AGROCLIMATIC ATLAS OF NEPAL

Department of Hydrology and Meteorology
Ministry of Science, Technology and Environment (MoSTE)
Government of Nepal (GoN)

Climate Change Agriculture and Food Security
CGIAR-CCAFS Regional(IGP) Program Unit

Final Report

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Department of Hydrology and Meteorology, Ministry of Science, Technology and Environment (MoSTE), Government of Nepal (GoN)
CGIAR-CCAFS Regional(IGP) Program unit, International water management Institute, New Delhi

December 2013

Agro-climatic Atlas of Nepal

A Project carried out by Department of Hydrology and Meteorology under CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS)

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Foreword

Climate change is the most burning issue for the global as a whole. Its impacts have been observed on environment as well as on socio-economic sectors. Nepal is one of the climatologically most vulnerable Himalayan countries in the world. Agricultural development and increase in crop production is the prerequisite for sustained economic growth of a country. It is an accepted fact that food production is very intimately linked with the influence of weather. Weather is one of the most important factors to have an attentive impact on food availability and socio-economic condition of the people and farming community in particular. Weather and Climate play an important role in determining the amount of physical productivity of agricultural crops and the risk of failure of productivity. Fluctuation in weather and climate affects all economic sectors to some extent. Recurrence of adverse weather phenomena such as floods, droughts, hailstorms, strong winds etc. is an accepted fact. Weather/climate information if properly applied can help to increase agricultural production, reduce loss and damage, and improve planning and decision making.

Many countries of the world have observed increasing trend of extreme weather events, variability in precipitation pattern particularly at higher elevations in recent years. Rapidly retreating glaciers, upward movement of snow lines, decrease in snow cover and increase in the number of glacial lakes and their rapid growth have led to increased events of disastrous floods; including Glacial Lake Outburst Floods (GLOF) in the Himalayan countries. According to the IPCC's fourth Assessment Report, Climate change is already taking place. Consistent with the report, the impacts of climate change and their associated costs will fall inexplicably on developing countries threatening to undermine achievement of the Millennium Development Goals, reduce poverty, and safeguard food security. Apart from its influence on agricultural and socioeconomic practices, it also acts as a cylindrical triggering factor for various natural disasters in the mountainous countries like Nepal.

Drought is one of the most damaging of all natural hazards. Recurrent severe droughts in parts of the country have significantly impacted agricultural production and chain of trade of agro-products. The severity and extent of drought not only depends on low rainfall but also on other hydro-meteorological factors like soil moisture, infiltration and moisture-retention capacity of the soil. Aridity of an area depends on rainfall in relation to potential or actual evapo-transpiration and the moisture holding capacity of the soil. Potential evaporation is a measure of the maximum possible evaporation from the soil and the transpiration from vegetation.

Increased intensity and frequency of storms, droughts and flooding, altered hydrological cycles and precipitation variance have implications for future food availability. Climate change is the most serious long-term challenge facing the world today, and the farmers as well as other land managers will be one of the first sectors to feel the effects of changing climate.

This Agro-climatic Atlas is one of the products under the project "**Innovative community-based agricultural development initiatives for increasing climatic resilience of rural poor, *CGIAR***

Research Program on Climate Change, Agriculture and Food Security (CCAFS)"sharing thematic climatic information specially on agricultural sectors which might be helpful to agricultural commodity, practitioners, researchers and decision as well as policy makers. The atlas is also valuable for other users/stakeholders; those directly or indirectly use the climatic information in course of their respective business (construction, tourism, landslide hazard activities and disaster risk reduction sectors etc.).

Considering the multifarious needs of climatic information for various sectors and development activities, it is hoped that this atlas will be a useful addition to the facts and knowhow on the climatic indices of Nepal. With anticipation, it will serve as a useful reference tools not only for the planners and technical experts but also for the readers interested in the climate of Nepal. It is anticipated that it may help to reduce the impact of extreme weather event on socioeconomic sectors such as loss of life and properties damage.

Finally, thanks go to all those who worked in various capacities to complete this Atlas. Any comments and suggestions to improve this Atlas will be highly appreciated.

Dr. Rishi Ram Sharma
Director General

Preface

Climate change across the globe is real. The causes have now been documented and each day, the bulk of knowledge on the causes and consequences of climate change is being expanded. These changes are likely going to negatively impact on food production, health and the environment around the world. In agriculture, the knowledge of weather and climate is used to produce foods to meet the requirements of the people. It will be more informative to the concerned Ministries such as Agriculture Development, Natural Resources, Irrigation, Science, Technology and Environment etc. as a basic tool to develop future projects within the context of regional climate Change adaptation.

Nepal is a landlocked south Asian country lies between China to the north and India to the east, west and south. It is extended from 80^o 4' to 88^o 12' E and 26^o 22'to 30^o 27' N. It has the area of 147,181 sq km. Although, Nepal lies near the northern limit of the tropics, wide range of climate, from subtropical in the Terai in the south to arctic in the high Himalayas in the north. The remarkable differences in climatic conditions are primarily related to the enormous range of altitudinal variation within a short north-south distance. The presence of the east-west-extending Himalayan massifs to the north and the monsoonal alteration of wet and dry seasons also greatly contribute to local variations in climate.

The summer monsoon (rainy season) starts generally, from June 10 and ends in September 23. Monsoon enters from south-eastern parts and advances to western parts, and covers the whole Nepal generally within a week. The country receives about 80% of annual rainfall in the monsoon season. In winter, the country experiences some spells of rain and snow in high mountains caused by westerly disturbances also known as winter monsoon. In post monsoon and pre monsoon the country experiences occasionally thunder shower associated with hails and rain. So, winter is the driest season compared to the other seasons, amounting about 3-5% of total annual rainfall.

Temperature is lowest in winter and increases gradually as spring advances in the country. The maximum temperature of the year occurs generally in May/June. Temperature starts decreasing from October and reaches the minimum either in December or January. The temperature decreases from south to north due to altitudinal variation within a short distance. The hottest part of the country is the Tarai belt where extreme maximum temperature reaches more than 40°C. The coldest part of the country is high Himalayas in the north where snow perseveres all year round.

The climate concerns can span a variety of time scales, ranging from seasonal to inter-annual to inter decadal variability. Warming is evident in all seasons and is higher in winter season than other in seasons. Similarly, both the days and nights are becoming warmer with less cool days and nights. The trend of monsoon rainfall is not clear. Heavy rainfall events are increasing indicating increasing trends of floods and landslides. Similarly, increasing trend of temperature

in higher region is more pronounced than the lower region. Drought is one of the most damaging of all the natural hazards. Most parts of the country in this region are characterized by poor infrastructure and low resilience to impacts of natural disasters, yet they are heavily dependent on agricultural production, which is strongly influenced by the prevailing weather.

Standard data set of 30 years from 1981 to 2010 was used to prepare the Atlas. In this Atlas, the meteorological parameters, such as precipitation, temperature, relative humidity and numbers of rainy days have been used to prepare the climatic maps in the first section. The second section of the Atlas incorporated Agro-climatic zoning especially for the four crops (Rice, Wheat, Maize and Potato), drought index and soil moisture index (percentage saturation).The purpose of this Agro-climatic Atlas is to present climate information that is relevant to agriculture to various stakeholders like researchers, planners, policy makers and finally to farming community. This atlas tries to reflect better visual information on climatic variables in the form of maps that are important in food production system, particularly in the regions that are vulnerable to climate variability such as agricultural zones in sub-tropics and tropics. Recurrent severe droughts in parts of the country have significantly impacted agricultural production and chain of trade of agro-products. Persistent drought, incessant rain, flash flood, forest fire the manifestations of climate change poses countless challenges for farmers and other who depend on natural resources for their living. Mostly Rural poor communities bear the brunt of the climate-related disasters.

This type of work is the first kind in nature in Nepal. Most of the project members were in learning process and worked together to make the Atlas meaningful. All the members have contributed their best to complete the work. It is hoped that this Atlas will be of more use not only to planners and decision makers but also to researchers, students and farming community in reality. The valuable comments and suggestions are expected from the readers that will help to improve the Atlas in next edition.

Saraju Kumar Baidya
Deputy Director General

Acknowledgements

This project was funded by CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). The excellent support and cooperation from CCAFS Regional (IGP) Program unit, International Water Management Institute, New Delhi, throughout the project period in providing the advice and services of experts were significant to the successful completion of the project. Thanks are due to those organizations for their supports directly/indirectly. Thanks also goes to Dr. Rishi Ram Sharma, Director General and other senior meteorologists who provided valuable input, guidance and support at all stages of the project; and Dr. Jaya K. Gurung, Executive Director, NDRI for facilitating to execute this Atlas preparation work. DHM likes to thanks to Mr. Ramesh Kumar Regmi, agroclimatological consultant of his valuable inputs and efforts to complete this Atlas. The project could not have been completed without the encouragement and valuable input and advice from Dr. P. K. Aggarwal, Dr. Gopal Datt Bhatta. Special thanks are due to Dr. Y.S. Ramakrishna, former Director of CRIDA for his valuable suggestions and guidance in the preparation of Atlas. Thanks are also due to the other staffs of the DHM who are involved directly or indirectly and provided valuable suggestions in the preparation of this praiseworthy Agro climatic Atlas. Finally, the Department of Hydrology and Meteorology avails the work done by the team, experts, consultant and the financial supporters for their valuable supports.

Contents

Acronyms

CCAFS	Climate Change, Agriculture and Food Security
CGIAR	Consultative Group on International Agricultural Research
DHM	Department of Hydrology and Meteorology
GDD	Growing Degree Days
GLOF	Glacier Lake Outburst flood
GoN	Government of Nepal
IGP	Indo-Gangetic Plains
IWMI	International Water Management Institute
NST	Nepal Standard Time
NDRI	Nepal Development Research Institute
MoSTE	Ministry of Science, Technology and Environment
PET	Potential Evapotranspiration
SMI	Soil Moisture Index
SPI	Standardized Precipitation Index

Methods for preparing an Agro-climatic Atlas

1.0 Introduction

Weather describes the condition of the atmosphere over a short period of time e.g. from day to day or week to week state of the atmosphere, consists of short-term variation of energy and mass exchanges within the atmosphere and between the earth and the atmosphere.

Climate of an area or country is known as the average weather over a long period of time. It refers to the characteristic condition of the atmosphere deduced from repeated observations over a long period. More than a statistical average, climate is an aggregate of environmental conditions involving heat, moisture and motion. Climate studies must consider extremes in addition to means, trends, fluctuation, probabilities and their variations in time and space. Full potential of climate in agricultural resource has not been used or very often realized. It is inevitable to make adjustment with the weather to extract the maximum benefit from this resource. In this context, knowledge on agro-climatology of a region is a valuable tool in crop planning and Management.

The **purpose** of Agro-climatic Atlas is to present climate information that is relevant to agriculture in a country to various stakeholders like researchers, planners, policy makers, managers, environmentalists and finally to farming community. Assessment and characterization of the climate resources help in identification of priority problems, development of specific management options and action plans and finally implementing them towards climate resilient agricultural production and better weather management.

Procedure follows Climate data collection, quality checking, climate database development, computation of agro-climatic indices. Surfer and GIS were used for spatial interpolation, analysis and map creation.

2.0 Data collection and database development

Climate data was collected from Department of Hydrology and Meteorology (DHM), Ministry of Science, Technology and Environment, Government of Nepal. As per the WMO Guidelines, climate data for 30 consecutive years were collected for all the available stations of Nepal. The period of meteorological parameters used in this Atlas were taken from the year 1981 to 2010. Though, monthly data were generally adequate for the purpose of climatic atlas, daily data on temperature and rainfall were also used for computing certain indices for preparing agro-climatic atlas. The data acquired from DHM were further scrutinized and only reliable data were used. RclimDex was used for homogeneity test. The data was prepared in user-friendly format which is compatible to different computer programs for climate analysis.

3.0 Computing agro-climatic variables and indices

Southwest monsoon is the major rainy season for country. The dates of monsoon onset and withdrawal vary both temporally and spatially which generally indicate the major crop-growing period at any location. Agriculture is mainly influenced by soil, water and climate. Climate variables that influence agriculture mostly are rainfall, temperature and solar radiation. Other elements like wind speed and direction, relative humidity and evaporation are also important. While preparing an agro-climatic atlas, basic variables along with information derived from the basic data were also used. Another important aspect is the selection of reference period for the agro-climatic variable to compute statistics. Length of reference period could be a month or a season or even a year. Daily data was used for computing days with rainfall above a certain threshold value, growing degree days, frost free days, etc. Further information on various Indices for an Agro-climatic Atlas of Nepal is included in Section III, explanatory notes.

I. Rainfall / Precipitation

The complex topography, lack of sufficient meteorological stations in high mountains and Himalayan region may not meet the required coverage and distribution of the stations in the country. However, the existing data can provide the necessary useful climate information of the country. Precipitation data available from 233 stations with altitude range up to 3650 m was used in preparing the maps related to precipitation indices. Precipitation measurement mainly includes rainfall and snow water equivalent measured from simple manual rain gauge.

Agricultural production in Nepal depends heavily on the timely onset of the monsoon and its spatial and temporal distribution. The year to year variation in the seasonal monsoon rainfall makes a year excess or deficit in rainfall. Hence monthly, seasonal and annual totals for each year were computed. The four seasons are as follows.

Winter Season	December to February
Pre-monsoon Season	March to May
Monsoon Season	June to September
Post-Monsoon Season	October to November

Thus, twelve monthly, four seasons and annual values for all the locations were available for mapping.

Seasonal precipitation, Daily and monthly extreme precipitation

The station wise daily extreme rainfall for each year is calculated only if the data is available for more than 350 days in a year. The further extreme calculation for the period was done for those stations where year wise extreme daily rainfall was available for more than 20 years in 1981-2010. Daily, monthly and seasonal (four seasons) precipitation extreme were computed and mapped. *The precipitation extremes shown increasing trend in total and heavy precipitation events at most of the areas.*

Annual number of days with rainfall > = 1.0 mm, 10 mm, 25 mm, 50 mm and 100 mm

Knowledge on the amount of rainfall and rainfall intensity helps in understanding the moisture status as well as water harvesting potential at a location. In general, a rainy day is defined as a day that receives at least 1.0 mm of rainfall in Nepal. Further, daily rainfall data were grouped into five categories receiving rainfall of more than or equal to 1, 10, 25, 50 and 100 mm per day. Classes with 10 and 25 mm indicate how far the crop water requirements are satisfied and soil moisture enhanced. Spatial variability of number of days with different rainfall amount on seasonal and annual basis are shown in maps.

Length of crop growing season (based on rainfall regime)

Based on simple thumb rules, beginning and end of rain fed crop-growing period were estimated based on average rainfall at each location and were spatially mapped.

II. Temperature

Temperature is other most important parameter for agriculture. There is no growth and development of vegetation without favourable temperature. No growth is possible in very low temperature and very high temperature which causes adverse effects to the plants. High yield is possible in optimum temperature. Temperature data from 71 stations up to 3420 m were used for the analysis. Emphasis on agricultural needs was given in preparing the temperature maps. Annual, monthly and seasonal (pre-monsoon, monsoon, post-monsoon and winter) maps of maximum and minimum temperatures were included in the Atlas. Hot and cold days as well as frost free and frost days are very important for plants. Frost damages vegetables. Therefore, maps of annual total number of days with temperature equal/greater than 30^0C and temperature equal/less than 5^0C as well as for frost free period, the total number of days with temperature greater than 0^0C; and number of days with temperature less or equal to 0^0C were also included in the Atlas. The highest temperature in the coldest months (December-February) and the lowest temperature in the hottest months (April-June) are also presented. For temperature, following additional maps were prepared.

