventions. As a result, they can prevent disaster risk from undermining poverty reduction. Extensive CGE modelling depicts the high impact countries, namely Armenia, Azerbaijan, Georgia, Kyrgyzstan and Tajikistan which have the highest difference between scenario A and F; more than 3 per cent of the people living under \$1.90 a day, in 2030 (Figure 19).

**FIGURE 19** Impact of investments on poverty levels, 2016–2030



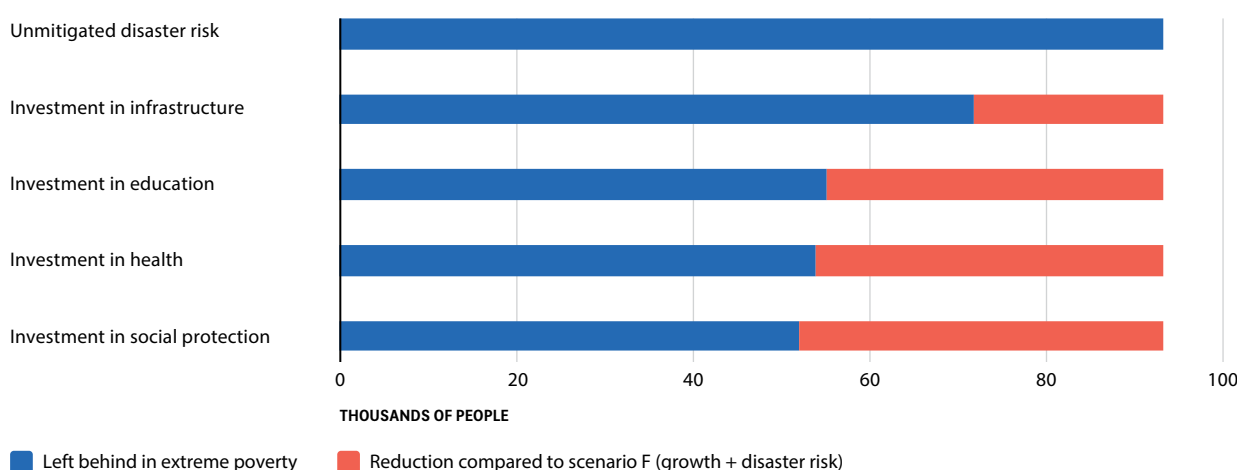
Source: ESCAP calculations based on CGE model simulation.

## Investments in resilient infrastructure and social sectors can prevent disasters from undermining development gains.

The projected economic growth (scenario A) is expected to reduce poverty, but these reductions are projected to be lower when disaster risk is taken into account (scenario F). Nevertheless, investments in each sector, especially social sectors and in resilient infrastructure, can mitigate this impact of disasters, and deliver higher reductions in poverty than scenario F in the subregion. The CGE model reiterates that increasing investment in social policy will provide the opportunity to lift people out of poverty.

