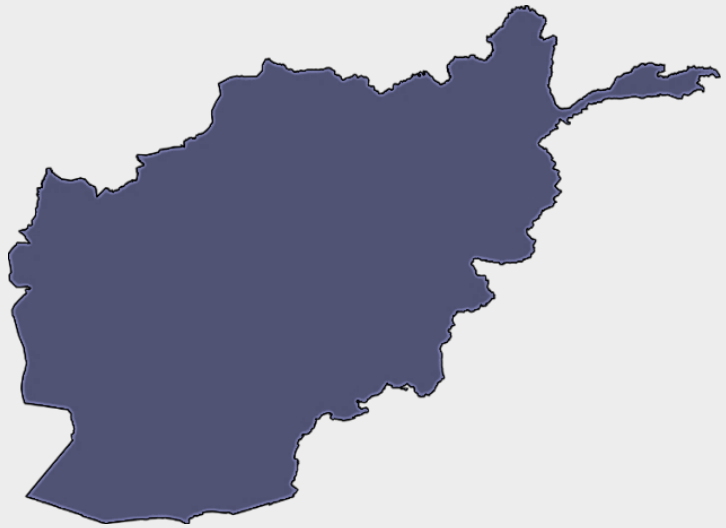
Islamic Republic of Afghanistan
Office of State Minister for Disaster Management & Humanitarian Affairs



Remote Sensing and GIS for Drought Management

Sayed Ab. Baset Rahmani
Hydro-metrological and DRR Sr. Advisor

Rank	Country	WorldRiskIndex	Exposure	Vulnerability	Susceptibility	Lack of coping capacities	Lack of adaptive capacities
40.	Viet Nam	10.31	22.03	46.83	25.07	77.68	37.75
41.	Kenya	10.30	16.53	62.32	50.32	86.92	49.72
42.	Burundi	10.29	14.81	69.47	61.05	91.13	56.24
43.	Cote d'Ivoire	10.03	15.55	64.52	47.18	86.12	60.27
44.	Senegal	9.82	16.48	59.59	44.89	79.89	53.97
45.	Sierra Leone	9.61	13.70	70.16	56.94	86.52	67.02
46.	Mozambique	9.50	13.50	70.44	64.80	88.05	58.46
47.	Mauritius	9.47	23.88	39.66	17.34	64.99	36.65
48.	Liberia	9.46	13.57	69.69	55.96	86.26	66.86
49.	Trinidad and Tobago	9.44	23.28	40.56	19.00	69.59	33.09
50.	Ghana	9.41	16.54	56.87	41.92	79.40	49.29
51.	United Republic of Tanzania	9.23	14.40	64.14	58.01	83.58	50.84
52.	Zimbabwe	9.21	14.72	62.58	50.30	89.12	48.34
53.	Afghanistan	9.21	13.73	67.11	49.21	92.36	59.75
54.	Japan	9.19	38.94	23.60	16.80	39.90	14.11
55.	Malawi	8.94	13.43	66.61	57.84	84.38	57.62
56.	Democratic Rep. of Congo	8.80	11.95	73.63	67.13	92.56	61.21
57.	Uganda	8.71	12.85	67.81	63.19	88.75	51.49
58.	Guinea	8.68	12.76	68.03	51.23	89.33	63.53
59.	Sudan	8.52	13.14	64.87	46.04	92.62	55.94

ROLES THAT REMOTE SENSING AND GIS PLAY IN DISASTER MANAGEMENT PHRRASES

Planning

• GIS is useful in helping with forward planning.
• It provides the framework for planners and disaster managers to view spatial data by way of computer based maps.

Mitigation

•Representation of High risk areas
•Facilitates the implementation of necessary mechanism to lessen the impact.

Preparedness

• Identification of emergency areas
•Positions of related departments, Agencies, and Human Resources
•Make it easier for security and shelters provides to plan the strategies

Response

•Provide accurate information on exact location of an emergency situation
•Time saving during the determination of trouble areas (Quick Response)
•Used as floor guide for evacuation routes

Recovery

Mapping level of damage

Information related to disrupted infrastructure, number of persons died or injured and impact on Environment.

GIS and data gathering-

The data required for disaster management is coming from different scientific disciplines, and should be integrated

Data integration is one of the strongest points of GIS. In general the following types of data are required:

- Data on the disastrous phenomena (e.g. landslides, floods, earthquakes), their location, frequency, magnitude etc.
- Data on the environment in which the disastrous events might take place: topography, geology, geo-morphology, soils, hydrology, land use, vegetation etc.
- Data on the elements that might be destroyed if the event takes place: infrastructure, settlements, population, socio-economic data