Mean Monthly Maximum Temperature
Mean Annual Maximum Temperature
Mean Monthly Minimum Temperature
Mean Annual Minimum Temperature
Mean Monthly Temperature
Mean Annual Temperature
Extreme Monthly Maximum Temperature (April-July)
Extreme Monthly Maximum Temperature (December-February)
Extreme Monthly Minimum Temperature (April-June)
Extreme Monthly Minimum Temperature (Jan-Feb)

Mean Maximum Temperature for 4 seasons
Mean Minimum Temperature for 4 seasons
Mean Temperature for 4 seasons
Average Annual Temperature

III. Growing Degree Days (GDD)

The concept of GDD assumes that there is a direct and linear relationship between plant growth and temperature. A degree-day or a heat unit is the departure from the mean daily temperature above the minimum threshold temperature. This minimum threshold is the temperature below which no growth takes place. The threshold temperature varies with different plants and for the majority ranges from 4.5°C to 12.5°C; there being higher values for tropical plants and lower values for temperate plants (Mavi 1986). The growing degree-days were used to estimate the growth and development of plants and insects during the growing season. In the calculation, the base temperatures (minimum threshold) of 5^oC and 10^oC (for different crops) have been used. (Further information: refer Section III)

Seasonal and Annual 'Total Growing Degree days' above 5^0C, 10^0C (base temperature for different crops: refer Section III**)**

Total Growing Degree Days (Tbase 5^0C) for 4 Seasons
Total Growing Degree Days (Tbase 5^0C): Annual
Total Growing Degree Days (Tbase 10^0C) for 4 Seasons
Total Growing Degree Days (Tbase 10^0C): Annual

Length of Growing Period above 5^0C, 10^0C (base temperature for different crops)

Lengths of growing period for monsoon, pre-monsoon and post-monsoon in all stations were the same at Tbase 5^0C and the lengths of growing period for monsoon is same all over the stations at Tbase 10^0C. So, there was not any worth of making maps of having same length of growing period in all stations at Tbase 5^0C (monsoon, pre-monsoon and post-monsoon) and at Tbase 10^0C (monsoon) . Thus, the following maps were prepared:

Length of Growing Period (Tbase 5^0C): Winter
Length of Growing Period (Tbase 5^0C): Annual
Length of Growing Period (Tbase 10^0C): Pre-Monsoon
Length of Growing Period (Tbase 10^0C): Post-Monsoon
Length of Growing Period (Tbase 10^0C): Winter
Length of Growing Period (Tbase 10^0C): Annual

IV. Relative humidity

Some crops need high humidity at different development phase from growing to maturity and harvesting period. However, very high humidity is harmful to some vegetables. Relative humidity recorded at 0845 NST and 1745 NST from dry-bulb and wet-bulb thermometers and number of days, the relative humidity equal/greater than 80% and equal/greater than 50% in the morning at 0845 NST are presented in the Atlas. Number of days with mean Relative Humidity <= 20% were not observed in the country.

V. **Drought Index:** Standardized Precipitation Index (**SPI)**

Standardized Precipitation Index (**SPI)** is simply calculated by taking the difference of the precipitation from the mean for a particular time step, and then dividing it by the standard deviation. McKee et al. (1993) used the classification system shown in the SPI Values table to define drought intensities resulting from the SPI (Further information: refer Section III). They also defined the criteria for a "drought event" for any of the time scales. A drought event occurs at any time when the SPI is less than or equal to -1.

Here, three categories of drought based on McKee *etal*., 1993, 1995 in four seasons were considered in the Atlas for computation of the indices which can be used for analysis of drought hazard in Nepal. SPI value from -0.99 to 0.99 is considered as normal.

Standardized precipitation index categories

SPI Values	Category	Abbreviation
–1.00 to –1.49	Moderate drought (**threshold**)	MOD
-1.50 to –1.99	Severe drought	SED
< –2.00	Extreme drought	EXD

The selected category of drought is abbreviated as moderate (MOD), severe (SED) and extreme (EXD) drought (Further information: refer Section III).

VI. Soil Moisture Index: Thornthwaite Method

Thornthwaite (1948) derived an empirical relationship between PET and mean air temperature. PET is expressed as an exponential function of mean monthly air temperature (Further information: refer Section III).

Moisture index is referred as Soil Moisture Index (SMI) mentioned in a website of encyclopaedia (http://www.encyclopedia.com/doc/1O13-soilmoistureindex.html). Thus,

$$SMI\ (I_m) = 100(P - PET)/PET$$

Where *SMI* is the Soil Moisture Index and can be expressed in integer or percentage.

4.0 Agro-Climatic zoning (Rice, Maize, Wheat and Potato)

The climatic variables used in the zoning are as follows:

1. Precipitation
2. Temperature (Maximum, Minimum & Mean)

The optimum range of air temperature was used for agro-climatic zoning of main crops.

Crops	Maximum air temp. (^{0}C)	Minimum air temp. (^{0}C)	Average air temp (^{0}C)	Effect of humidity
Rice	48	12	22-30	High
Maize	45	10	25	Very high
Wheat	35	5.8	15-20	Medium
Potato	35	7.0	12-20	Medium

Source: Hunsiqi and Krishna 1998; Balasubramaniyan and Palaniappan, 2001. Dr. S. K. Pandey, 2007 FAO 1980

Precipitation and temperature distribution map, and overlying of those two maps (layers) on conditional basis could produce a separate map of different crops (Further information: refer Section III).

5.0 GIS for Map preparation

Digitization of the Nepal map with zone and district boundaries were already available in the department. There are several interpolation techniques like spline, IDW, krigging etc. Surfer software was used to produce the gridded rainfall (10km*10km) for whole Nepal using Krigging with point linear interpolation technique. The gridded data output from surfer which (.grd ascii format) was directly supported in GIS. Only the area within Nepal boundary is extracted from the whole grid. Once interpolation was complete, pixels were classified for better understanding of the spatial variability, and proper colours are assigned to each class to produce the different climatic indices maps of Nepal. After the completion of the map layout with north arrow, legend etc., and the map was exported in to JPEG or TIFF format for presenting in the Atlas and printing.

Section I

CLIMATIC MAPS

Table 1: List of Meteorological Stations

S.N.	Station Name	Latitude deg (N)	Longitude deg (E)	Elevation m	Index No.	Type of station	District
1	Kakerpakha	29.65	80.50	842	0101	PRECIPITATION	Baitadi
2	Baitadi	29.55	80.42	1635	0102	PRECIPITATION	Baltadi
3	Patan (West)	29.47	80.53	1266	0103	CLIMATOLOGY	Baitadi
4	Dadeldhura	29.30	80.58	1848	0104	SYNOPTIC	Dadeldhura
5	Mahendra Nagar	29.03	80.22	176	0105	AGROMETEOROLOGY	Kanchanpur
6	BelauriSantipur	28.68	80.35	159	0106	PRECIPITATION	Kanchanpur
7	Darchula	29.85	80.57	1097	0107	CLIMATOLOGY	Darchula
8	Satbanjh	29.53	80.47	2370	0108	PRECIPITATION	Baitadi
9	Pipalkot	29.62	80.87	1456	0201	PRECIPITATION	Bajhang
10	Chainpur(West)	29.55	81.22	1304	0202	CLIMATOLOGY	Bajhang
11	SilgadhiDoti	29.27	80.98	1360	0203	CLIMATOLOGY	Doti
12	Bajura	29.38	81.32	1400	0204	PRECIPITATION	Bajura
13	Katai	29.00	81.13	1388	0205	PRECIPITATION	Doti
14	Tikapur	28.53	81.12	140	0207	CLIMATOLOGY	Kailali
15	Sandepani	28.75	80.92	195	0208	PRECIPITATION	Kailali
16	Dhangadhi(Atariya)	28.80	80.55	187	0209	SYNOPTIC	Kaliali
17	Bangga Camp	28.97	81.12	340	0210	PRECIPITATION	Achham
18	Sitapur	28.57	80.82	152	0212	PRECIPITATION	Kailali
19	Kola Gaun	29.12	80.68	1304	0214	PRECIPITATION	Doti
20	Godavari(West)	28.87	80.63	288	0215	CLIMATOLOGY	Kailali
21	Mangalsen	29.15	81.28	1345	0217	PRECIPITATION	Achham
22	Dipayal (Doti)	29.10	80.77	652	0218	SYNOPTIC	Doti
23	Thirpu	29.32	81.77	1006	0302	PRECIPITATION	Kalikot
24	Jumla	29.28	82.17	2300	0303	SYNOPTIC	jumla
25	GuthiChaur	29.28	82.32	3080	0304	PRECIPITATION	Jumla
26	Sheri Ghat	29.13	81.60	1210	0305	PRECIPITATION	Kalikot
27	Gam Shree Nagar	29.55	82.15	2133	0306	PRECIPITATION	Mugu
28	Nagma	29.20	81.90	1905	0308	PRECIPITATION	Kalikot
29	Bijayapur (Raskot)	29.23	81.63	1814	0309	PRECIPITATION	Kalikot
30	DipalGaun	29.27	82.22	2310	0310	CLIMATOLOGY	Jumla
31	Simikot	29.97	81.83	2800	0311	CLIMATOLOGY	Humla
32	Dunai	28.93	82.92	2058	0312	CLIMATOLOGY	Dolpa
33	Darma	29.73	82.10	1950	0313	PRECIPITATION	Humla
34	Pusma Camp	28.88	81.25	950	0401	CLIMATOLOGY	Surkhet
35	Dailekh	28.85	81.72	1402	0402	CLIMATOLOGY	Dailekh
36	Jamu (Tikuwa Kuna)	28.78	81.33	260	0403	PRECIPITATION	Surkhet
37	Jajarkot	28.70	82.20	1231	0404	PRECIPITATION	Jajarkot

S.N.	Station Name	Latitude deg (N)	Longitude deg (E)	Elevation m	Index No.	Type of station	District
38	Chisapani(Karnali)	28.65	81.27	225	0405	CLIMATOLOGY	Bardiya
39	Surkhet(Birendra Nagar)	28.60	81.62	720	0406	SYNOPTIC	Surkhet
40	Kusum	28.02	82.12	235	0407	PRECIPITATION	Banke
41	Gulariya	28.17	81.35	215	0408	PRECIPITATION	Bardiya
42	Khajura (Nepalganj)	28.10	81.57	190	0409	AGROMETEOROLOGY	Banke
43	Bale Budha	28.78	81.58	610	0410	PRECIPITATION	Dailekh
44	Rajapur	28.43	81.10	129	0411	PRECIPITATION	Bardiya
45	Naubasta	28.27	81.72	135	0412	PRECIPITATION	Banke
46	Baijapur	28.05	81.90	226	0414	PRECIPITATION	Banke
47	Bargadaha	28.43	81.35	200	0415	PRECIPITATION	Bardiya
48	Nepalgunj(Reg.Off.)	28.07	81.62	144	0416	CLIMATOLOGY	Banke
49	Rani Jaruwa Nursery	28.38	81.35	200	0417	CLIMATOLOGY	Bardiya
50	MainaGaun (D.Bas)	28.98	82.28	2000	0418	PRECIPITATION	Jajarkot
51	Sikta	28.03	81.78	195	0419	AGROMETEOROLOGY	Banke
52	Rukumkot	28.60	82.63	1560	0501	PRECIPITATION	Rukum
53	LibangGaun	28.30	82.63	1270	0504	PRECIPITATION	Rolpa
54	Bijuwar Tar	28.10	82.87	823	0505	PRECIPITATION	Pyuthan
55	Nayabasti (Dang)	28.22	82.12	698	0507	PRECIPITATION	Dang
56	Tulsipur	28.13	82.30	725	0508	CLIMATOLOGY	Dang
57	Ghorahi (Masina)	28.05	82.50	725	0509	PRECIPITATION	Dang
58	Koilabas	27.70	82.53	320	0510	PRECIPITATION	Dang
59	Salyan Bazar	28.38	82.17	1457	0511	CLIMATOLOGY	Salyan
60	Luwamjula Bazar	28.30	82.28	885	0512	PRECIPITATION	Salyan
61	ChaurJhari Tar	28.63	82.20	910	0513	CLIMATOLOGY	Rukum
62	Musikot(Rukumkot)	28.63	82.48	2100	0514	CLIMATOLOGY	Rukum
63	Ghorai (Dang)	28.05	82.50	634	0515	SYNOPTIC	Dang
64	Jomsom	28.78	83.72	2744	0601	CLIMATOLOGY	Mustang
65	Thakmarpha	28.75	83.70	2566	0604	AGROMETEOROLOGY	Mustang
66	Baglung	28.27	83.60	984	0605	CLIMATOLOGY	Baglung
67	Tatopani	28.48	83.65	1243	0606	PRECIPITATION	Myagdi
68	Lete	28.63	83.60	2384	0607	CLIMATOLOGY	Mustang
69	Ranipauwa (M.Nath)	28.82	83.88	3609	0608	PRECIPITATION	Mustang
70	Beni Bazar	28.35	83.57	835	0609	CLIMATOLOGY	Myagdi
71	Ghami (Mustang)	29.05	83.88	3465	0610	PRECIPITATION	Mustang
72	KarkiNeta	28.18	83.75	1720	0613	PRECIPITATION	Parbat
73	Kushma	28.22	83.70	891	0614	CLIMATOLOGY	Parbat
74	Bobang	28.40	83.10	2273	0615	PRECIPITATION	Baglung