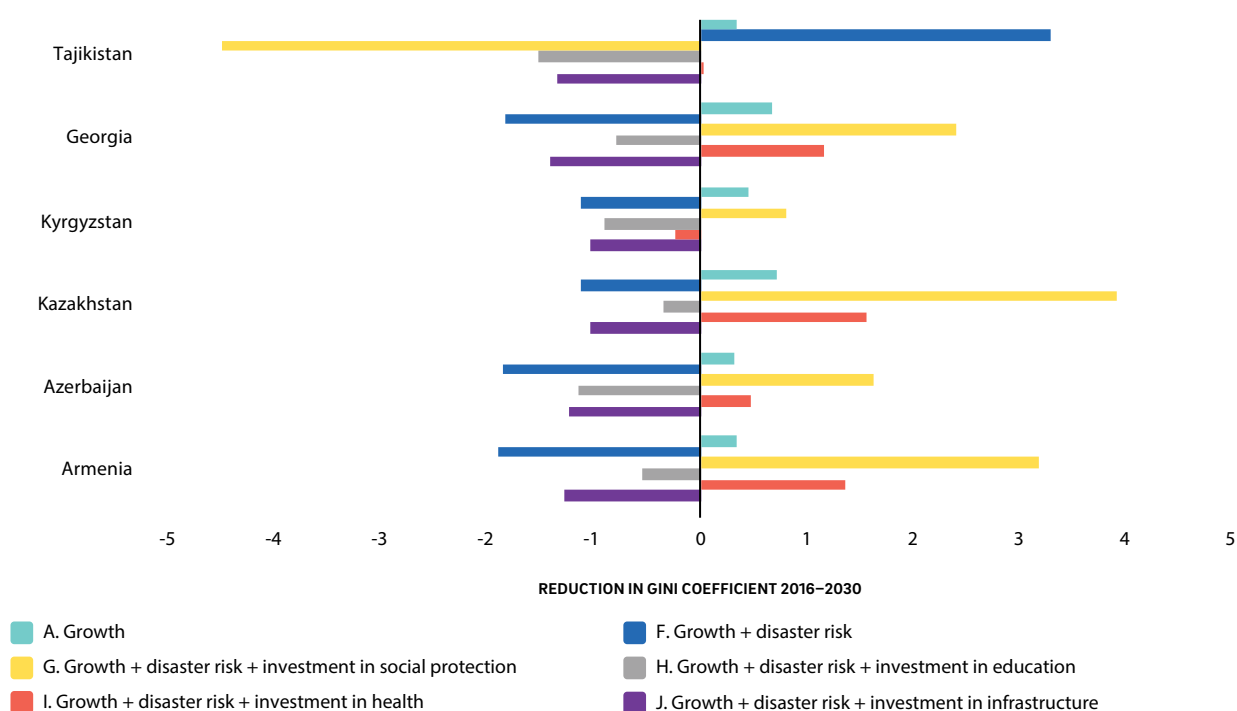
Using computable general equilibrium modelling (CGE) to quantify the relationship between poverty, the data available for Armenia, Azerbaijan, Georgia, Kyrgyzstan and Tajikistan, shows that investments in four key sectors can mitigate the impact of disasters on poverty and inequality. Figure 20 and Figure 21 display the reductions in the \$1.90, \$3.20 and \$5.50 poverty rate and Gini coefficient, respectively, for the sub-regional countries. The highest reductions are achieved from investing in social protection, but other interventions are also effective in mitigating the disaster driven increases in inequalities.

**FIGURE 20** Projected number of people living in extreme poverty in 2030, with disaster risk



Source: ESCAP calculations based on CGE model simulation.

Translating these rates and coefficients into numbers reveals how many people are at risk of being left behind in extreme poverty, if disaster risk is not reduced. Investing in line with global averages in education, infrastructure, health and social protection will bring this number down. Within North and Central Asia, 622,000 people are projected to be lifted out of poverty. Investing in line with global averages in education, health, social protection and infrastructure will allow for the inequality and poverty gaps to be reduced. A clear message therefore emerges that disaster risk threatens to undermine development gains, but countries can still reduce poverty and inequality despite disaster risk, by investing in social protection, health, education and infrastructure.

**FIGURE 21** Impact of investments on inequality, 2016–2030

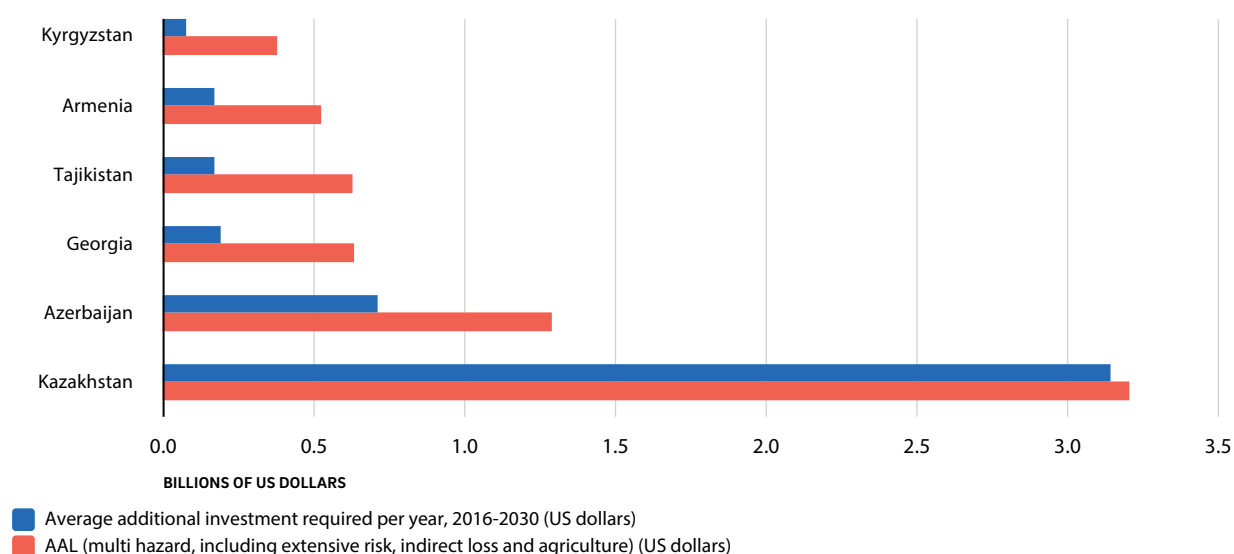
Source: ESCAP calculations based on CGE model simulation.