Remote assessment System

Hazards

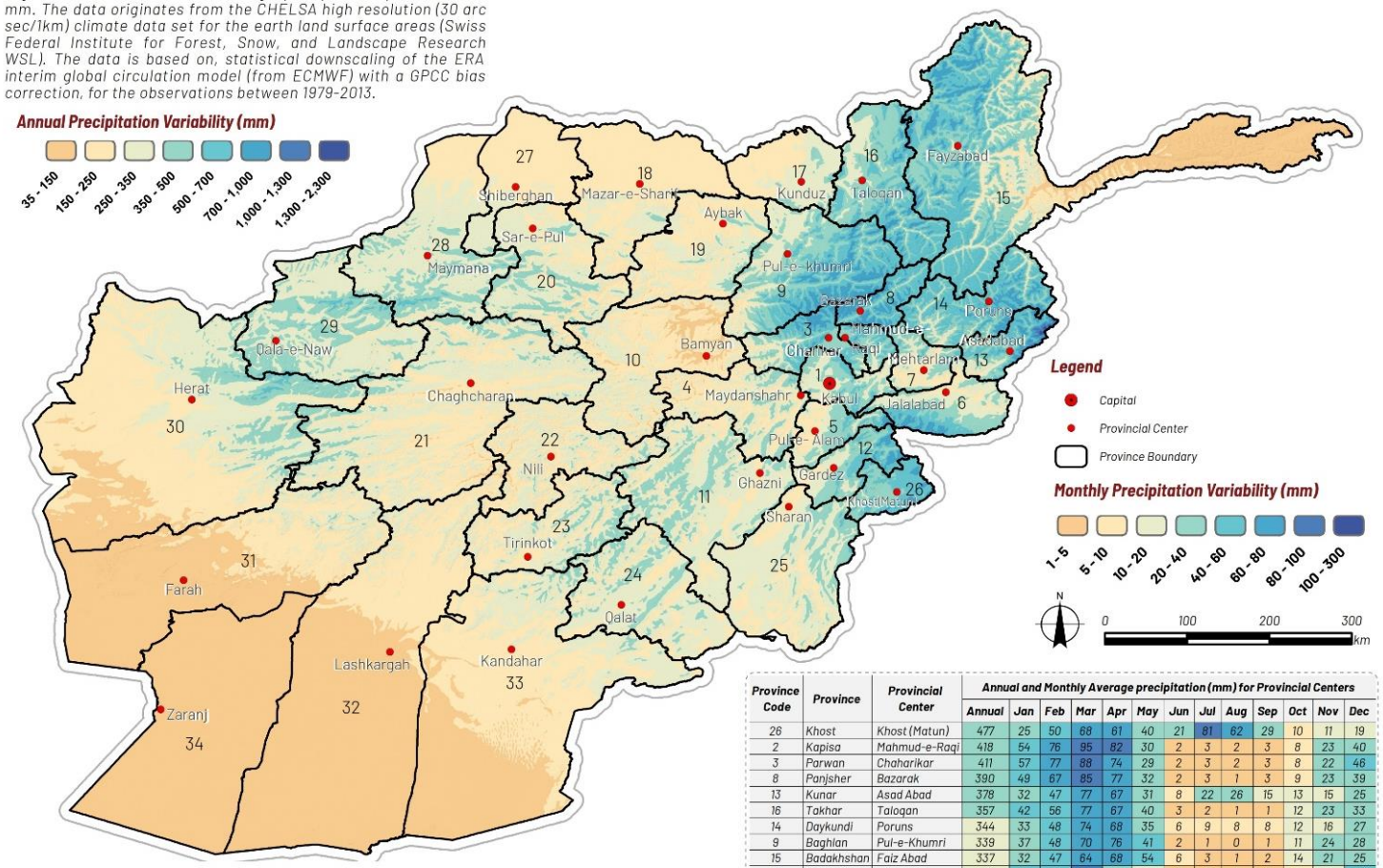
Population

Accessibility

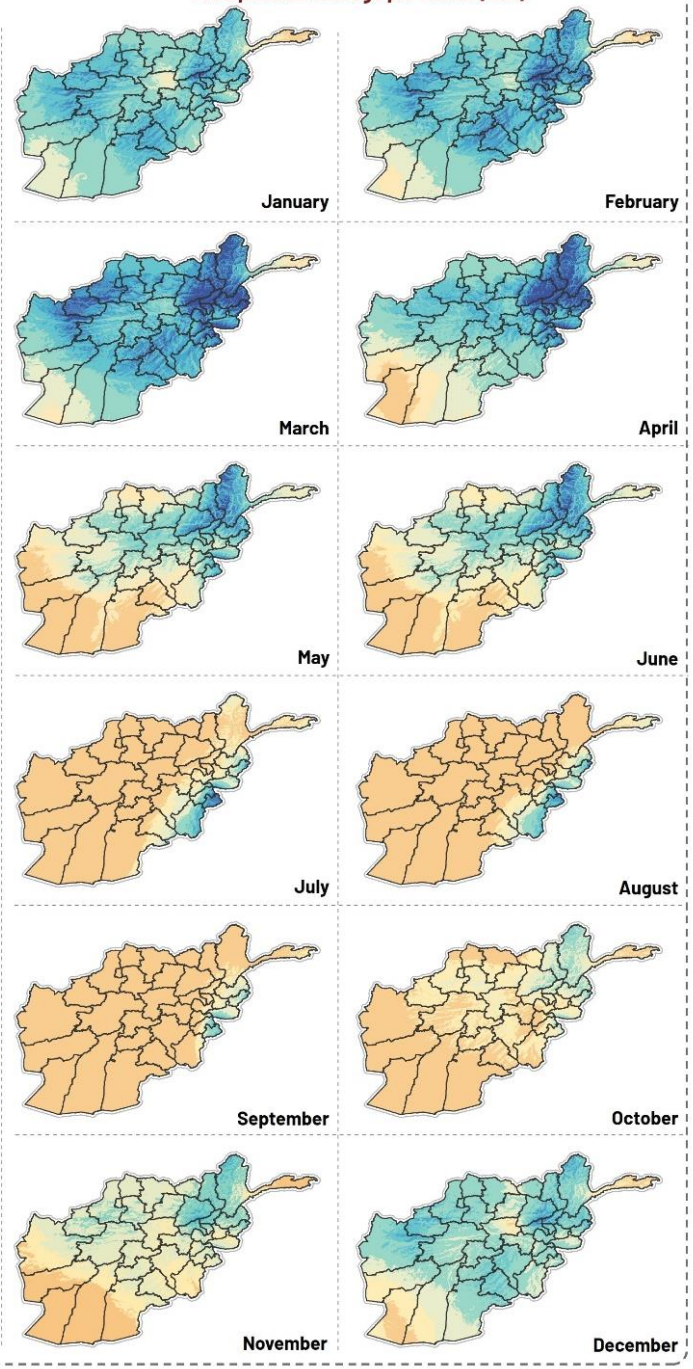
anhdc.andma.gov.af

Annual and Monthly Average Precipitation in Afghanistan

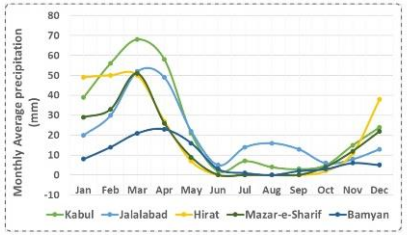
This map shows the average annual total precipitation in Afghanistan as well as the average precipitation per month in mm. The data originates from the CHELSA high resolution (30 arc sec/1km) climate data set for the earth land surface areas (Swiss Federal Institute for Forest, Snow, and Landscape Research WSL). The data is based on, statistical downscaling of the ERA interim global circulation model (from ECMWF) with a GPCC bias correction, for the observations between 1979-2013.



Precipitation Average per Month (mm)