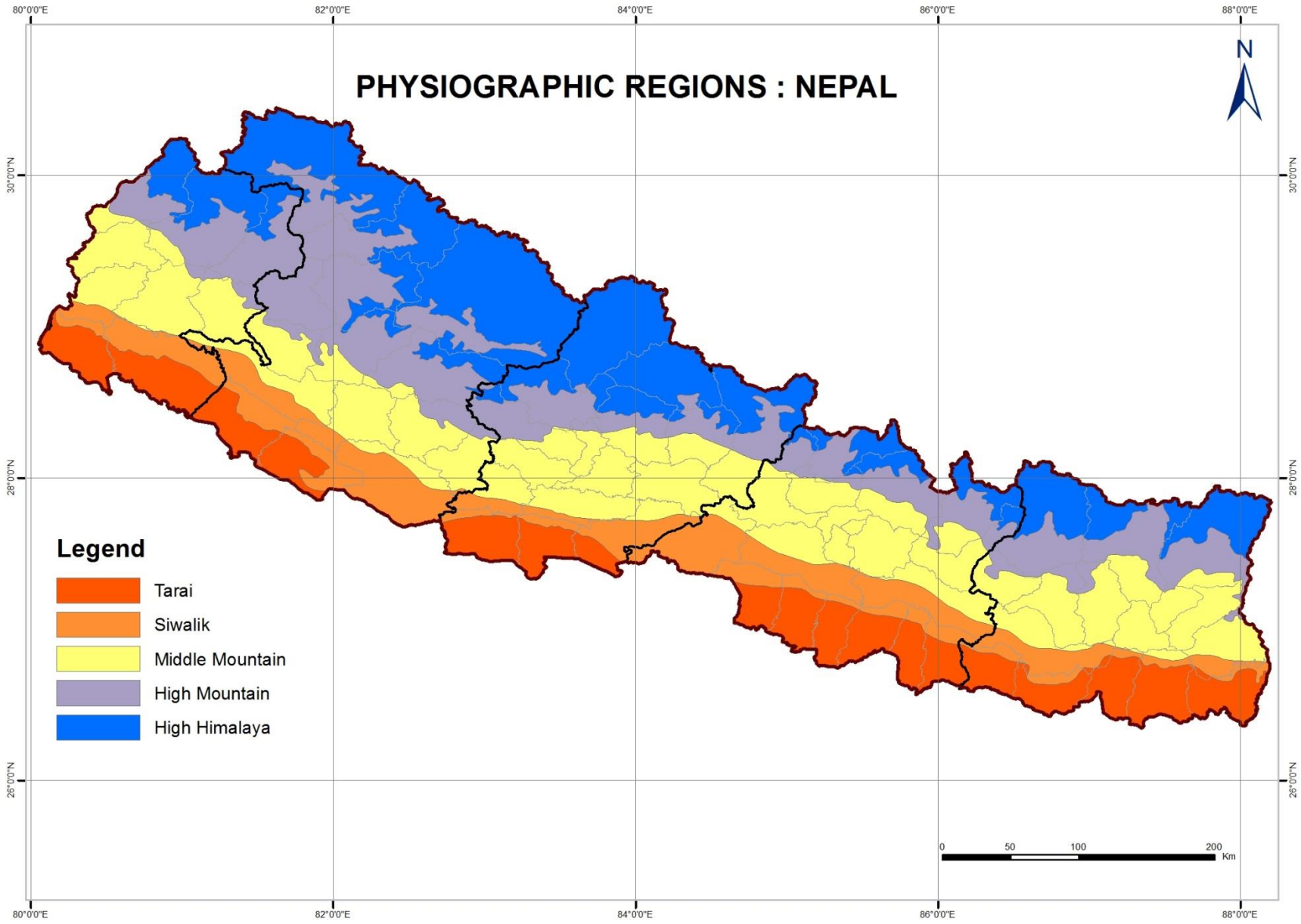
S.N.	Station Name	Latitude deg (N)	Longitude deg (E)	Elevation m	Index No.	Type of station	District
75	GurjaKhani	28.60	83.22	2530	0616	CLIMATOLOGY	Myagdi
76	Ghorapani	28.40	83.73	2742	0619	PRECIPITATION	Myagdi
77	Rangkhani	28.15	83.57	1740	0622	PRECIPITATION	Baglung
78	Ridi Bazar	27.95	83.43	442	0701	PRECIPITATION	Gulmi
79	Tansen	27.87	83.53	1067	0702	CLIMATOLOGY	Palpa
80	Butwal	27.70	83.47	205	0703	CLIMATOLOGY	Rupandehi
81	Beluwa (Girwari)	27.68	84.05	150	0704	PRECIPITATION	Nawalparasi
82	Bhairahawa Airport	27.52	83.43	109	0705	AERONATICAL	Rupandehi
83	Dumkauli	27.68	84.22	154	0706	AGROMETEOROLOGY	Nawalparasi
84	Parasi	27.53	83.67	125	0708	PRECIPITATION	Nawalparasi
85	Dumkibas	27.58	83.87	164	0710	PRECIPITATION	Nawalparasi
86	Khanchikot	27.93	83.15	1760	0715	CLIMATOLOGY	Arghakhanchi
87	Taulihawa	27.55	83.07	94	0716	CLIMATOLOGY	Kapilbastu
88	Pattharkot (West)	27.77	83.05	200	0721	PRECIPITATION	Kapilbastu
89	Musikot	28.17	83.27	1280	0722	PRECIPITATION	Gulmi
90	Bhagwanpur	27.68	82.80	80	0723	PRECIPITATION	Kapilbastu
91	Tamghas	28.07	83.25	1530	0725	CLIMATOLOGY	Gulmi
92	Garakot	27.87	83.80	500	0726	PRECIPITATION	Palpa
93	LumbiniMandir	27.47	83.28	95	0727	CLIMATOLOGY	Rupandehi
94	Simari	27.53	83.75	154	0728	CLIMATOLOGY	Nawalparasi
95	Jagat (Setibas)	28.37	84.90	1334	0801	PRECIPITATION	Gorkha
96	Khudi Bazar	28.28	84.37	823	0802	CLIMATOLOGY	Lamjung
97	Pokhara Airport	28.22	84.00	827	0804	AERONATICAL	Kaski
98	Syangja	28.10	83.88	868	0805	CLIMATOLOGY	Syangia
99	LarkeSamdo	28.67	84.62	3650	0806	PRECIPITATION	Gorkha
100	Kunchha	28.13	84.35	855	0807	PRECIPITATION	Lamiung
101	Bandipur	27.93	84.42	965	0808	CLIMATOLOGY	Tanahun
102	Gorkha	28.00	84.62	1097	0809	AGROMETEOROLOGY	Gorkha
103	Chapkot	27.88	83.82	460	0810	CLIMATOLOGY	Syangja
104	Malepatan (Pokhara)	28.12	84.12	856	0811	AGROMETEOROLOGY	Kaski
105	BhadaureDeurali	28.27	83.82	1600	0813	PRECIPITATION	Kaski
106	Lumle	28.30	83.80	1740	0814	AGROMETEOROLOGY	Kaski
107	Khairini Tar	28.03	84.10	500	0815	AGROMETEOROLOGY	Tanahun
108	Chame	28.55	84.23	2680	0816	CLIMATOLOGY	Manang
109	Damauli	27.97	84.28	358	0817	CLIMATOLOGY	Tanahun
110	Lamachaur	28.27	83.97	1070	0818	PRECIPITATION	Kaski
111	ManangBhot	28.67	84.02	3420	0820	CLIMATOLOGY	Manang

S.N.	Station Name	Latitude deg (N)	Longitude deg (E)	Elevation m	Index No.	Type of station	District
112	Ghandruk	28.38	83.80	1960	0821	PRECIPITATION	Kaski
113	Gharedhunga	28.20	84.62	1120	0823	PRECIPITATION	Lamjung
114	Siklesh	28.37	84.10	1820	0824	PRECIPITATION	Kaski
115	Walling	27.98	83.77	750	0826	PRECIPITATION	Syangja
116	Rumjakot	27.87	84.13	660	0827	PRECIPITATION	Tanahun
117	Rampur	27.62	84.42	256	0902	AGROMETEOROLOGY	Chitawan
118	Jhawani	27.58	84.53	270	0903	PRECIPITATION	Chitawan
119	ChisapaniGadhi	27.55	85.13	1706	0904	PRECIPITATION	Makwanpur
120	Daman	27.60	85.08	2314	0905	CLIMATOLOGY	Makwanpur
121	Hetaunda N.F.I.	27.42	85.05	474	0906	CLIMATOLOGY	Makwanpur
122	Amlekhganj	27.28	85.00	396	0907	PRECIPITATION	Bara
123	Simara Airport	27.17	84.98	130	0909	AERONATICAL	Bara
124	Nijgadh	27.18	85.17	244	0910	PRECIPITATION	Bara
125	Parwanipur	27.07	84.97	115	0911	AGROMETEOROLOGY	Bara
126	RamoliBairiya	27.02	85.38	152	0912	PRECIPITATION	Routahat
127	MarkhuGaun	27.62	85.15	1530	0915	PRECIPITATION	Makwanpur
128	Birganj	27.00	84.87	91	0918	PRECIPITATION	Parsa
129	MakwanpurGadhi	27.42	85.17	1030	0919	PRECIPITATION	Makwanpur
130	Beluwa(Manahari)	27.55	84.82	274	0920	PRECIPITATION	Makwanpur
131	Kalaiya	27.03	85.00	140	0921	PRECIPITATION	Bara
132	Gaur	26.77	85.30	90	0922	CLIMATOLOGY	Routahat
133	Timure	28.28	85.38	1900	1001	CLIMATOLOGY	Rasuwa
134	AruGhatD.Bazar	28.05	84.82	518	1002	PRECIPITATION	Dhading
135	Nuwakot	27.92	85.17	1003	1004	CLIMATOLOGY	Nuwakot
136	Dhading	27.87	84.93	1420	1005	PRECIPITATION	Dhading
137	Gumthang	27.87	85.87	2000	1006	PRECIPITATION	Sindhupalchok
138	Kakani	27.80	85.25	2064	1007	AGROMETEOROLOGY	Nuwakot
139	Nawalpur	27.80	85.62	1592	1008	PRECIPITATION	Sindhupalchok
140	Chautara	27.78	85.72	1660	1009	PRECIPITATION	Sindhupalchok
141	Thankot	27.68	85.20	1630	1015	PRECIPITATION	Kathmandu
142	Sarmathang	27.95	85.60	2625	1016	PRECIPITATION	Sindhupalchok
143	Dubachaur	27.87	85.57	1550	1017	PRECIPITATION	Sindhupalchok
144	Baunepati	27.78	85.57	845	1018	PRECIPITATION	Sindhupalchok
145	Mandan	27.70	85.65	1365	1020	PRECIPITATION	Kabhre
146	Godavari	27.58	85.40	1400	1022	CLIMATOLOGY	Lalitpur
147	DolalGhat	27.63	85.72	710	1023	PRECIPITATION	Kabhre
148	Dhulikhel	27.62	85.55	1552	1024	CLIMATOLOGY	Kabhre

S.N.	Station Name	Latitude	Longitude	Elevation	Index No.	Type of station	District
		deg (N)	deg (E)	m			
149	Dhap	27.92	85.63	1240	1025	PRECIPITATION	Sindhupalchok
150	Bahrabise	27.78	85.90	1220	1027	CLIMATOLOGY	Sindhupalchok
151	PachuwarGhat	27.57	85.75	633	1028	PRECIPITATION	Kabhre
152	Khumaltar	27.67	85.33	1350	1029	AGROMETEOROLOGY	Lalitpur
153	Kathmandu Airport	27.70	85.37	1337	1030	AERONATICAL	Kathmandu
154	Sankhu	27.75	85.48	1449	1035	PRECIPITATION	Kathmandu
155	Panchkhal	27.68	85.63	865	1036	CLIMATOLOGY	Kabhre
156	Dhunibesi	27.72	85.18	1085	1038	CLIMATOLOGY	Dhading
157	Panipokhari(Kathmandu)	27.73	85.33	1335	1039	CLIMATOLOGY	Kathmandu
158	Nagarkot	27.70	85.52	2163	1043	CLIMATOLOGY	Bhaktapur
159	Khopasi(Panauti)	27.58	85.52	1517	1049	PRECIPITATION	Kabhre
160	Bhaktapur	27.67	85.42	1330	1052	PRECIPITATION	Bhaktapur
161	Thamachit	28.17	85.32	1847	1054	PRECIPITATION	Rasuwa
162	Dhunche	28.10	85.30	1982	1055	CLIMATOLOGY	Rasuwa
163	Pansayakhola	28.02	85.12	1240	1057	PRECIPITATION	Nuwakot
164	TarkeGhyang	28.00	85.55	2480	1058	PRECIPITATION	Sindhupalchok
165	ChanguHarayan	27.70	85.42	1543	1059	CLIMATOLOGY	Bhaktapur
166	Chapa Gaun	27.60	85.33	1448	1060	PRECIPITATION	Lalitpur
167	Sangachok	27.70	85.72	1327	1062	PRECIPITATION	Sindhupalchok
168	Thokarpa	27.70	85.78	1750	1063	PRECIPITATION	Sindhupalchok
169	Nagdaha	27.68	86.10	850	1101	PRECIPITATION	Dolkha
170	Charikot	27.67	86.05	1940	1102	PRECIPITATION	Dolkha
171	Jiri	27.63	86.23	2003	1103	AGROMETEOROLOGY	Dolkha
172	Melung	27.52	86.05	1536	1104	PRECIPITATION	Dolkha
173	SindhuliGadhi	27.28	85.97	1463	1107	CLIMATOLOGY	Sindhuli
174	BahunTilpung	27.18	86.17	1417	1108	PRECIPITATION	Sindhuli
175	Pattharkot(East)	27.08	85.67	275	1109	PRECIPITATION	Sarlahi
176	Tulsi	27.03	85.92	457	1110	PRECIPITATION	Dhanusa
177	Janakpur Airport	26.72	85.97	90	1111	CLIMATOLOGY	Dhanusa
178	Chisapani Bazar	26.92	86.17	165	1112	PRECIPITATION	Dhanusa
179	Nepalthok	27.45	85.82	1098	1115	PRECIPITATION	Sindhuli
180	HariharpurGadhi Valley	27.33	85.50	250	1117	PRECIPITATION	Sindhuli
181	Manusmara	26.88	85.42	100	1118	CLIMATOLOGY	Sarlahi
182	Gausala	26.88	85.78	200	1119	PRECIPITATION	Mahottari
183	Malangwa	26.87	85.57	150	1120	PRECIPITATION	Sarlahi
184	Karmaiya	27.12	85.47	131	1121	CLIMATOLOGY	Sarlahi
185	Chaurikhark	27.70	86.72	2619	1202	PRECIPITATION	Solukhumbu

S.N.	Station Name	Latitude deg (N)	Longitude deg (E)	Elevation m	Index No.	Type of station	District
186	Pakarnas	27.43	86.57	1982	1203	PRECIPITATION	Solukhumbu
187	Aisealukhark	27.35	86.75	2143	1204	PRECIPITATION	Khotang
188	Okhaldhunga	27.32	86.50	1720	1206	SYNOPTIC	Okhaldhunga
189	Mane Bhanjyang	27.48	86.42	1576	1207	PRECIPITATION	Okhaldhunga
190	KuruleGhat	27.13	86.43	497	1210	PRECIPITATION	Khotang
191	Khotang Bazar	27.03	86.83	1295	1211	PRECIPITATION	Khotang
192	Phatepur	26.73	86.93	100	1212	CLIMATOLOGY	Saptari
193	UdayapurGadhi	26.93	86.52	1175	1213	CLIMATOLOGY	Udayapur
194	Lahan	26.73	86.43	138	1215	AGROMETEOROLOGY	Siraha
195	Siraha	26.65	86.22	102	1216	PRECIPITATION	Siraha
196	Salleri	27.50	86.58	2378	1219	PRECIPITATION	Solukhumbu
197	Diktel	27.22	86.80	1623	1222	PRECIPITATION	Khotang
198	Rajbiraj	26.55	86.75	91	1223	CLIMATOLOGY	Saptari
199	Sirwa	27.55	86.38	1662	1224	PRECIPITATION	Solukhumbu
200	Barmajhiya	26.60	86.90	85	1226	PRECIPITATION	Saptari
201	Num	27.55	87.28	1497	1301	PRECIPITATION	Sankhuwasabha
202	Chainpur (East)	27.28	87.33	1329	1303	CLIMATOLOGY	Sankhuwasabha
203	Pakhribas	27.05	87.28	1680	1304	AGROMETEOROLOGY	Dhankuta
204	LeguwaGhat	27.13	87.28	410	1305	PRECIPITATION	Dhankuta
205	Munga	27.03	87.23	1317	1306	PRECIPITATION	Dhankuta
206	Dhankuta	26.98	87.35	1210	1307	SYNOPTIC	Dhankuta
207	MulGhat	26.93	87.33	365	1308	PRECIPITATION	Dhankuta
208	Tribeni	26.93	87.15	143	1309	PRECIPITATION	Dhankuta
209	Dharan Bazar	26.82	87.28	444	1311	CLIMATOLOGY	Sunsari
210	Haraincha	26.62	87.38	152	1312	PRECIPITATION	Morang
211	Terhathum	27.13	87.55	1633	1314	CLIMATOLOGY	Terhathum
212	Chatara	26.82	87.17	183	1316	PRECIPITATION	Sunsari
213	Chepuwa	27.77	87.42	2590	1317	PRECIPITATION	Sankhuwasabha
214	Biratnagar Airport	26.48	87.27	72	1319	AERONATICAL	Morang
215	Tarahara	26.70	87.27	200	1320	AGROMETEOROLOGY	Sunsari
216	Tumlingtar	27.28	87.22	303	1321	PRECIPITATION	Sankhuwasabha
217	Machuwaghat	26.97	87.17	158	1322	PRECIPITATION	Dhankuta
218	Bhojpur	27.18	87.05	1595	1324	AGROMETEOROLOGY	Bhojpur
219	Dingla	27.37	87.15	1190	1325	PRECIPITATION	Bhojpur
220	Lungthung	27.55	87.78	1780	1403	PRECIPITATION	Taplejung
221	Taplethok	27.48	87.78	1383	1404	PRECIPITATION	Taplejung
222	Taplejung	27.35	87.67	1732	1405	SYNOPTIC	Taplejung