Note: A positive value corresponds to a reduction in the Gini coefficient and therefore a reduction in inequality, whereas the inverse is true for negative values.

### The additional financing required in social sectors and infrastructure are small compared to the damages and losses already sustained by North and Central Asian countries due to disasters.

There are varying estimates of the total amount of investment required to meet the Sustainable Development Goals, to climate-proof infrastructure and so on. Governments can make real improvements in poverty and inequality by investing in line with global average expenditures in social protection, education, health, and 2 per cent of GDP in infrastructure. Figure 22 shows that the additional amounts required to meet these investments levels are small compared to the damage and losses already sustained by North and Central Asian countries due to disasters. For countries in the subregion that were evaluated, the additional investments required per year are lower than the AAL. For four out of the six countries, the additional investment required is even less than 50 per cent of the AAL. The additional investments are also less than the damage and losses sustained in major disasters.

**FIGURE 22** Annual additional investment to meet global averages compared to Average Annual Loss



# A way forward: recommendations for actions in the subregion

The *Asia-Pacific Disaster Report 2019* illustrates the challenges that countries in North and Central Asia face for resilient and risk-informed development. It also provides a range of policy options and opportunities to strengthen resilience vis-à-vis the new riskscape. Responses at the national, regional and global levels need to be upgraded across three broad areas.

## Implement risk-informed policies and investments

Multiple policies must be deployed depending on local circumstances. It will be important to guarantee risk-informed social protection, education and health services along with more disaster and climate resilient agriculture and infrastructure. The report shows that investments in resilient infrastructure, health and education, all offer an entry point for mitigating disaster-driven increases in poverty and inequality.

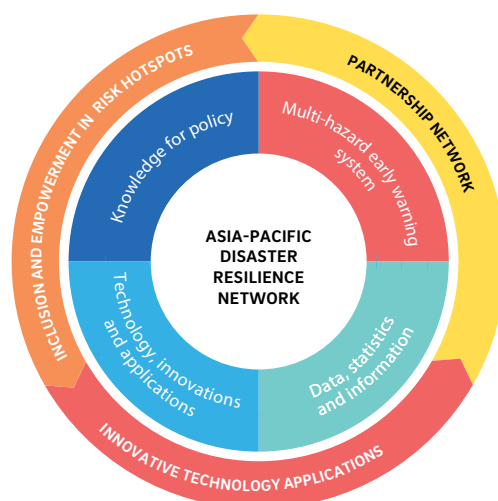
## Capitalize on new technologies

Disaster risk reduction should be grounded in a seamlessly integrated system that comprises big data, digital identity, risk analytics and geospatial data. New technologies can be deployed to overcome some of the critical challenges posed by the geography of North and Central Asia for delivering disaster risk reduction, preparedness and response actions, particularly in reaching the vulnerable communities.

## Unlock the potential of regional cooperation

Countries in North and Central Asia are at the intersections of various risk hotspots and high multi-hazard areas. With climate change, these are likely to expand still further, creating deep uncertainties. Addressing these will require strategies at the regional and sub-regional levels. The Asia-Pacific Disaster Resilience Network (APDRN), with an emphasis on partnerships and innovation, comprises inter-related streams: (i) *multi-hazard early warning system platform*; (ii) *data, statistics and information management*, which also includes big data from emerging technological platforms and sources; and (iii) *knowledge for policy* (Figure 23). ESCAP is leading

**FIGURE 23** Structure of Asia-Pacific Disaster Resilience Network



the way for regional cooperation, forging partnerships with Emergency Ministries of North and Central Asia, The Center for Emergency Situations and Disaster Risk Reduction, and other sectoral and line ministries along with other UN Agencies such as UNDRR, OCHA, RCOs and UNCT to build resilient infrastructure and population in the subregion.