Major Cities Monthly Average Precipitation



Major Cities Annual Average Precipitation

Province Code	Province	Provincial Center	Annual and Monthly Average precipitation (mm) for Provincial Centers											
			Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
26	Khost	Khost (Matun)	477	25	50	68	61	40	21	81	62	29	10	11	19
2	Kapisa	Mahmud-e-Raqi	418	54	76	95	82	30	2	3	2	3	8	23	40
3	Parwan	Chaharikar	411	57	77	88	74	29	2	3	2	3	8	22	46
8	Panjsher	Bazarak	390	49	67	85	77	32	2	3	1	3	9	23	39
13	Kunar	Asad Abad	378	32	47	77	67	31	8	22	26	15	13	15	25
16	Takhar	Talogan	357	42	56	77	67	40	3	2	1	1	12	23	33
14	Daykundi	Poruns	344	33	48	74	68	35	6	9	8	8	12	16	27
9	Baghlan	Pul-e-Khumri	339	37	48	70	76	41	2	1	0	1	11	24	28
15	Badakhshan	Faiz Abad	337	32	47	64	68	54	6	3	1	2	14	21	25
29	Badghis	Qala-e-naw	310	51	60	82	40	12	0	0	0	1	6	16	42
1	Kabul	Kabul	302	39	56	68	58	21	2	7	4	3	5	15	24
28	Faryab	Maymana	300	45	50	76	46	20	1	0	0	0	8	19	35
17	Kunduz	Kunduz	297	42	52	72	48	23	0	1	0	0	8	21	30
12	Paktya	Gardez	291	31	52	62	54	16	5	19	12	3	4	11	22
24	Zabul	Qalat	262	58	64	59	19	3	0	5	4	0	3	10	37
6	Nangarhar	Jalalabad	248	20	30	52	49	22	5	14	16	13	6	8	13
27	Jawzjan	Shiberghan	241	44	43	61	28	11	0	0	0	0	7	15	32
4	Wardak	Maydan Shahr	240	33	46	56	45	15	1	5	3	1	3	12	20
7	Laghman	Mehtarlam	239	25	35	52	50	18	3	7	8	9	5	9	18
20	Sar-e-Pul	Sar-e-pul	238	40	41	59	31	15	0	0	0	0	9	14	29
30	Hirat	Herat	234	49	50	50	27	7	0	0	0	0	2	11	38
11	Ghazni	Ghazni	232	33	45	53	36	10	1	12	7	0	4	10	21
23	Uruzgan	Tirin Kot	213	42	51	54	17	7	0	1	0	0	4	11	26
33	Kandahar	Kandahar	212	48	47	54	20	5	0	2	0	0	2	8	26
5	Logar	Pul-e-Alam	203	27	38	42	39	13	2	9	5	1	2	9	16
25	Paktika	Sharan	201	27	39	45	25	7	2	17	12	1	4	7	15
19	Samangan	Aybak	194	24	30	47	38	19	0	0	0	0	6	13	17
18	Balkh	Mazar-e-Sharif	186	29	33	51	26	9	0	0	0	0	4	12	22
22	Nuristan	Nili	185	33	39	36	25	12	1	0	0	0	5	9	25
21	Ghor	Chaghcharan	169	32	28	34	29	12	1	0	0	0	3	11	19
32	Hilmand	Lashkar Gah	136	31	31	36	10	5	0	0	0	0	2	4	17
10	Bamyan	Bamyan	102	8	14	21	23	16	3	1	0	2	3	6	5
31	Farah	Farah	96	24	22	27	7	2	0	0	0	0	1	3	10
34	Nimroz	Zaranj	48	15	10	13	3	0	0	0	0	0	1	1	5

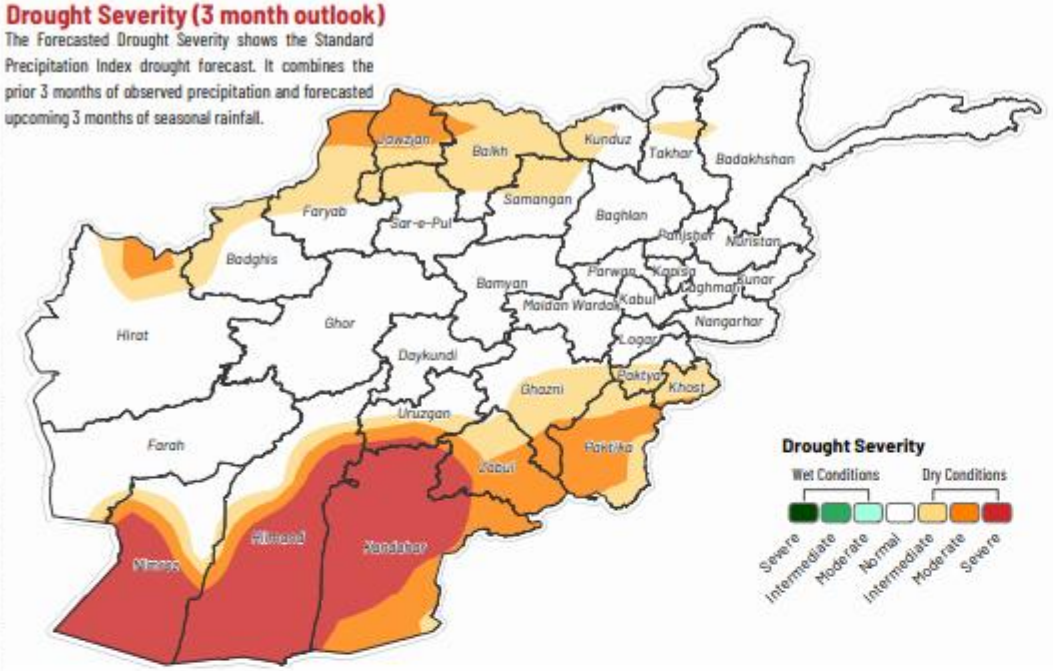
Datum/projection: WGS84/Geographic
Data Sources: CHELSA, AGCHO
Date Created: 20/July/2020

Feedback: afghanistan@immap.org

Drought Risk

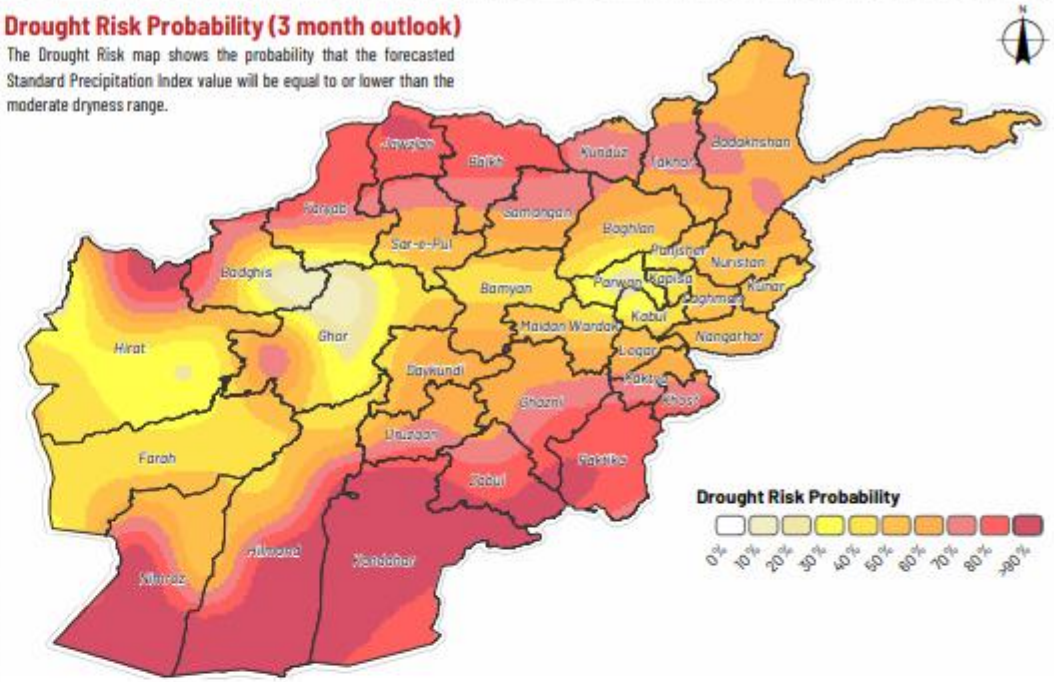
Drought Severity (3 month outlook)

The Forecasted Drought Severity shows the Standard Precipitation Index drought forecast. It combines the prior 3 months of observed precipitation and forecasted upcoming 3 months of seasonal rainfall.