S.N.	Station Name	Latitude deg (N)	Longitude deg (E)	Elevation m	Index No.	Type of station	District
223	MemengJagat	27.20	87.93	1830	1406	PRECIPITATION	Panchther
224	Ilam Tea Estate	26.92	87.90	1300	1407	AGROMETEOROLOGY	Ilam
225	Damak	26.67	87.70	163	1408	PRECIPITATION	Jhapa
226	AnarmaniBirta	26.63	87.98	122	1409	PRECIPITATION	Jhapa
227	HimaliGaun	26.88	88.03	1654	1410	PRECIPITATION	Ilam
228	Chandra Gadhi	26.57	88.05	120	1412	PRECIPITATION	Jhapa
229	Sanischare	26.68	87.97	168	1415	PRECIPITATION	Jhapa
230	Kanyam Tea Estate	26.87	88.07	1678	1416	CLIMATOLOGY	Ilam
231	Phidim (Panchther)	27.15	87.75	1205	1419	CLIMATOLOGY	Panchther
232	Dovan	27.35	87.60	763	1420	PRECIPITATION	Taplejung
233	Gaida (Kankai)	26.58	87.90	143	1421	AGROMETEOROLOGY	Jhapa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High Mountain
High Himalaya
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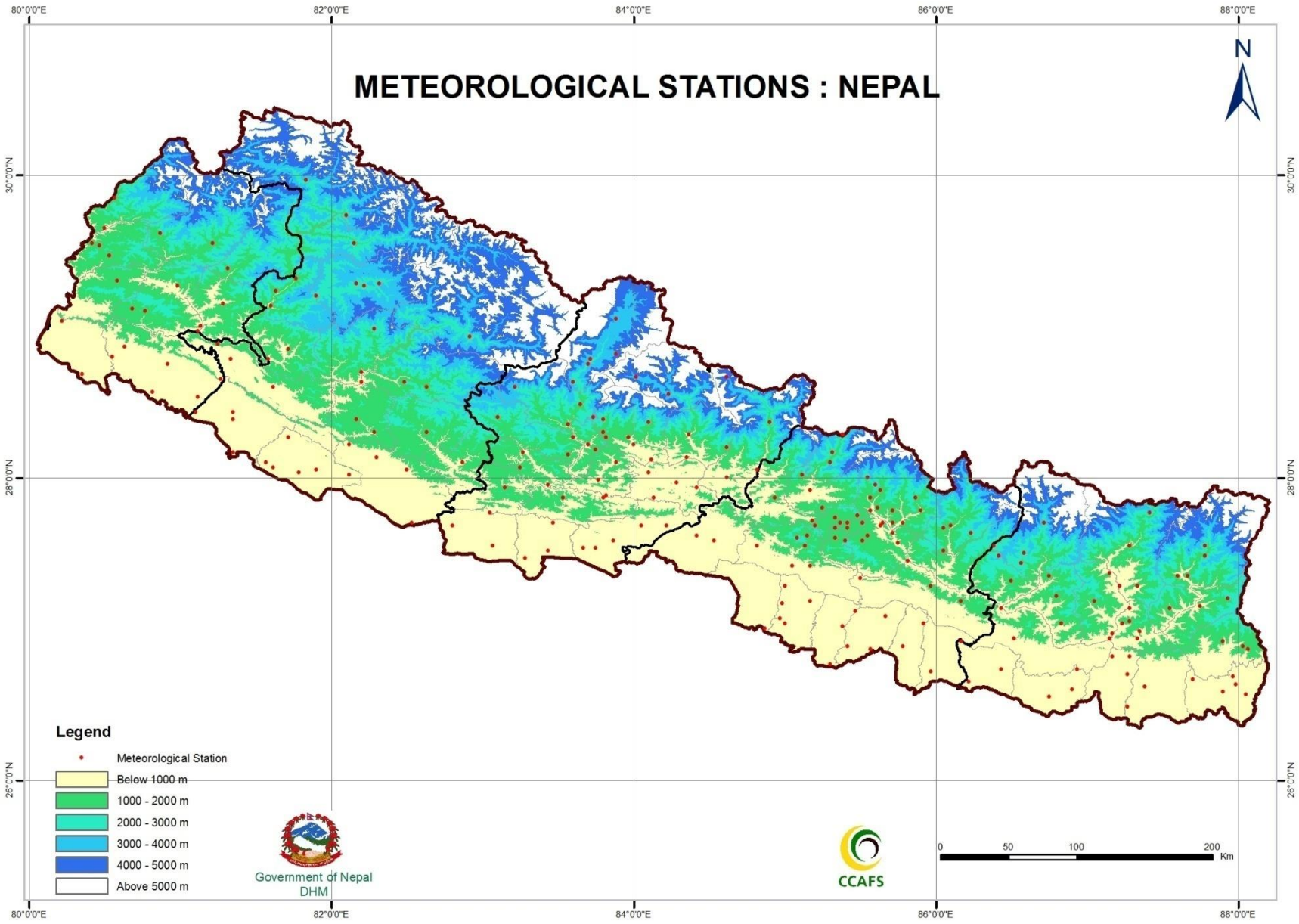
Km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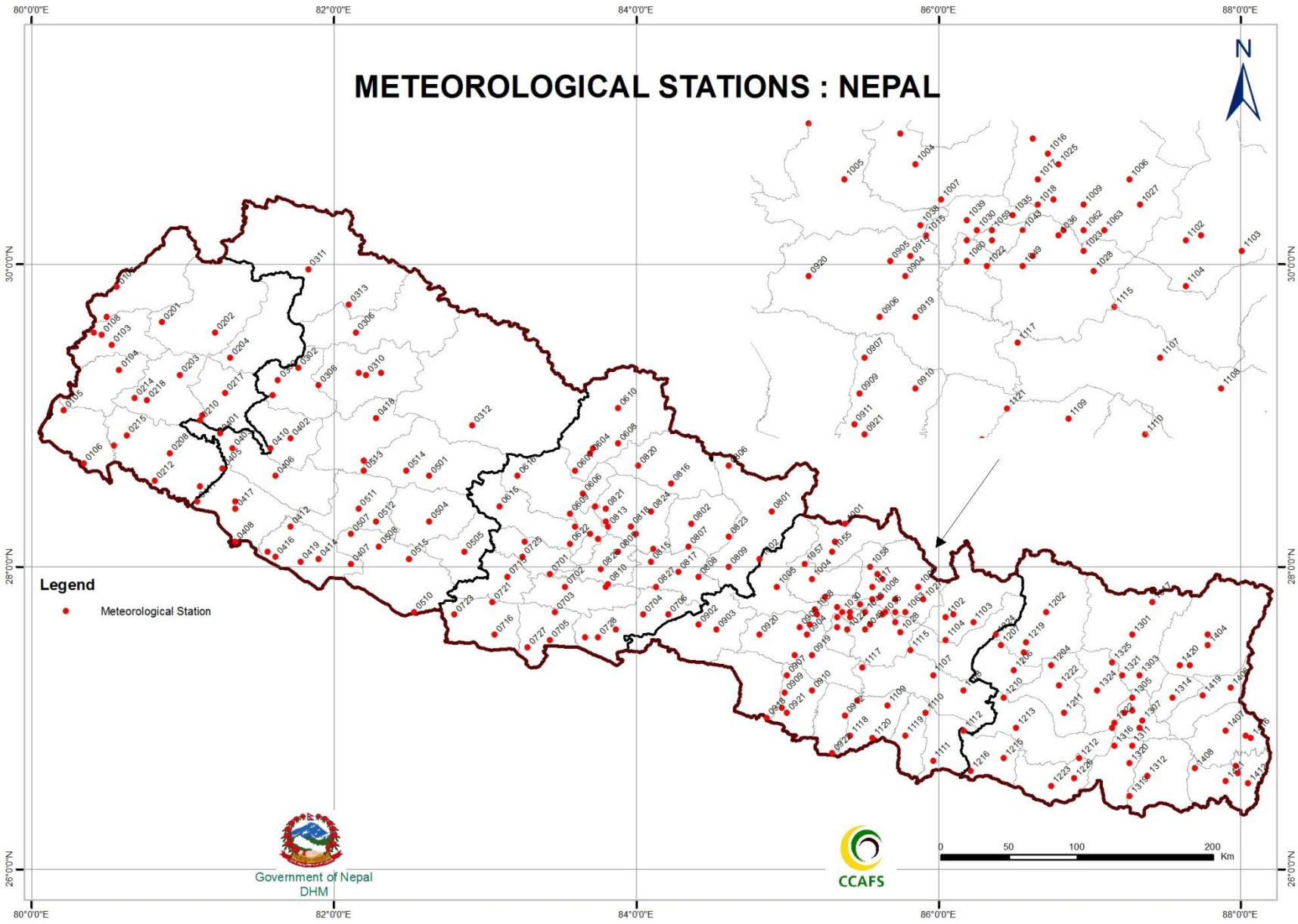
28°0'0"N
26°0'0"N
Legend
Meteorological Station
Below 1000 m