## 1 Regional multi-hazard early warning systems

The advances in industry 4.0 technologies enable more-effective, risk-informed and end-to-end multi-hazard early warning systems. The benefits can be scaled up through regional cooperation. The longer forecasting and warning lead times enabled through smart technologies go beyond saving lives to ensuring livelihood support.

Forecasting transboundary floods and slow-onset disasters, especially droughts remains difficult. Efforts to strengthen regional cooperation for early warning in drought in North and Central Asia are underway and require scaling up of regional cooperation.

## 2 Data, statistics and information

In support of strengthening big data ecosystems, APDRN has three initiatives.

*The Asia-Pacific Disaster Risk Atlas* – The atlas is the online data and information platform of ESCAP's regional institute, the Asian and Pacific Centre for the Development of Disaster Information Management (APDIM).<sup>6</sup> It serves as a decision-support tool for risk-informed infrastructure investment and development policy decisions.

*The Disaster-related Statistics Framework* – The Disaster-related Statistics Framework (DRSF) covers the core concepts and indicators defined in the Sendai Framework and the SDGs. For risk assessment and post-disaster impact assessments, the DRSF also analyses data on population, society, and economy from censuses and surveys.

*Data-and information-driven regional cooperation* – Earth observation satellite and surface-based observations are used to capture transboundary impacts and origins of disasters. Sand and dust storms, for example, are frequently transboundary in nature. Risk-informed policy interventions therefore require dialogue and cooperation among the related countries.<sup>7</sup> APDIM is currently establishing a regional slow-onset hazards network and sand and dust storms alert system. ESCAP has also joined a United Nations Coalition on Combating Sand and Dust Storms to deepen regional cooperation in South and South-West Asia, North and Central Asia and North and North-East Asia.

## 3 Knowledge for policy

ESCAP has put in place a knowledge and innovation platform and develops its analytical research products to promote risk-informed policies. The *Asia-Pacific Disaster Report*, for example, has been produced on a biennial basis and the report findings are discussed at the respective sessions of the Committee on Disaster Risk Reduction. The report also contributes to the High-Level Political Forum for Sustainable Development and its regional preparatory process, the Asia-Pacific Forum on Sustainable Development.

The North and Central Asia subregion has had considerable experience with reducing disaster risk. But with climate change and expanding disaster hotspots, the region is entering an increasingly uncertain future. Countries in the subregion will need to consider how every aspect of development can face up to disaster risk. All ministries and departments should consider how they can work together in a more integrated way, so that they are able to identify the people in danger of being left behind and empower them to protect themselves and build sustainable and resilient livelihoods.

## Endnotes

- 1 IPCC (2018).
- 2 Middleton (1986).
- 3 World Bank (2015).
- 4 ESCAP (2018c).
- 5 Sabrina Alkire, and Selim Jahan (2018).
- 6 ESCAP and APDIM (2019).
- 7 ESCAP and APDIM joint report, 2018.

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The Asia-Pacific region faces a daunting spectrum of natural hazards. Indeed, many countries could be reaching a tipping point beyond which disaster risk, fuelled by climate change, exceeds their capacity to respond.

This *Asia-Pacific Disaster Report 2019* shows how these disasters are closely linked to inequality and poverty, each feeding on the other and leading to a vicious downward cycle. It assesses the scale of losses across the disaster 'risky landscape' and estimates the amounts that countries would need to invest to outpace the growth of disaster risk. It shows the negative effects of disasters on economies in the region and where investments are more likely to make the biggest difference.

While this will require significant additional finance, the report shows the amounts are small compared to the amounts that countries in the region are currently losing due to disasters. The report demonstrates how countries can maximize the impacts of their investments by implementing a comprehensive portfolio of sectoral investments and policies that jointly address poverty, inequality and disaster risk. It showcases examples from the region of innovative pro-poor disaster risk reduction measures and risk-informed social policies that are breaking the links between poverty, inequality and disasters. Similarly, it explores how emerging technologies such as big data and digital identities can be used to ensure the poorest and most vulnerable groups are included in these policy interventions.

*The Disaster Risk Landscape Across North and Central Asia: Key Takeaways for Stakeholders*, zooms into the analytical research findings of the APDR with specific reference to the North and Central Asia region and comprehensively presents its sub-regional risk landscape to inform policy actions.