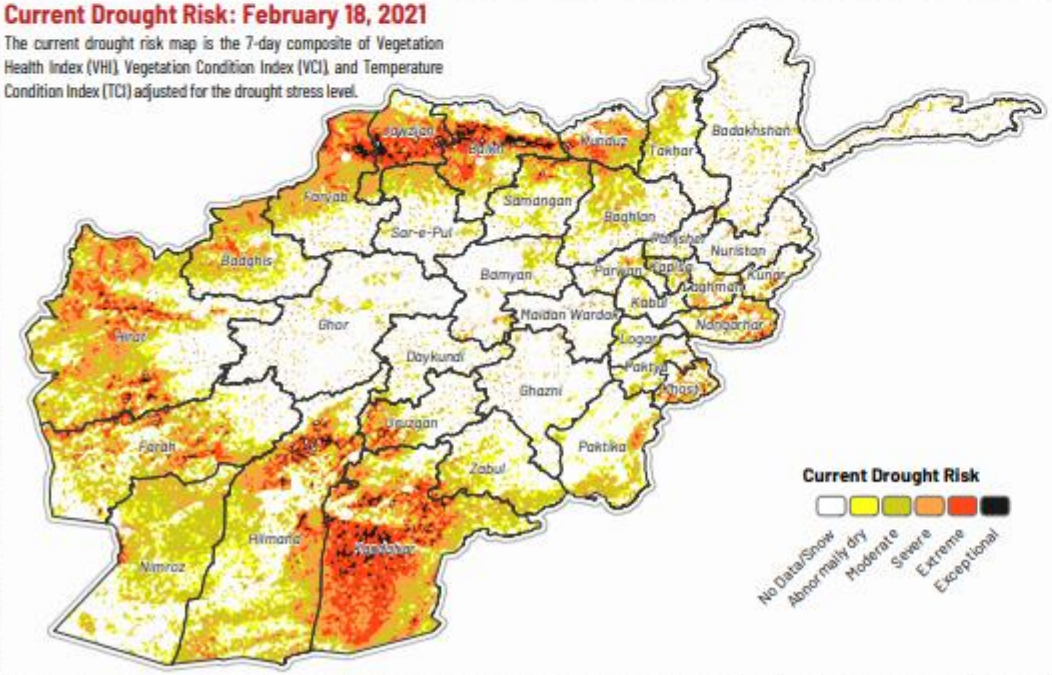
Drought Risk Probability (3 month outlook)

The Drought Risk map shows the probability that the forecasted Standard Precipitation Index value will be equal to or lower than the moderate dryness range.



Current Drought Risk: February 18, 2021

The current drought risk map is the 7-day composite of Vegetation Health Index (VHI), Vegetation Condition Index (VCI), and Temperature Condition Index (TCI) adjusted for the drought stress level.



Drought Severity and Drought Risk Probability

Maps of meteorological drought risk using the Standardized Precipitation Index (SPI). The timescale presented here is for the 6-month Standardized Precipitation Index (SPI6). Which combines the prior 3 months of observed precipitation and forecasted upcoming (outlook) 3 months of seasonal rainfall for March 2021 issued at the end of December 2020.

The severity map shows the predicted drought severity for Afghanistan at 30% likelihood. This implies that the highlighted regions will be as dry or drier than the value presented in the map with a likelihood of 30% (lower threshold calibrated with past Afghan droughts).

- Moderate Dryness: 1 in 11-year event. SPI > -1.0
- Intermediate Dryness: 1 in 23-year event. SPI >-1.5
- Severe Dryness: 1 in 43-year event. SPI > -2.0

The Drought Risk Probability map shows the probabilities that the forecast SPI value will be equal to or lower than the moderate dryness level. Probabilities are displayed on a scale between 0% and 100%. With values more than 50% indicating that it is likely to be drier than moderate dryness. These two versions of the information are complementary. In one case, the consideration is what is the drought severity indicated at a given level of confidence. In the other case, the consideration is what is the likelihood that drought will be at a given level of severity or worse.

Source: IRI/LDEO Climate Data Library, using the NMME Multi-Model Ensemble SPI Forecast and Global Forecast Drought Tool (World Bank).

Note: there are various scales to use SPI to define drought severity, we have chosen to use the Global Forecast Drought Tool.

Current Drought Risk

The current drought risk map is based on the Vegetation Health (VH) Index, provided by NOAA.

Drought risk assessment is based on VHI, VCI, and TCI if their values are below 40. Drought risk is 'Exceptional' if the indices are between 0 and 5; 'Extreme' if they are 6-15; 'Severe' 16-25; 'Moderate' 26-35; 'Abnormally dry condition' 35-40. The data and images have 4 km spatial and 7-day composite temporal resolution.

Source: NOAA STAR (Satellite Applications and Research) Global Vegetation Health Products/Kogan, F.N.