1000 - 2000 m
2000 - 3000 m
3000 - 4000 m
4000 - 5000 m
Above 5000 m
Government of Nepal
DHM
CCAFS
0
50
100
200
Km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Legend
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Government of Nepal
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CCAFS
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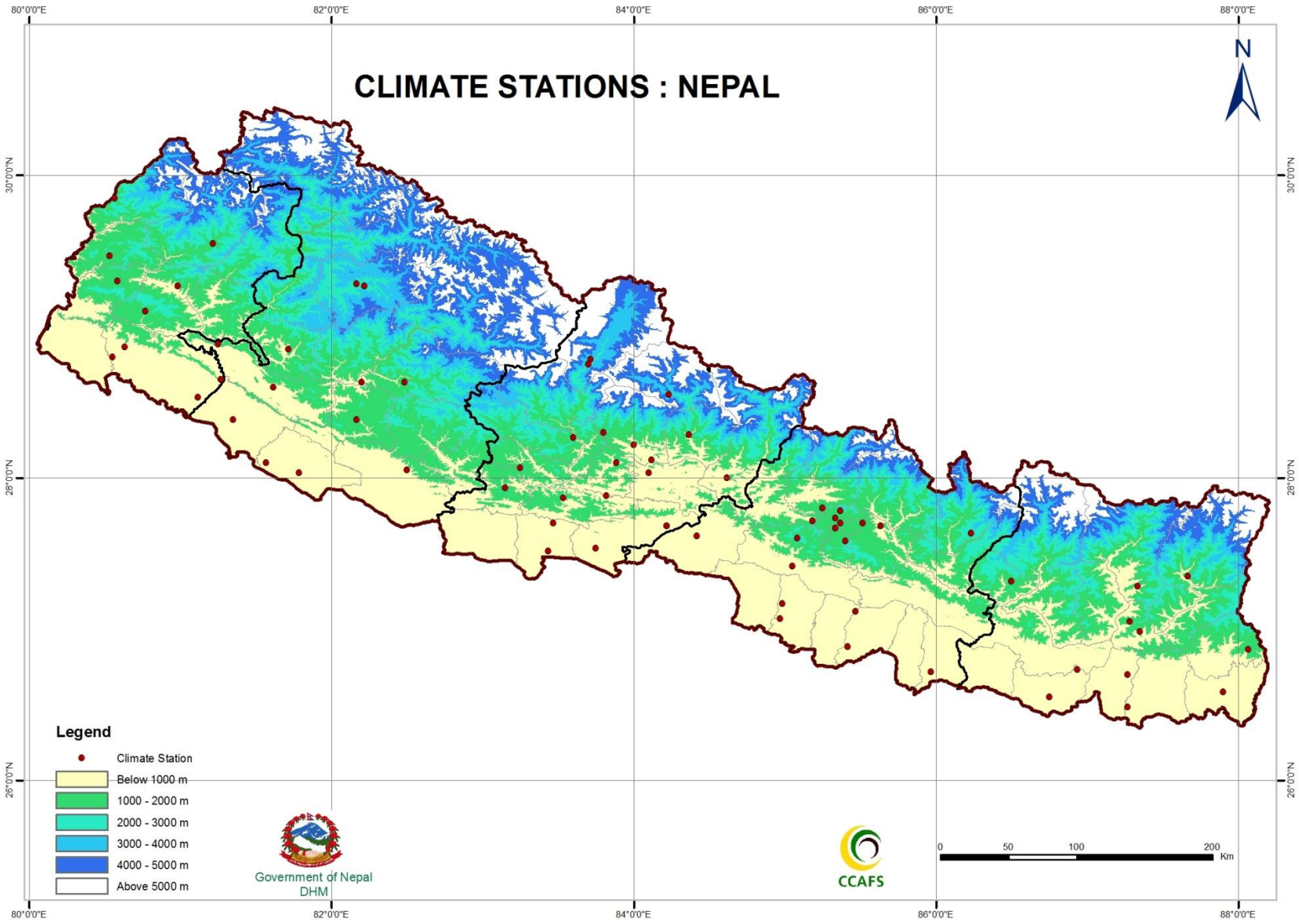
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26°0'0"N
Legend
Climate Station
Below 1000 m
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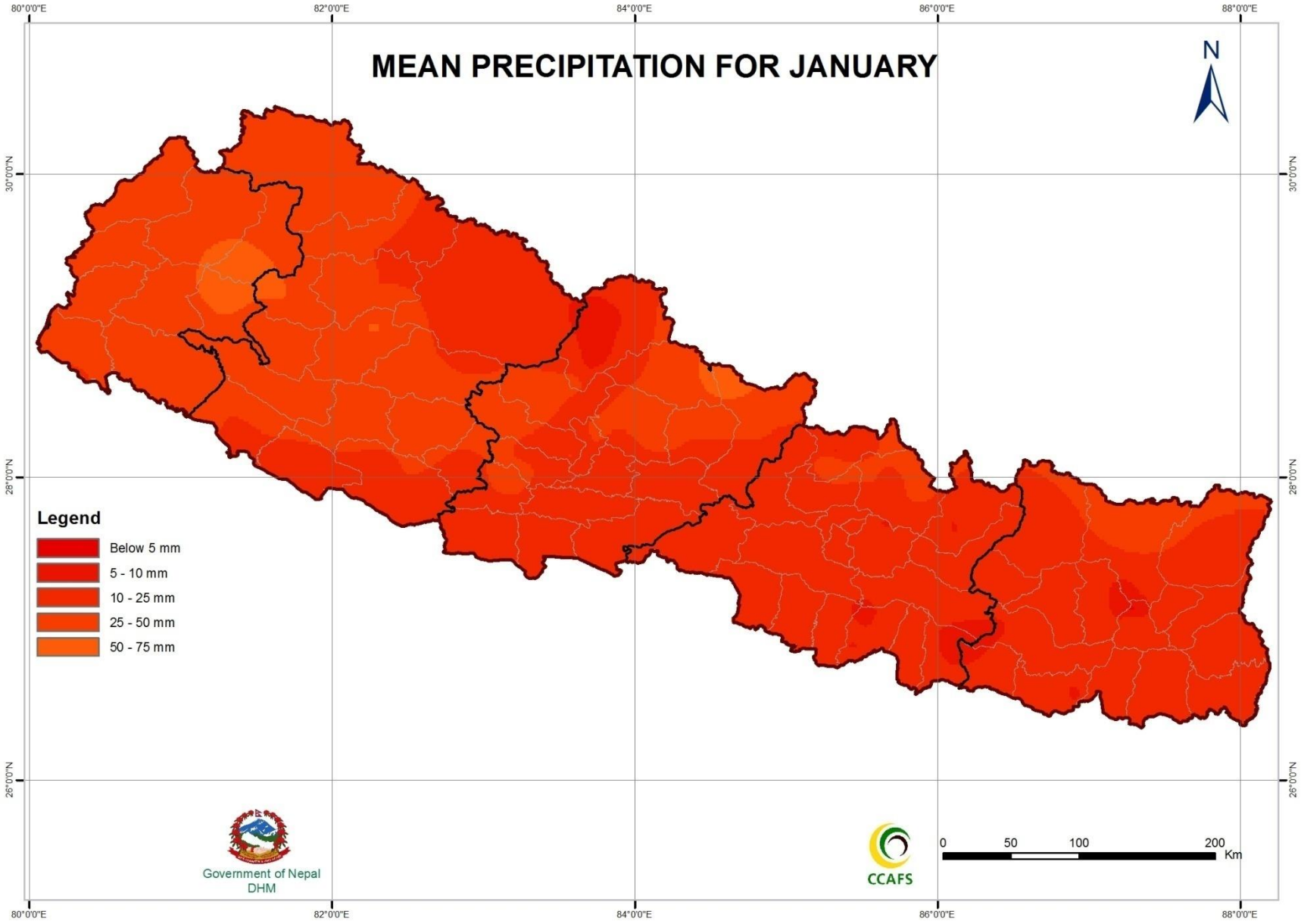
4000 - 5000 m
Above 5000 m
Government of Nepal
DHM
CCAFS
0
50
100
200
Km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Legend
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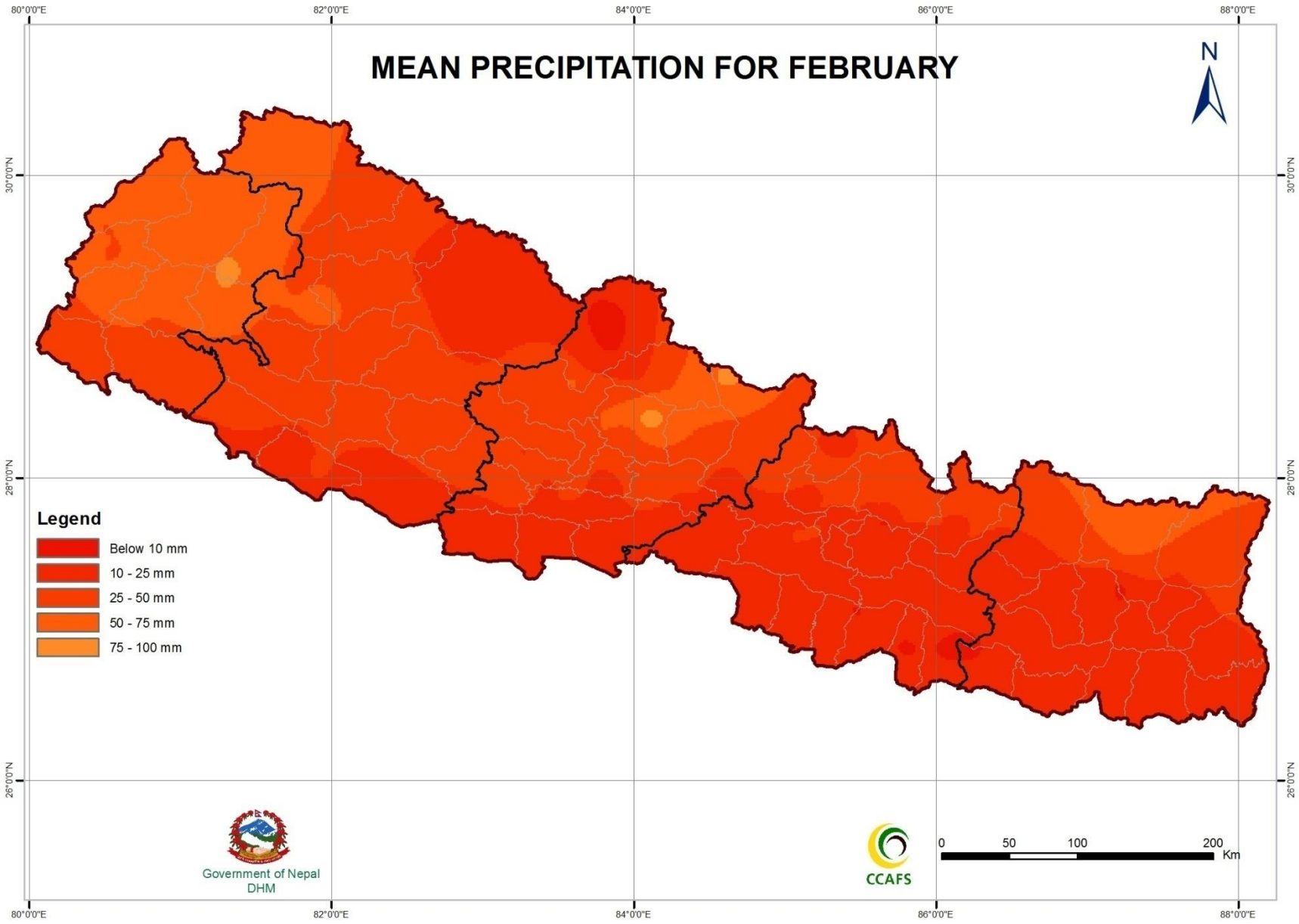
Government of Nepal
DHM
CCAFS
0
50
100
200
Km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Legend
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75 - 100 mm
Government of Nepal
DHM
CCAFS
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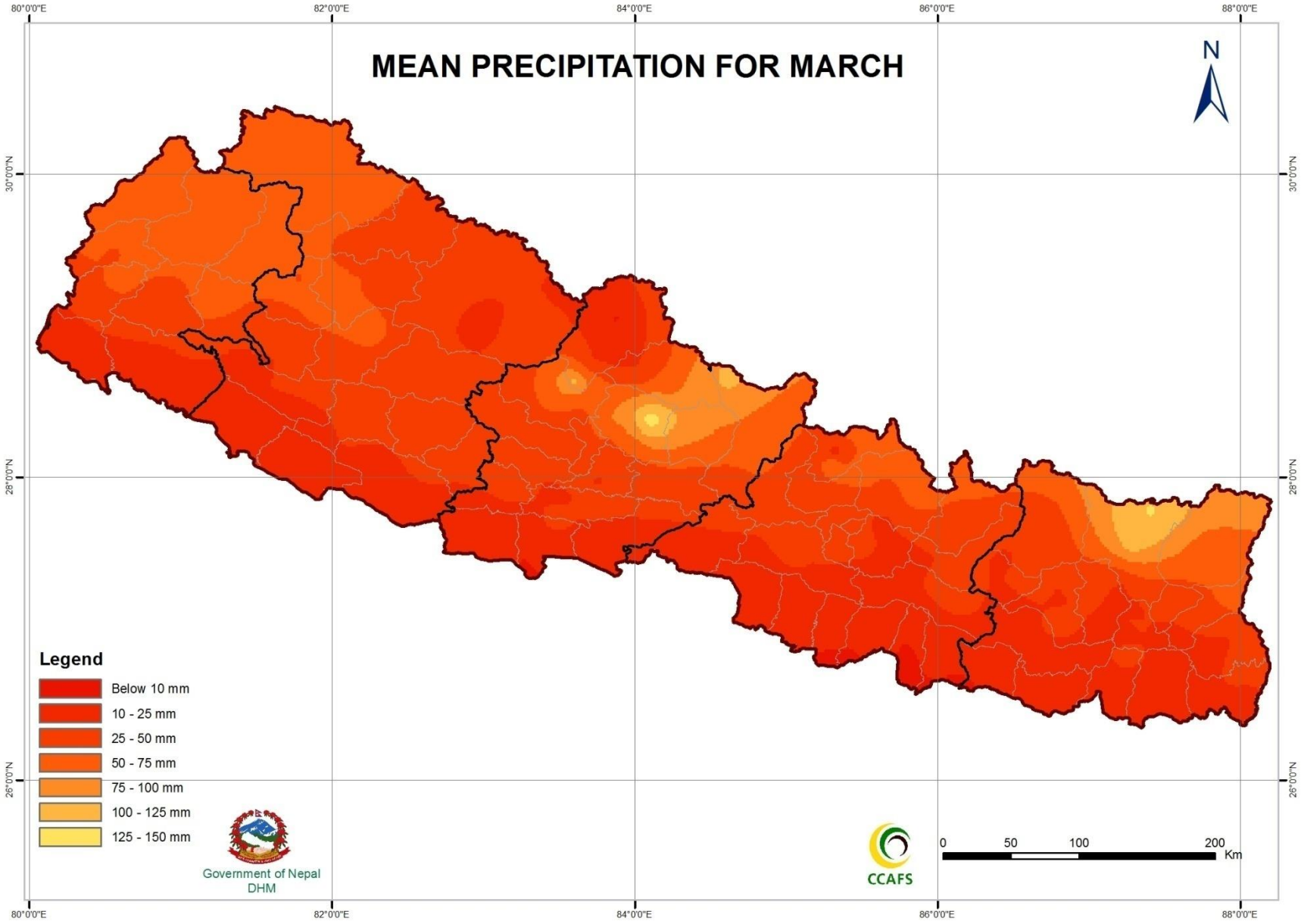
50
100
200
Km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Legend
Below 10 mm
10 - 25 mm
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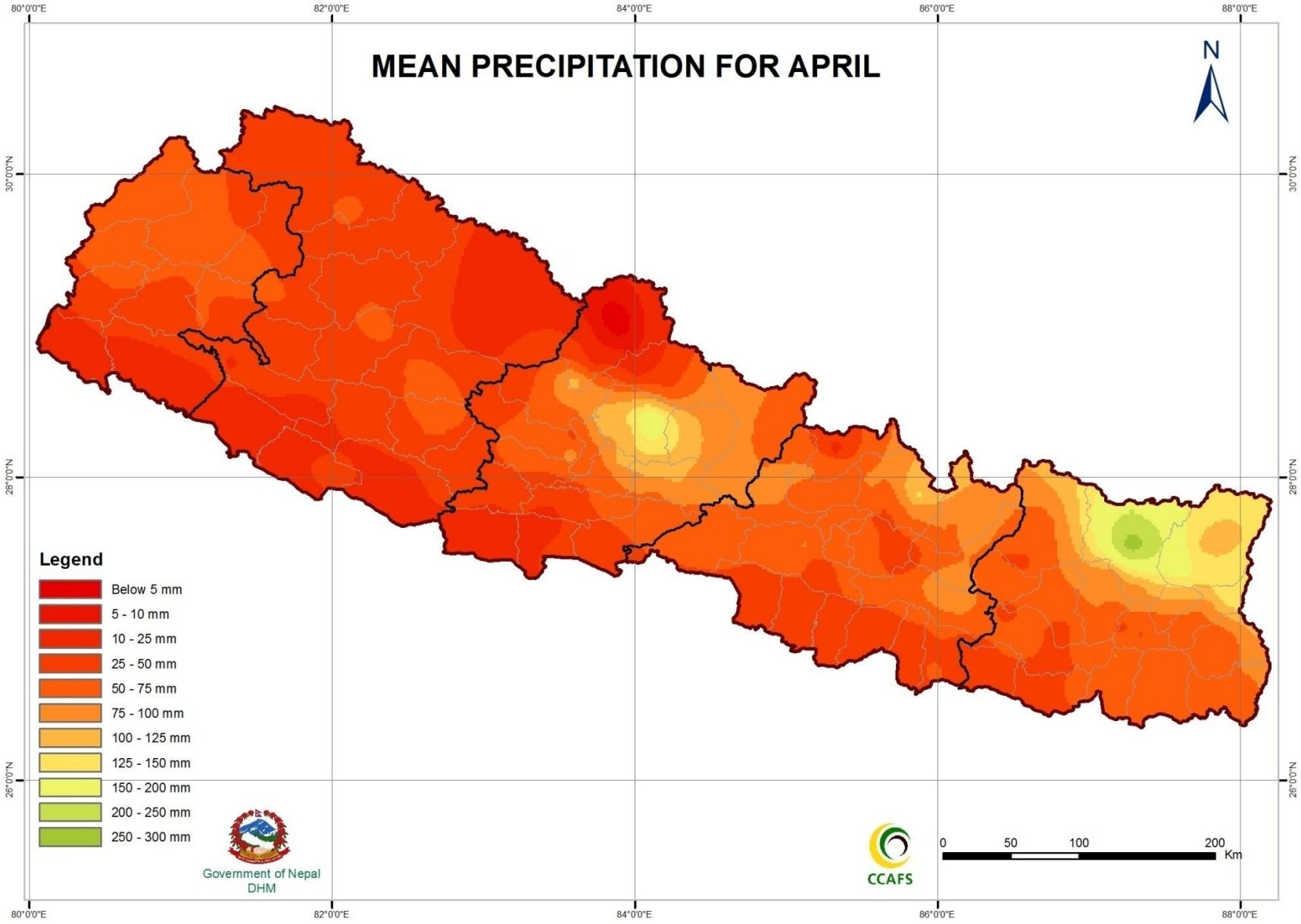
Government of Nepal
DHM
CCAFS
0
50
100
200
Km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Legend
Below 5 mm
5 - 10 mm
10 - 25 mm
25 - 50 mm
50 - 75 mm
75 - 100 mm
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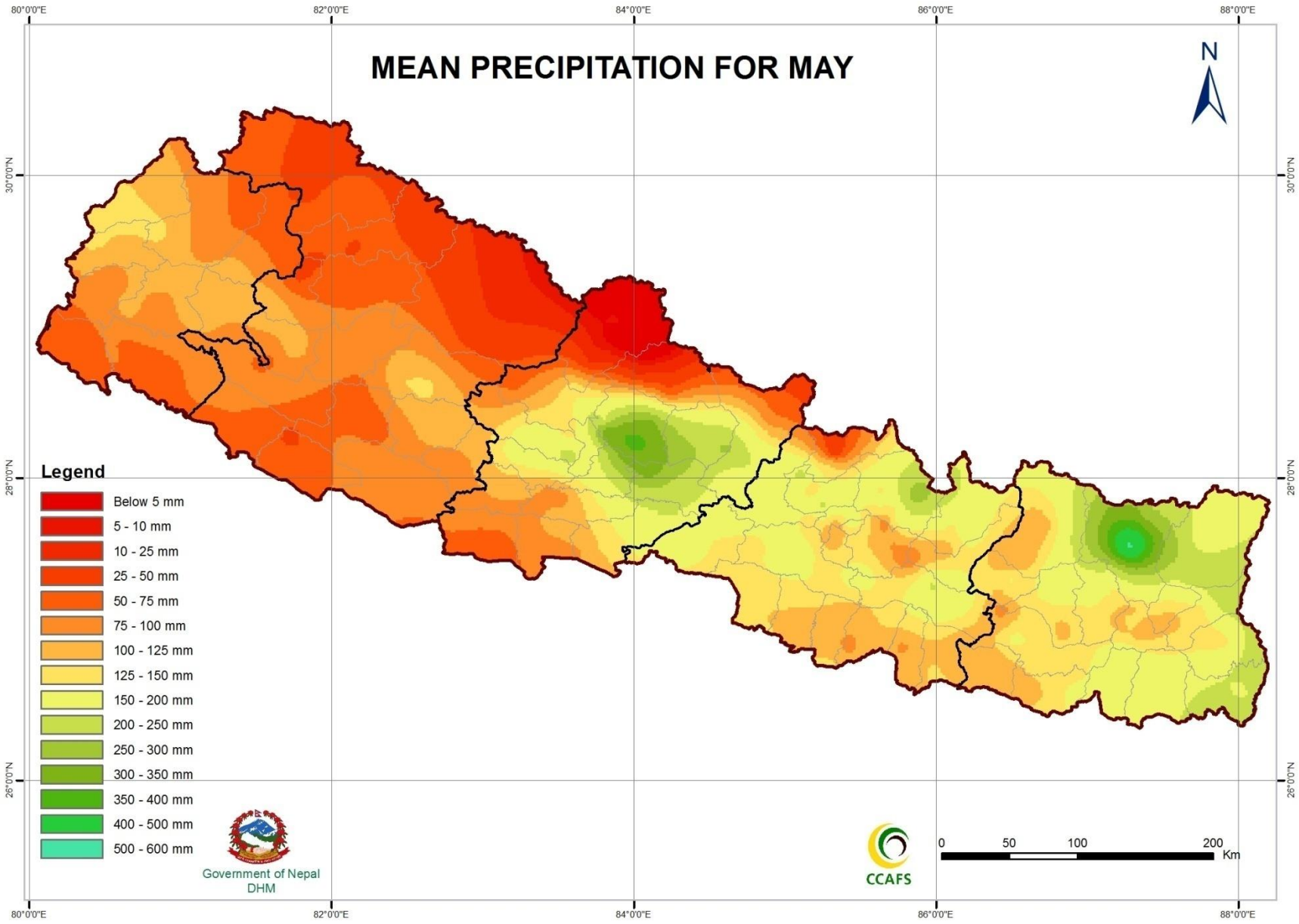
150 - 200 mm
200 - 250 mm
250 - 300 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km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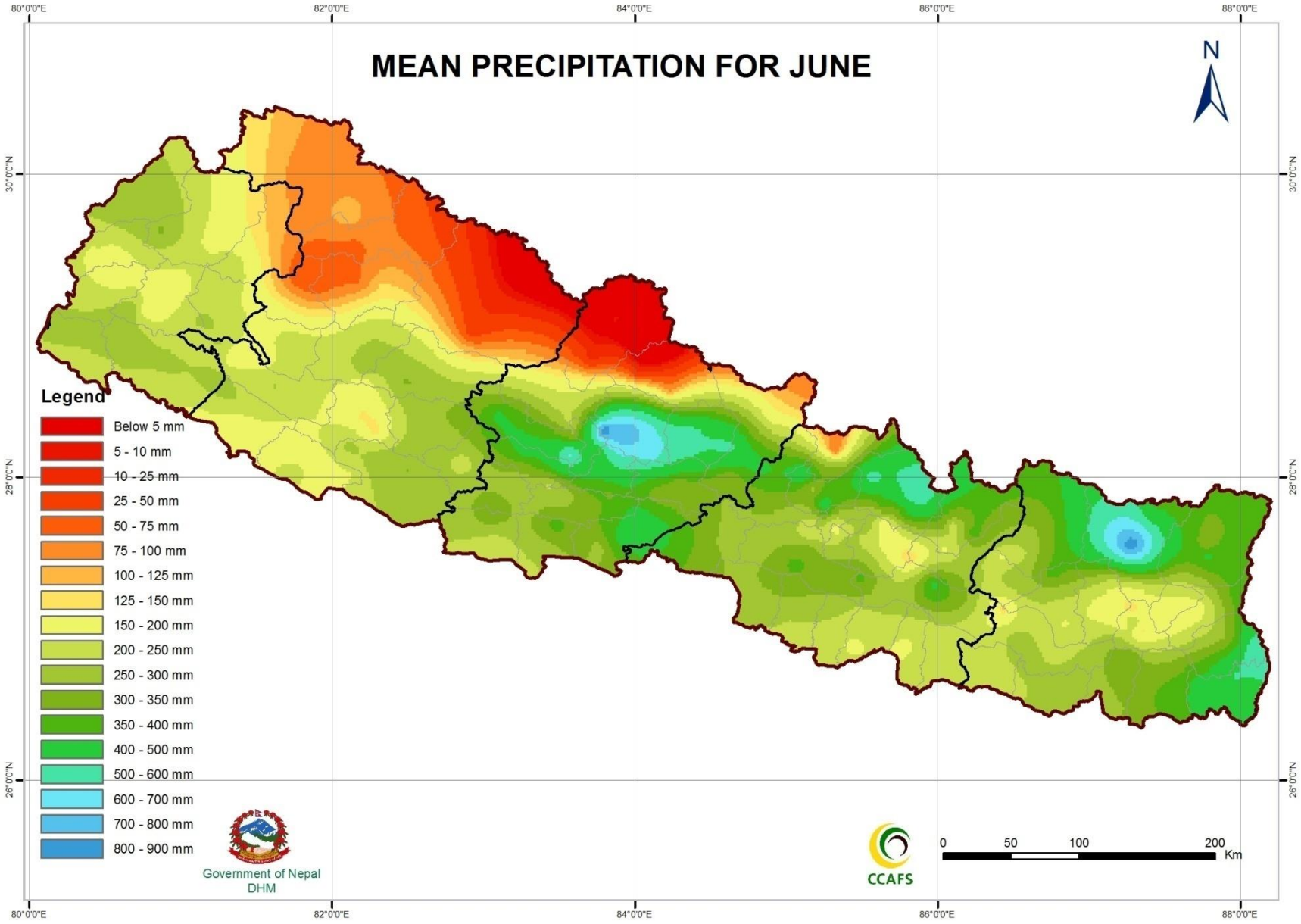
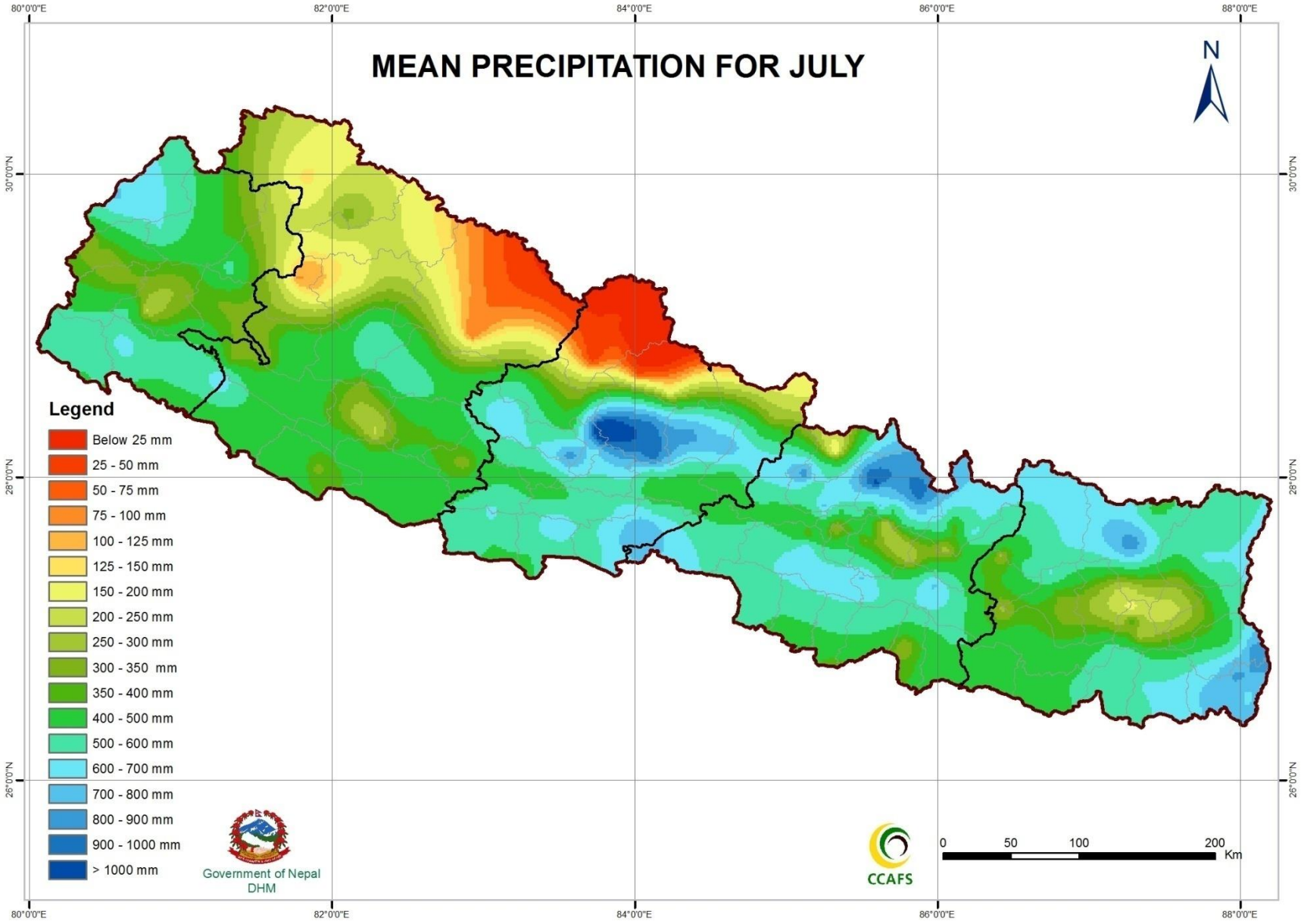
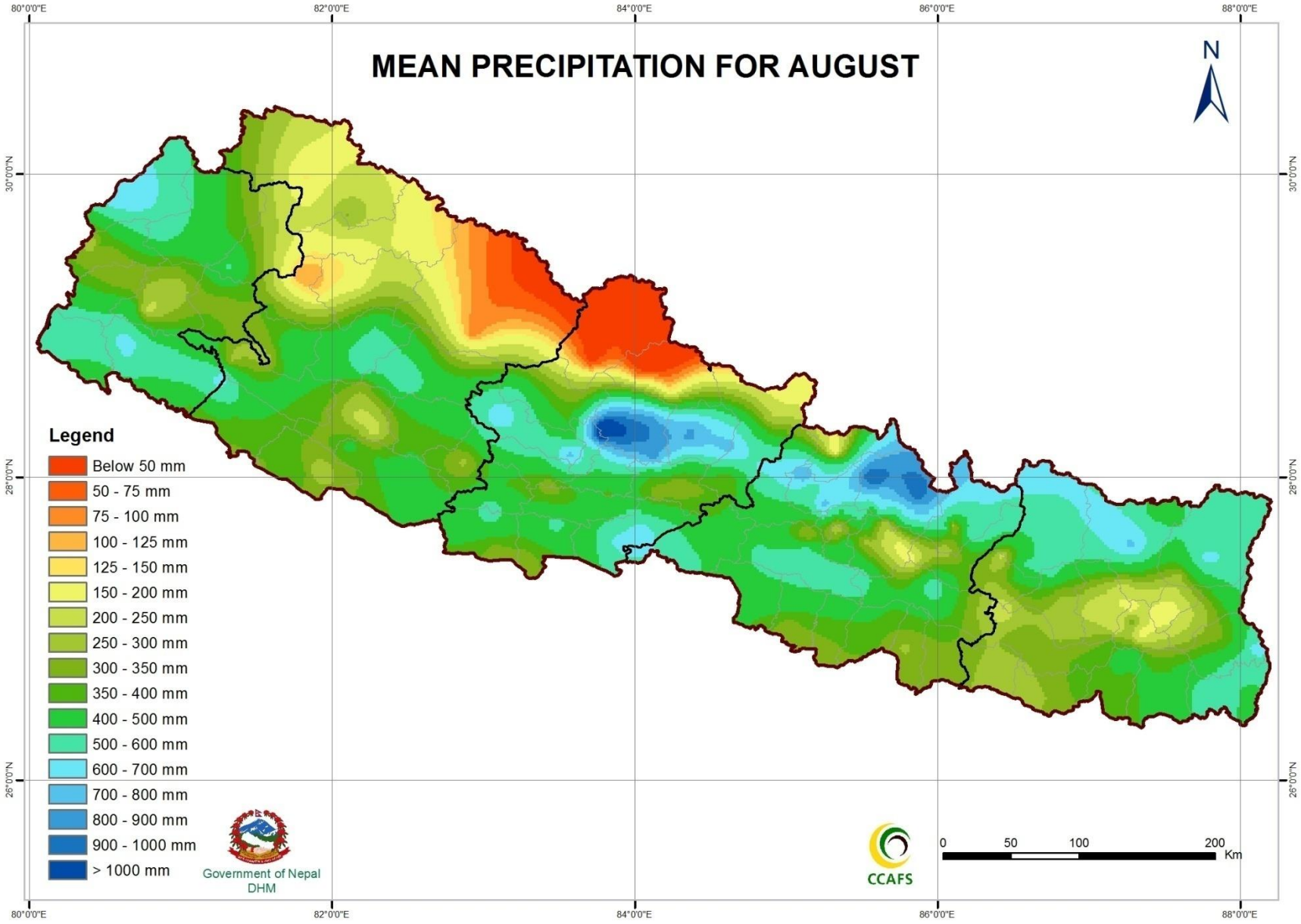
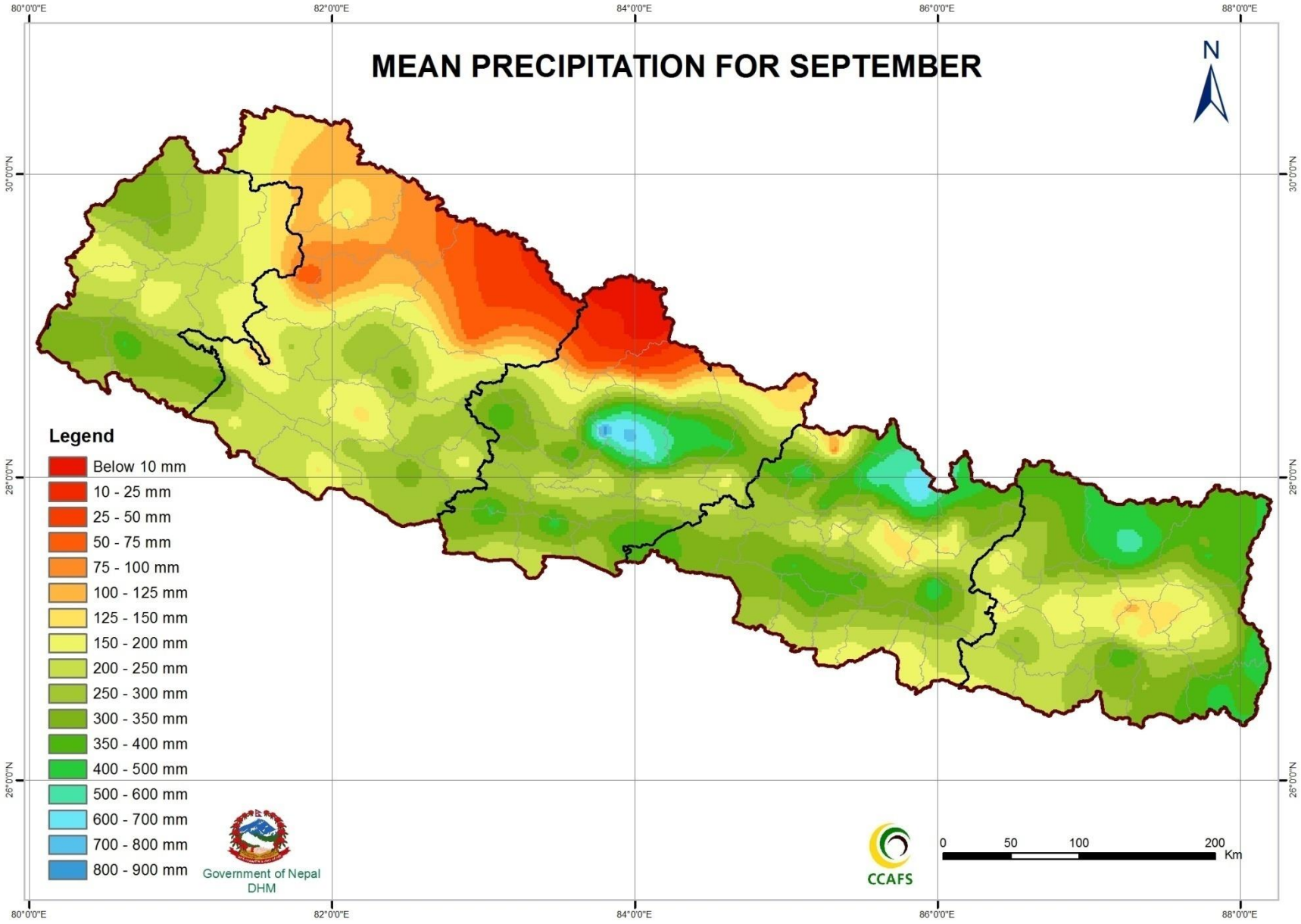
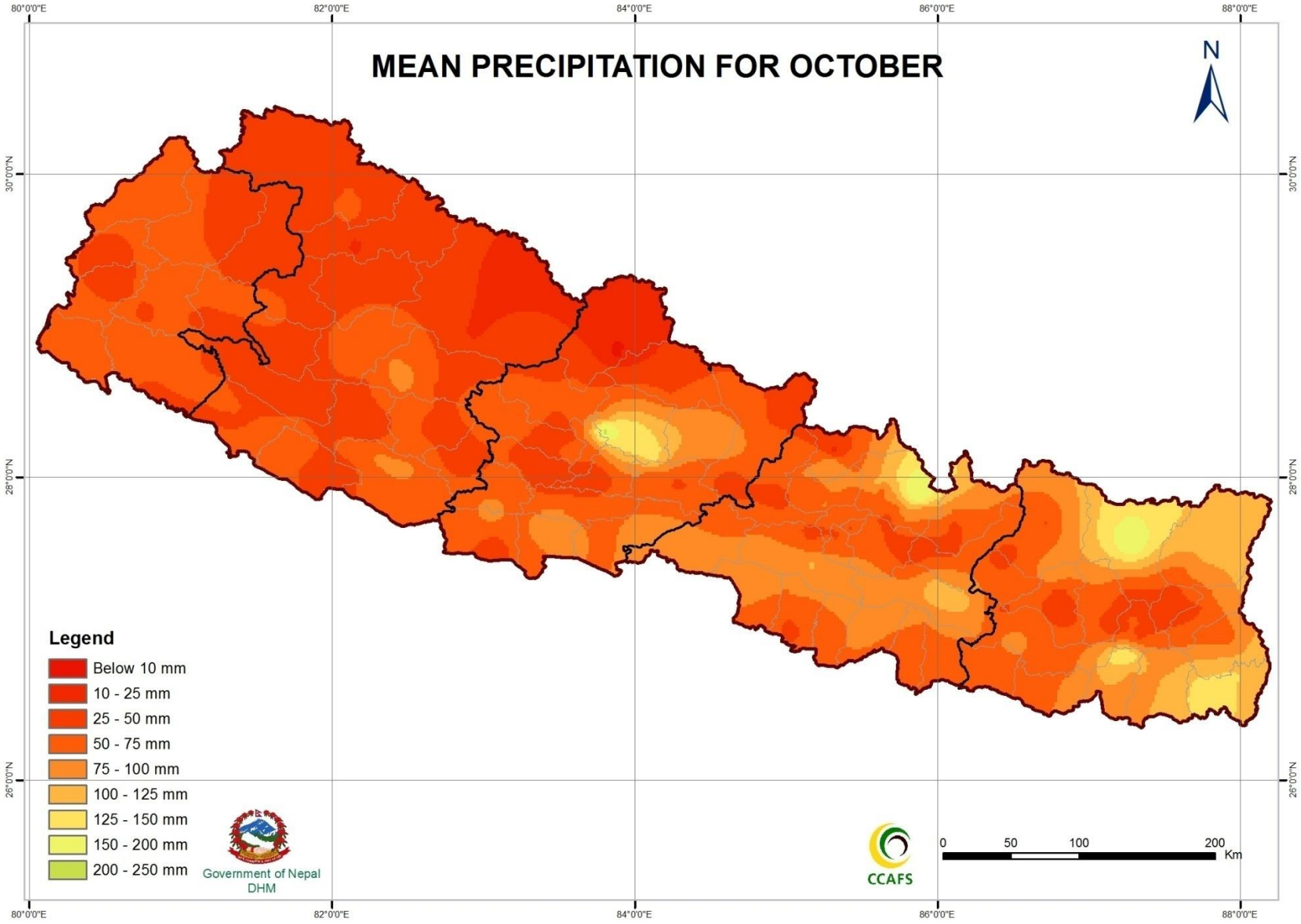
28°0'0"N
26°0'0"N
Legend
Below 5 mm
5 - 10 mm
10 - 25 mm
25 - 50 mm
50 - 75 mm
75 - 100 mm
100 - 125 mm
125 - 150 mm
150 - 200 mm
200 - 250 mm
250 - 300 mm
300 - 350 mm
350 - 400 mm
400 - 500 mm
500 - 600 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