Datum/projection: WGS84/Geographic

Data Source: NOAA, IRI, AGCHO

Date Created: February 24, 2021

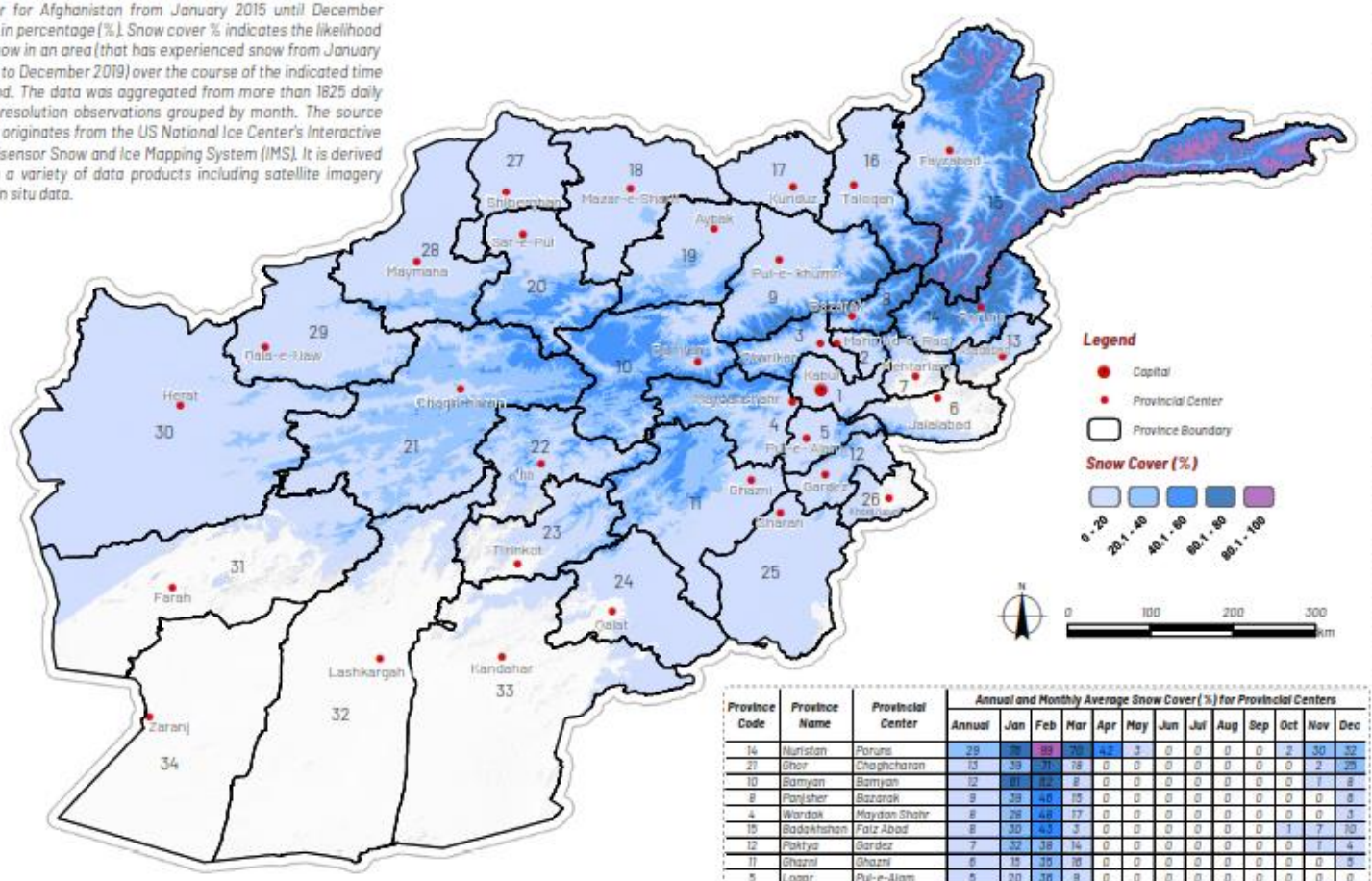
Disclaimer: This map highlights the various details on the current drought and drought outlook in Afghanistan. The resolution of the drought data and the overall accuracy of this data only work at a regional and global level. This information is thus only provided for informative purposes. This map has been produced and processed from sources believed to be reliable. iMMAP provides no guarantee, expressed or implied regarding accuracy, the source of the information is indicated beneath each map.

iMMAP Afghanistan is funded by the U.S. Agency for International Development (USAID). The boundaries, names, and designations used on this map do not imply official endorsement or acceptance by iMMAP or USAID. All information displayed is the best available at the time this map was produced.

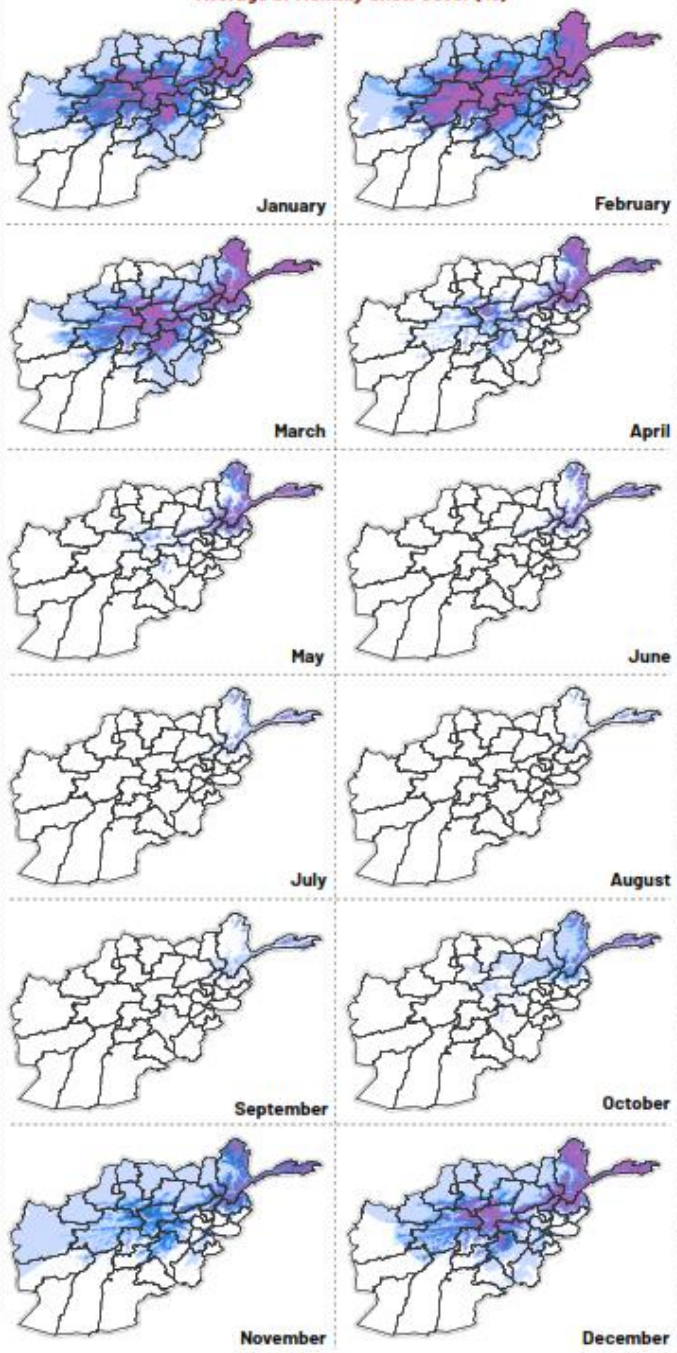
Feedback: afghanistan@immap.org

Annual and Monthly Average Snow Cover In Afghanistan

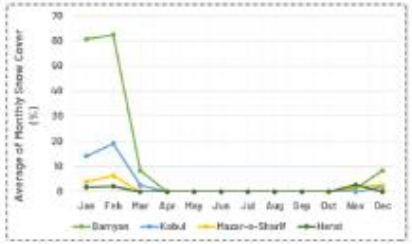
This map shows annual and monthly average snow and ice cover for Afghanistan from January 2015 until December 2019 in percentage (%). Snow cover % indicates the likelihood of snow in an area (that has experienced snow from January 2015 to December 2019) over the course of the indicated time period. The data was aggregated from more than 1825 daily 1km resolution observations grouped by month. The source data originates from the US National Ice Center's Interactive Multisensor Snow and Ice Mapping System (IMS). It is derived from a variety of data products including satellite imagery and in situ data.