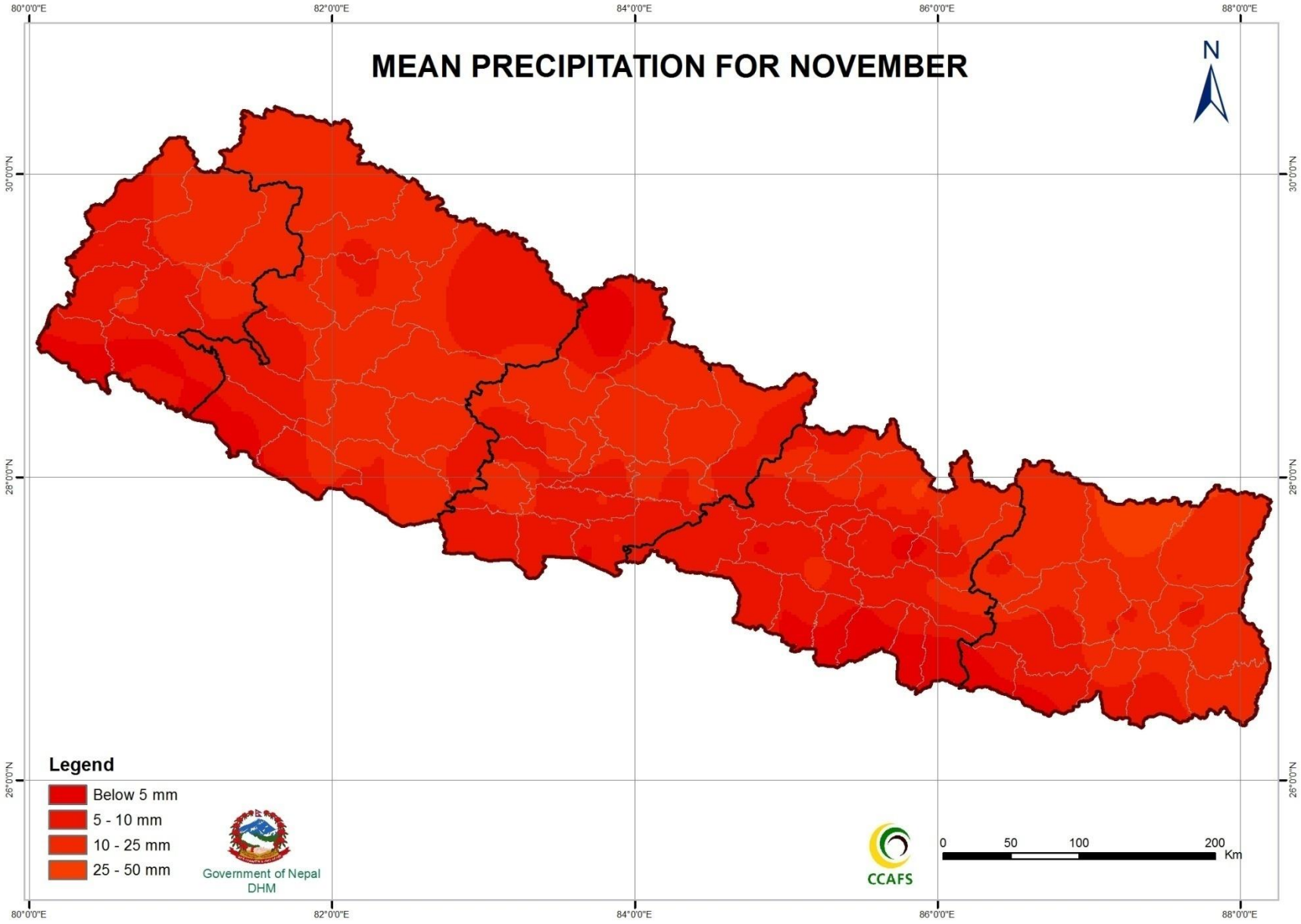

MEAN PRECIPITATION FOR JUNE
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 5 mm
5 - 10 mm
10 - 25 mm
25 - 50 mm
50 - 75 mm
75 - 100 mm
100 - 125 mm
125 - 150 mm
150 - 200 mm
200 - 250 mm
250 - 300 mm
300 - 350 mm
350 - 400 mm
400 - 500 mm
500 - 600 mm
600 - 700 mm
700 - 800 mm
800 - 900 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

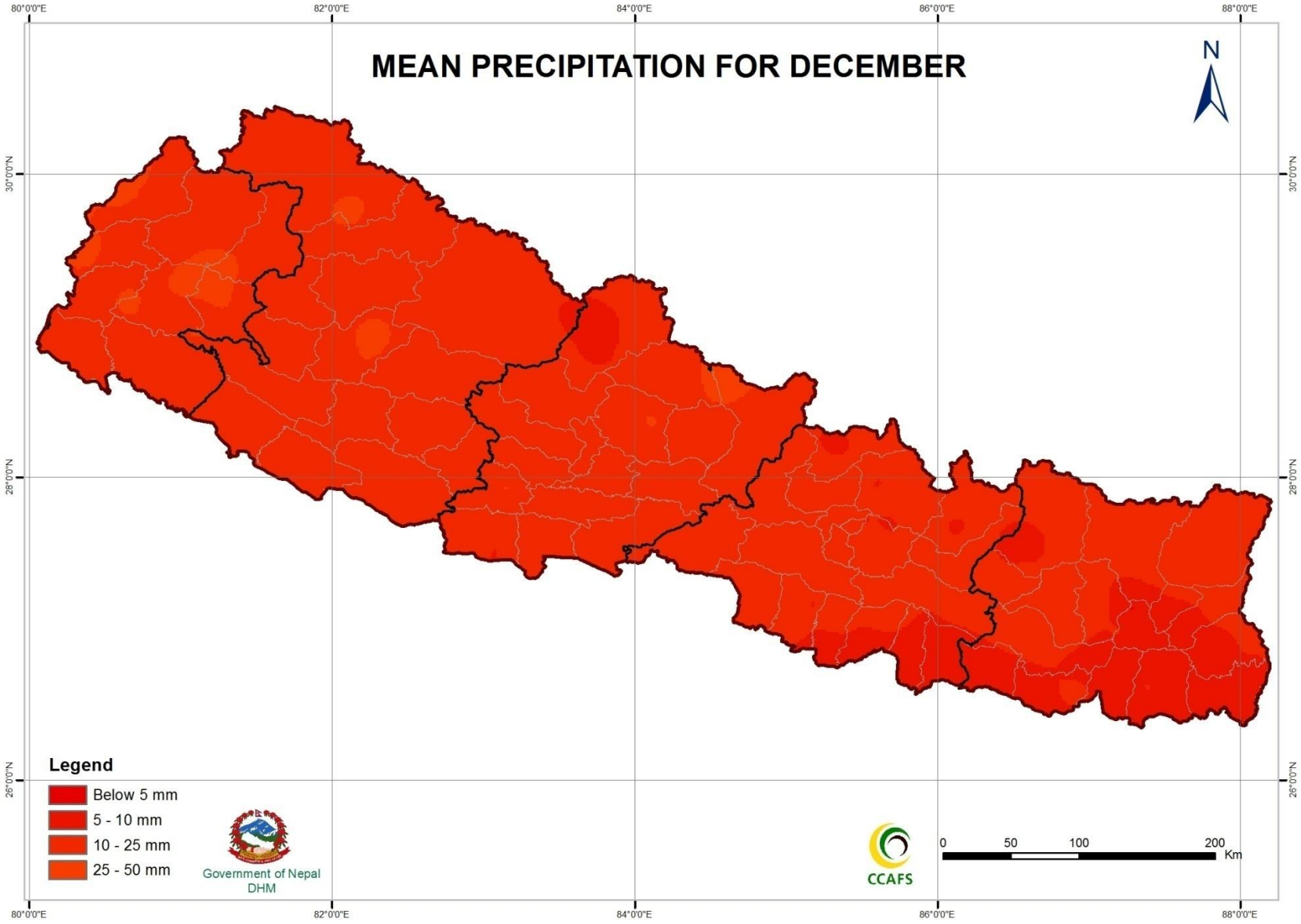

MEAN PRECIPITATION FOR JULY
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 25 mm
25 - 50 mm
50 - 75 mm
75 - 100 mm
100 - 125 mm
125 - 150 mm
150 - 200 mm
200 - 250 mm
250 - 300 mm
300 - 350 mm
350 - 400 mm
400 - 500 mm
500 - 600 mm
600 - 700 mm
700 - 800 mm
800 - 900 mm
900 - 1000 mm
> 1000 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

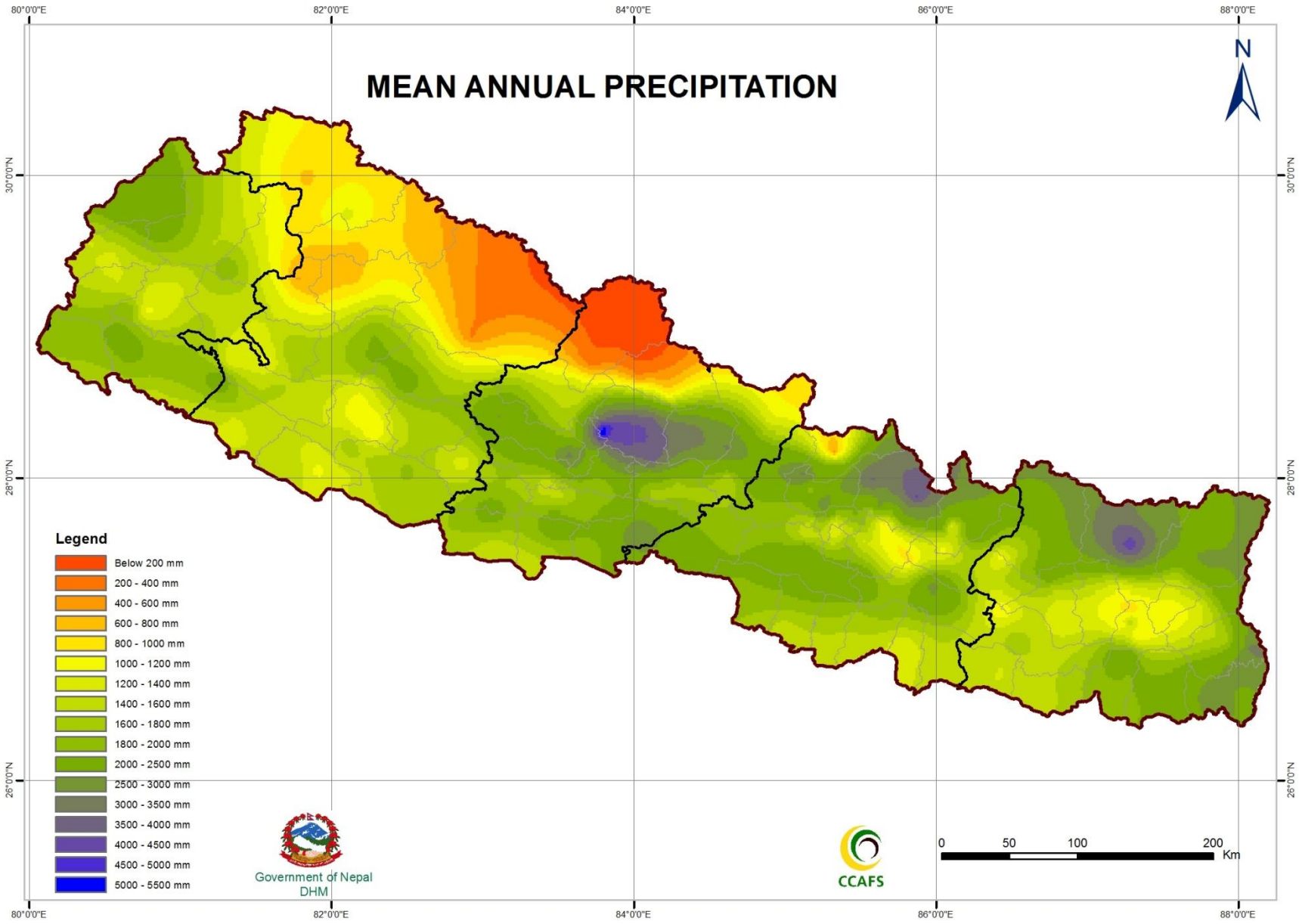

MEAN PRECIPITATION FOR AUGUST
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 50 mm
50 - 75 mm
75 - 100 mm
100 - 125 mm
125 - 150 mm
150 - 200 mm
200 - 250 mm
250 - 300 mm
300 - 350 mm
350 - 400 mm
400 - 500 mm
500 - 600 mm
600 - 700 mm
700 - 800 mm
800 - 900 mm
900 - 1000 mm
> 1000 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