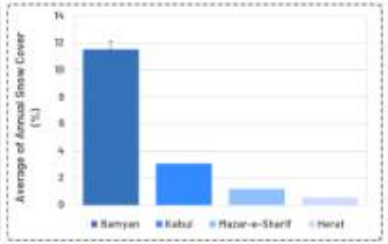
Average of Monthly Snow Cover (%)



Major Cities Monthly Average Snow Cover



Major Cities Annual Average Snow Cover

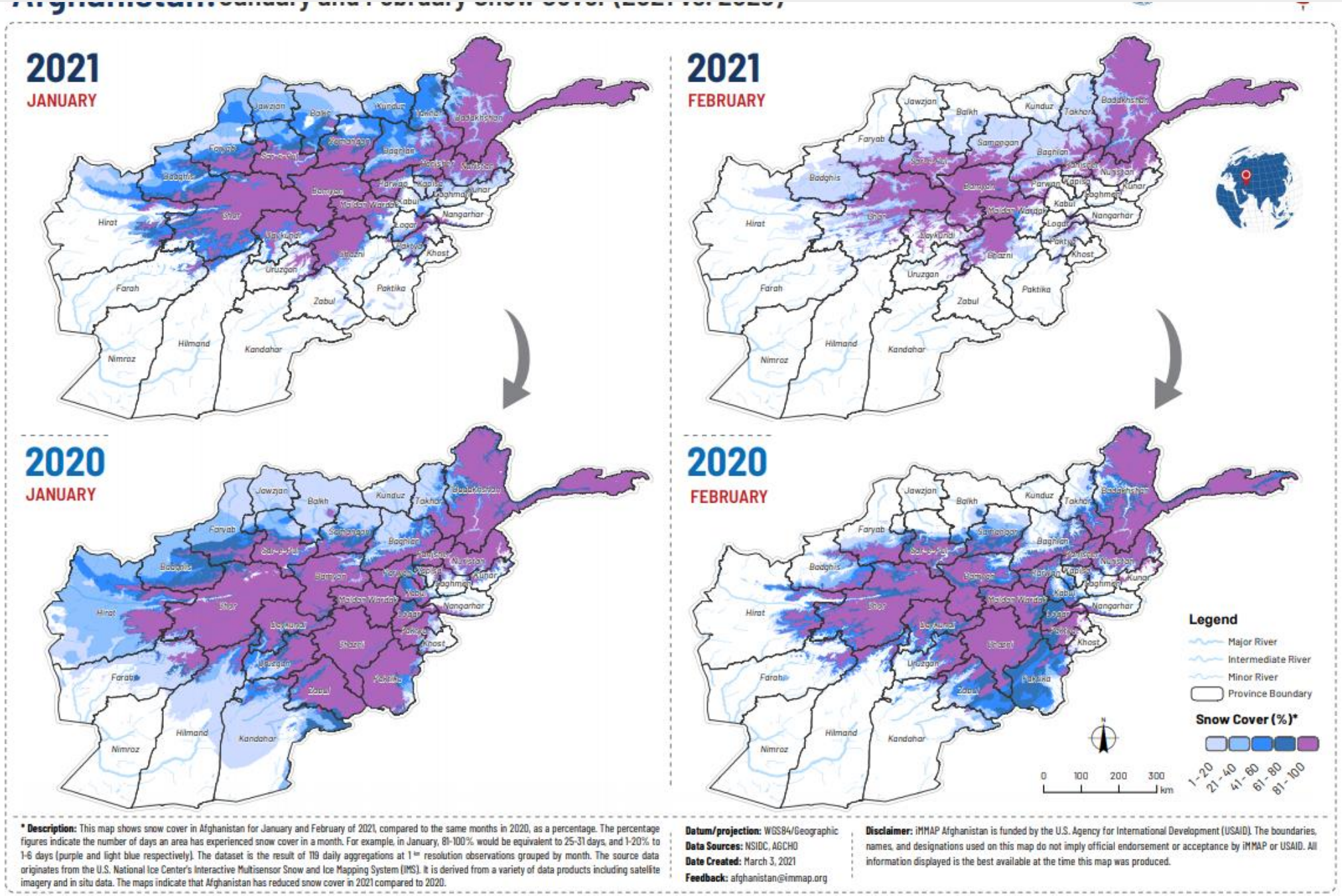


Province Code	Province Name	Provincial Center	Annual and Monthly Average Snow Cover (%) for Provincial Centers											
			Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
14	Nuristan	Parun	29	35	39	30	42	3	0	0	0	0	2	30	32
27	Ghor	Chaghcharan	13	39	31	16	0	0	0	0	0	0	2	25	
10	Bamyan	Bamyan	12	81	82	8	0	0	0	0	0	0	1	8	
8	Panjsher	Bazarak	9	39	46	15	0	0	0	0	0	0	0	6	
4	Wardak	Maydan Shahr	8	29	48	17	0	0	0	0	0	0	0	3	
15	Badakhshan	Faiz Abad	8	30	43	3	0	0	0	0	0	1	7	10	
12	Paktya	Gardez	7	32	38	14	0	0	0	0	0	0	1	4	
11	Ghazni	Ghazni	6	15	35	16	0	0	0	0	0	0	0	5	
5	Logar	Pul-e-Alam	5	20	36	9	0	0	0	0	0	0	0	0	
25	Paktika	Sharan	5	15	31	15	0	0	0	0	0	0	3	1	
19	Samangan	Aybak	5	13	26	4	0	0	0	0	0	1	7	14	
9	Baghlan	Pul-e-Khumri	5	8	25	7	0	0	0	0	0	1	6	8	
16	Takhar	Taloqan	4	8	26	1	0	0	0	0	0	1	7	3	
29	Badghis	Qala-e-naw	4	13	20	5	0	0	0	0	0	0	6	3	
28	Faryab	Maymana	4	8	20	2	0	0	0	0	0	0	9	5	
1	Kabul	Kabul	3	14	19	3	0	0	0	0	0	0	0	2	
20	Sar-e-Pul	Sar-e-pul	3	5	19	0	0	0	0	0	0	0	9	5	
3	Parwan	Charikar	3	10	13	12	0	0	0	0	0	0	0	2	
17	Kunduz	Kunduz	3	8	16	0	0	0	0	0	0	0	7	5	
2	Kapisa	Mahmud-e-Raqi	3	11	13	6	0	0	0	0	0	0	0	0	
22	Daykundi	Nili	2	10	11	3	0	0	0	0	0	0	0	0	
27	Jawzjan	Shibirghan	1.3	5	7	0	0	0	0	0	0	0	1	3	
18	Balkh	Mazar-e-sharif	1.2	4	6	0	0	0	0	0	0	0	2	3	
30	Hirat	Herat	0.5	2	2	0	0	0	0	0	0	0	3	0	
13	Kunar	Asad Abad	0.3	2	1	0	0	0	0	0	0	0	0	0	
34	Nimroz	Zaranj	0	0	0	0	0	0	0	0	0	0	0	0	
33	Kandahar	Kandahar	0	0	0	0	0	0	0	0	0	0	0	0	
32	Hilmand	Lashkar Gah	0	0	0	0	0	0	0	0	0	0	0	0	
31	Farah	Farah	0	0	0	0	0	0	0	0	0	0	0	0	
26	Khost	Khost (Matun)	0	0	0	0	0	0	0	0	0	0	0	0	
24	Zabul	Qalat	0	0	0	0	0	0	0	0	0	0	0	0	
23	Uruzgan	Tirin Kot	0	0	0	0	0	0	0	0	0	0	0	0	
7	Laghman	Mehtarlam	0	0	0	0	0	0	0	0	0	0	0	0	
6	Nangarhar	Jalalabad	0	0	0	0	0	0	0	0	0	0	0	0	

Datum/projection: WGS84/Geographic
Data Sources: NSIDC, AGCHO
Date Created: July 9, 2020

Feedback: afghanistan@immap.org

Annual and Monthly Average Snow Cover In Afghanistan

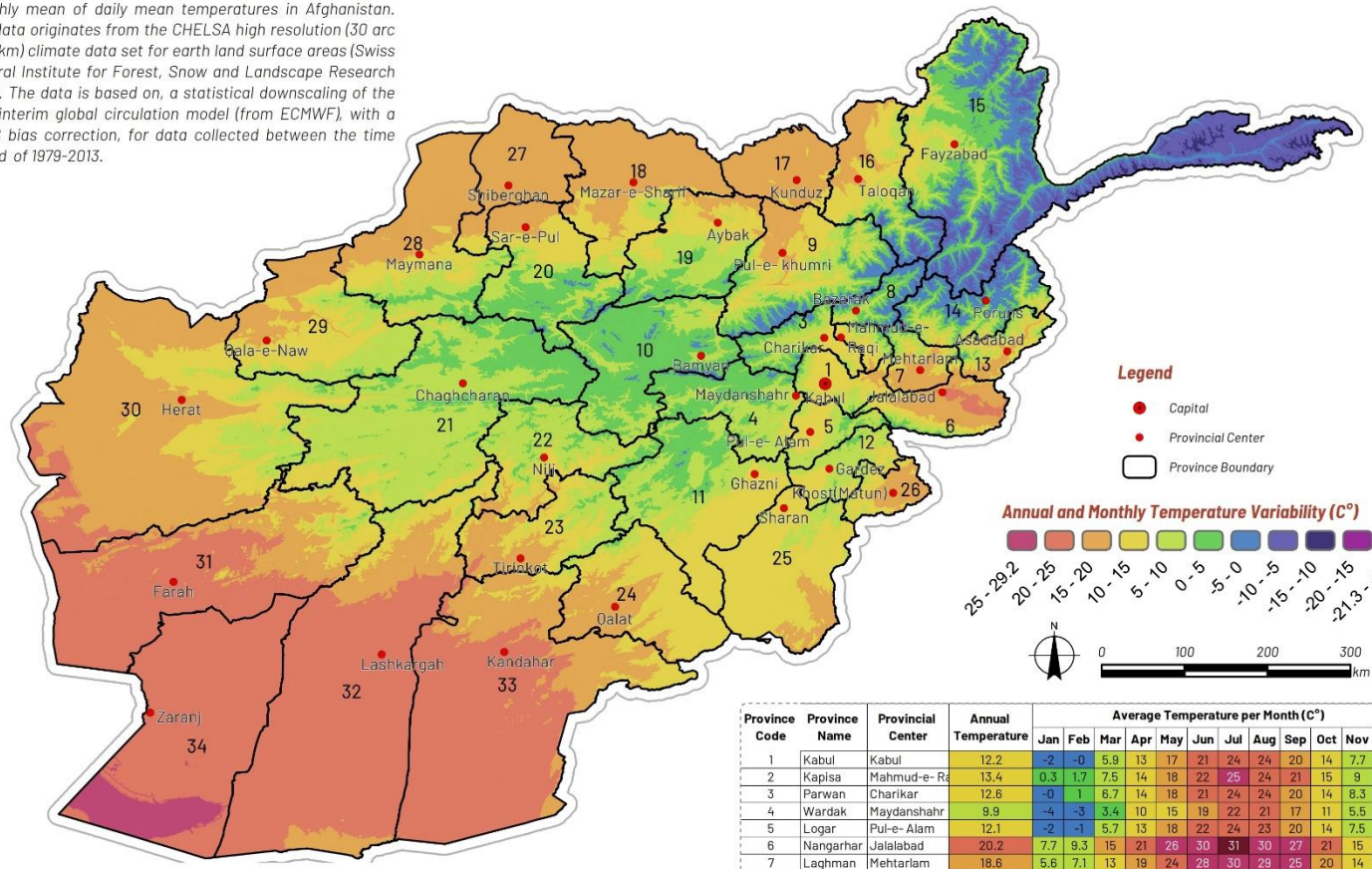


*** Description:** This map shows snow cover in Afghanistan for January and February of 2021, compared to the same months in 2020, as a percentage. The percentage figures indicate the number of days an area has experienced snow cover in a month. For example, in January, 81-100% would be equivalent to 25-31 days, and 1-20% to 1-6 days (purple and light blue respectively). The dataset is the result of 119 daily aggregations at 1 km resolution observations grouped by month. The source data originates from the U.S. National Ice Center's Interactive Multisensor Snow and Ice Mapping System (IMS). It is derived from a variety of data products including satellite imagery and in situ data. The maps indicate that Afghanistan has reduced snow cover in 2021 compared to 2020.

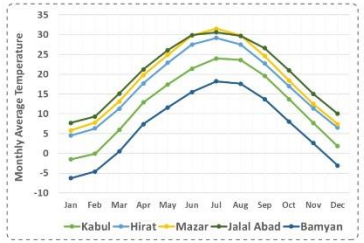
Datum/projection: WGS84/Geographic
Data Sources: NSIDC, AGCHO
Date Created: March 3, 2021
Feedback: afghanistan@immap.org

Annual and Monthly Mean Temperatures in Afghanistan

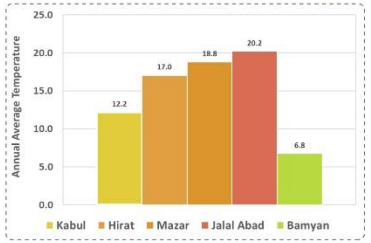
This map shows the annual mean temperatures and the monthly mean of daily mean temperatures in Afghanistan. The data originates from the CHELSA high resolution (30 arc sec/1km) climate data set for earth land surface areas (Swiss Federal Institute for Forest, Snow and Landscape Research WSL). The data is based on, a statistical downscaling of the ERA interim global circulation model (from ECMWF), with a GPCC bias correction, for data collected between the time period of 1979-2013.



Major Cities Monthly Average Temperature

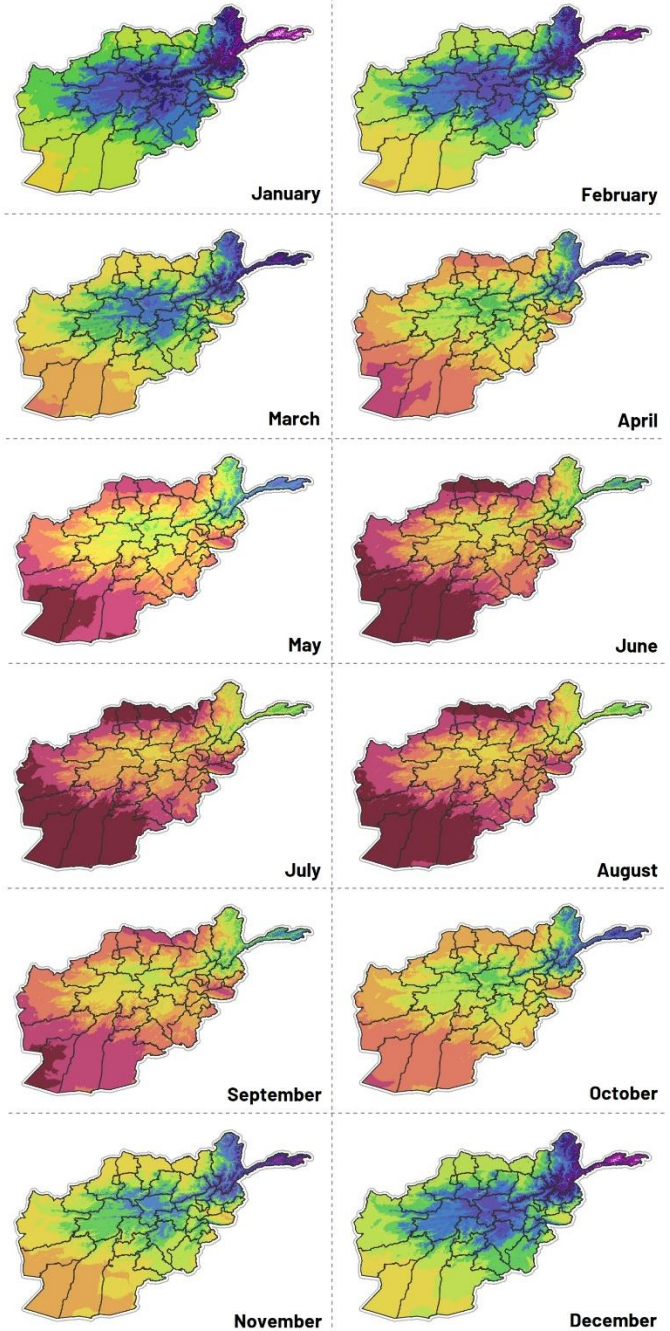


Major Cities Annual Average Temperature



Province Code	Province Name	Provincial Center	Annual Temperature	Average Temperature per Month (C°)											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	Kabul	Kabul	12.2	-2	-0	5.9	13	17	21	24	24	20	14	7.7	1.8
2	Kapisa	Mahmud-e- Ra	13.4	0.3	1.7	7.5	14	18	22	25	24	21	15	9	3.3
3	Parwan	Charikar	12.6	-0	1	6.7	14	18	21	24	24	20	14	8.3	2.7
4	Wardak	Maydanshahr	9.9	-4	-3	3.4	10	15	19	22	21	17	11	5.5	-1
5	Logar	Pul-e- Alam	12.1	-2	-1	5.7	13	18	22	24	23	20	14	7.5	1.5
6	Nangarhar	Jalalabad	20.2	7.7	9.3	15	21	26	30	31	30	27	21	15	10
7	Laghman	Mehtarlam	18.6	5.6	7.1	13	19	24	28	30	29	25	20	14	8.2
8	Panjsher	Bazarak	9.9	-3	-1	4.2	11	15	18	21	21	17	11	5.4	0.2
9	Baghlan	Pul-e- khumri	16.7	4.7	6.1	12	18	22	25	28	27	23	17	12	7
10	Bamyan	Bamyan	6.8	-6	-5	0.5	7.4	12	16	18	18	14	8	2.6	-3
11	Ghazni	Ghazni	11.0	-3	-2	4.3	11	17	21	23	23	19	13	6.2	0.3
12	Paktya	Gardez	10.4	-3	-2	4.4	11	16	20	22	21	17	12	5.5	0.1
13	Kunar	Asadabad	17.8	6.3	8.1	13	19	23	27	28	27	24	18	13	8.2
14	Nuristan	Porun	5.4	-6	-5	0	5.2	9.6	14	17	16	12	5.6	0.1	-4
15	Badakhsha	Fayzabad	11.6	-1	1.2	5.9	12	16	21	23	23	19	12	6.3	0.9
16	Takhar	Taloqan	15.7	3.2	4.7	10	17	21	25	27	27	22	16	10	5.1
17	Kunduz	Kunduz	18.5	5.6	7.3	13	19	24	29	31	30	25	19	13	7.5
18	Balkh	Mazar-e-Shari	18.8	5.8	7.8	13	20	25	30	32	30	25	18	13	7.4
19	Samangan	Aybak	14.9	2.8	4.3	9.5	16	20	24	27	26	21	15	9.4	4.6
20	Sar-e-Pul	Sar-e-Pul	16.5	4.6	6.4	11	18	22	26	28	26	22	16	11	6.3
21	Ghor	Chaghcharan	7.9	-4	-3	2.4	8.3	12	17	19	18	14	8.9	3.8	-1
22	Daykundi	Nili	11.4	-3	-1	4.8	12	16	21	24	23	19	13	6.6	0.8
23	Uruzgan	Tirinkot	18.4	4	6.2	12	19	25	29	32	31	26	19	13	6.8
24	Zabul	Qalat	17.3	3.1	5.2	11	18	24	28	31	29	25	18	12	5.9
25	Paktika	Sharan	11.9	-2	-0	5.7	12	18	22	24	23	19	13	7	1.4
26	Khost	Khost(Matun)	17.3	4.8	6.7	13	19	24	27	27	26	23	18	12	7.2
27	Jawzjan	Shiberghan	18.4	5.5	7.5	13	20	25	30	31	29	24	18	12	7
28	Faryab	Maymana	15.0	3.3	5	9.8	16	20	25	26	25	20	15	9.7	5.1
29	Badghis	Qala-e-Naw	15.7	3.9	5.6	10	16	21	26	27	26	21	16	11	5.9
30	Hirat	Herat	17.0	4.5	6.3	11	18	23	28	29	28	23	17	11	6.5
31	Farah	Farah	22.7	8.4	11	17	24	30	34	36	34	29	23	16	10
32	Hilmand	Lashkargah	22.9	8.5	11	17	24	30	35	36	34	29	23	16	11
33	Kandahar	Kandahar	21.5	7.4	9.8	15	22	29	33	35	33	28	22	15	9.6
34	Nimroz	Zaranj	24.6	11	14	20	27	32	36	37	36	30	24	18	12

Temperature Average per Month (C°)



Datum/projection: WGS84/Geographic
Data Sources: CHELSA, AGCHO
Date Created: July 9, 2020

Feedback: afghanistan@immap.org

World of Thanks

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