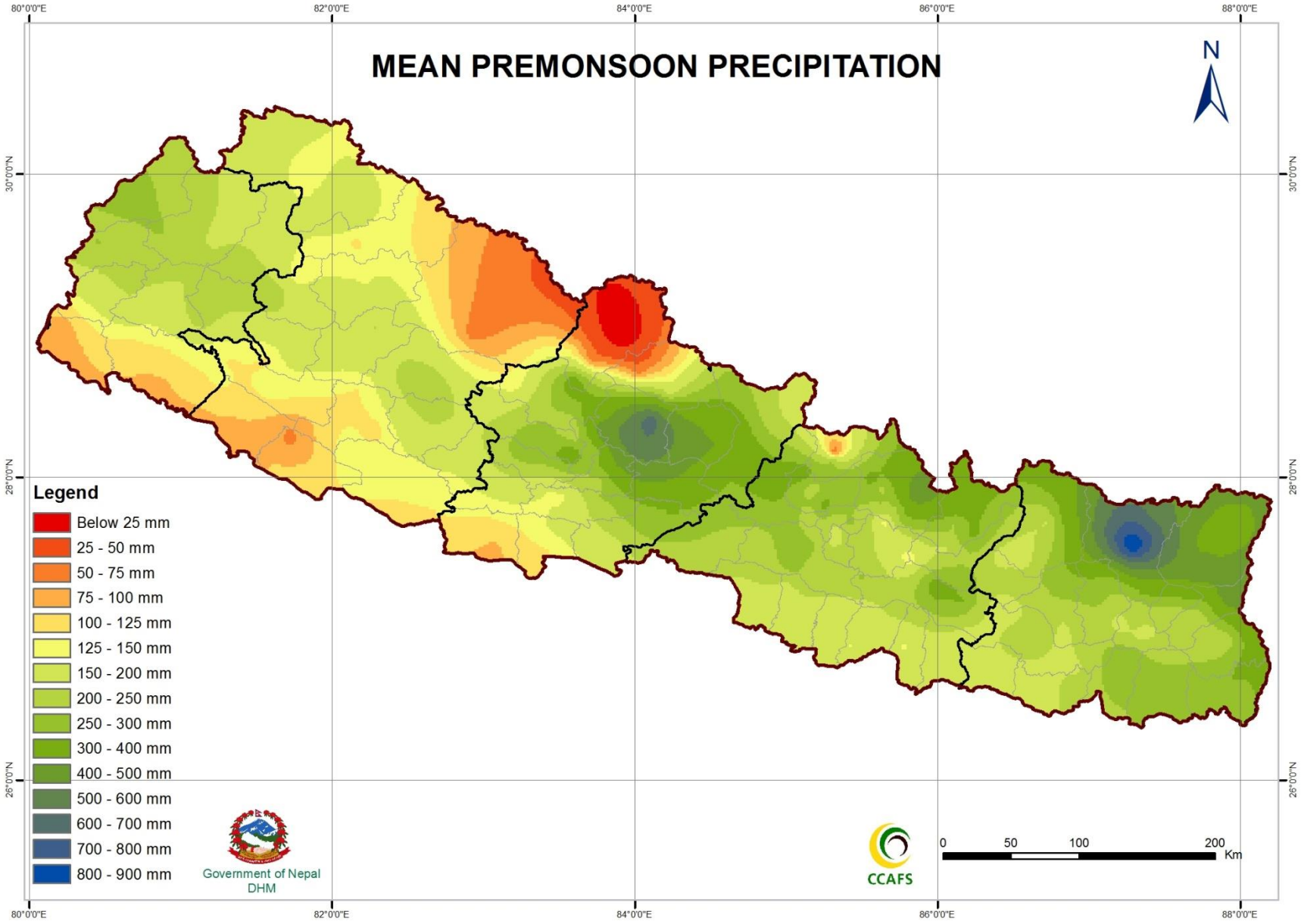

MEAN PRECIPITATION FOR SEPTEMBER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 10 mm
10 - 25 mm
25 - 50 mm
50 - 75 mm
75 - 100 mm
100 - 125 mm
125 - 150 mm
150 - 200 mm
200 - 250 mm
250 - 300 mm
300 - 350 mm
350 - 400 mm
400 - 500 mm
500 - 600 mm
600 - 700 mm
700 - 800 mm
800 - 900 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

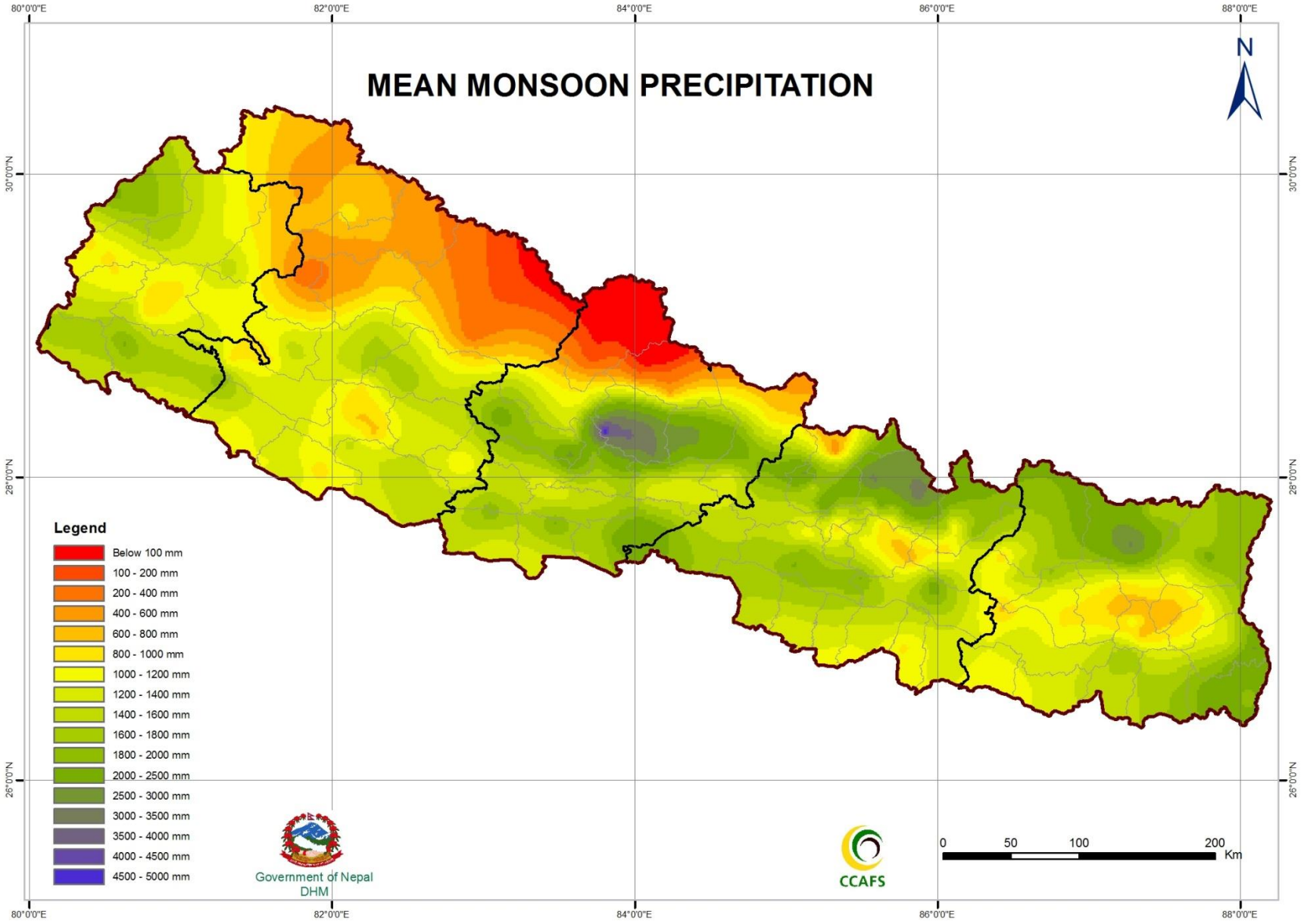

MEAN PRECIPITATION FOR OCTOBER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 10 mm
10 - 25 mm
25 - 50 mm
50 - 75 mm
75 - 100 mm
100 - 125 mm
125 - 150 mm
150 - 200 mm
200 - 250 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

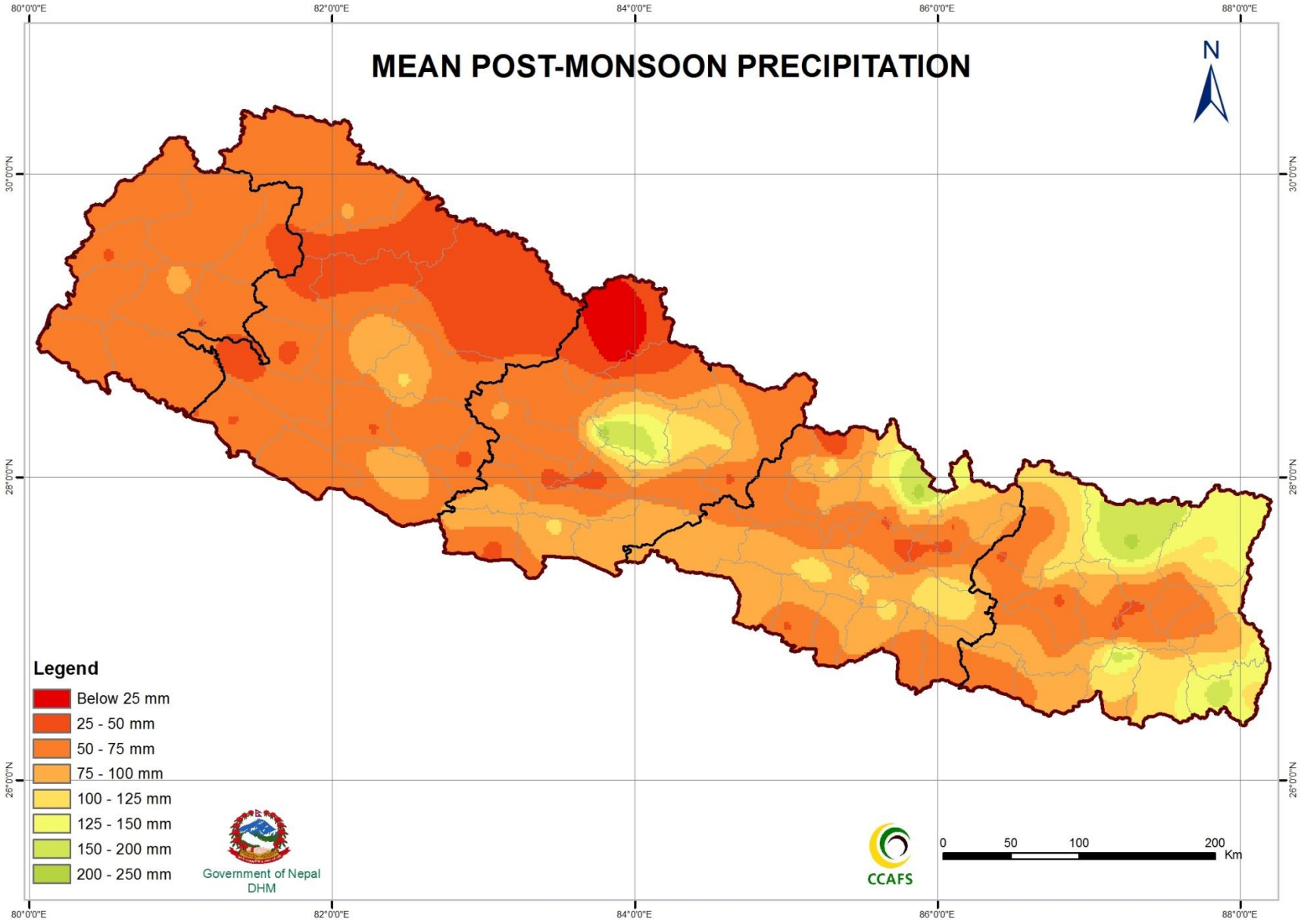

MEAN PRECIPITATION FOR NOVEMBER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 5 mm
5 - 10 mm
10 - 25 mm
25 - 50 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

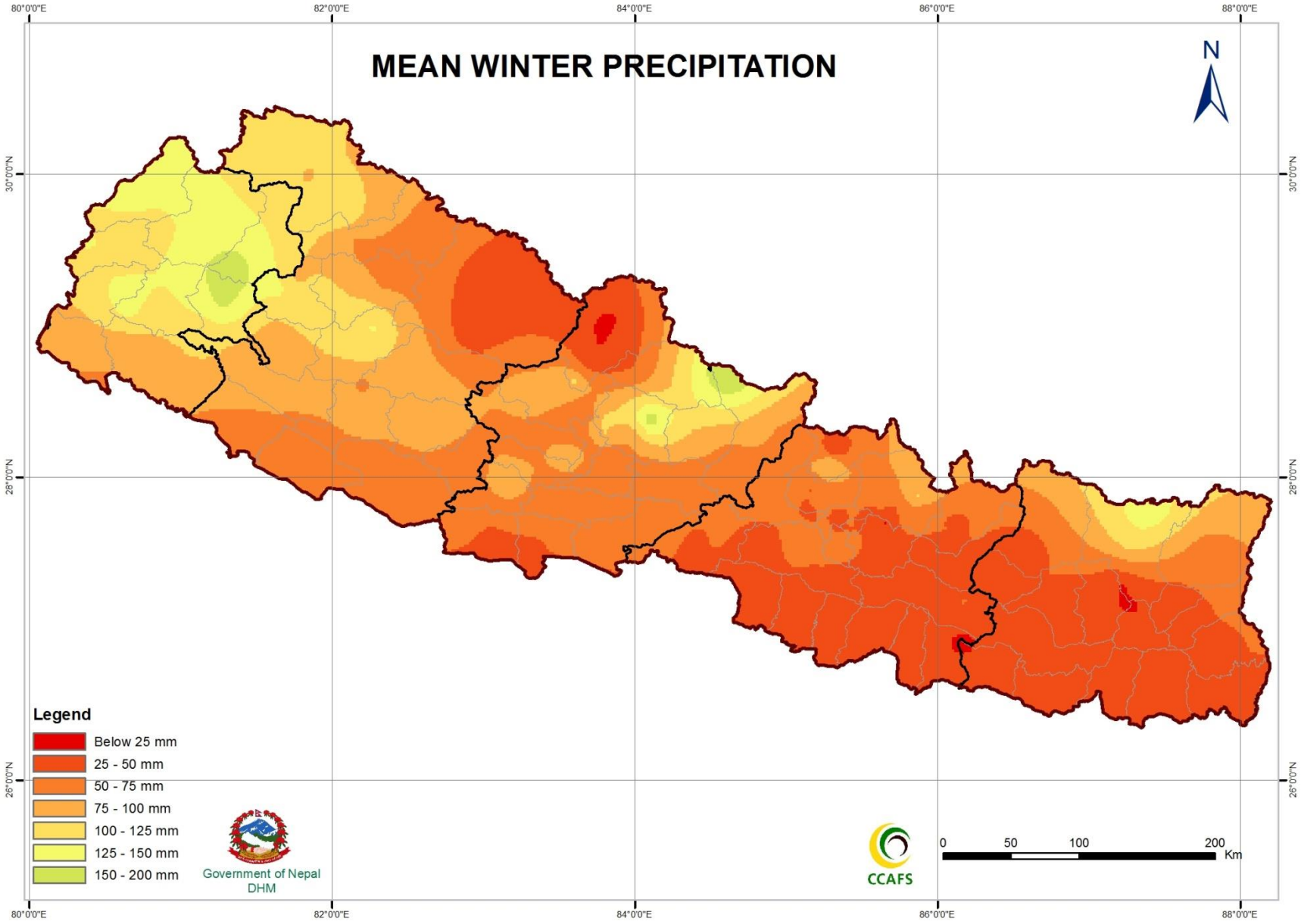

MEAN PRECIPITATION FOR DECEMBER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 5 mm
5 - 10 mm
10 - 25 mm
25 - 50 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

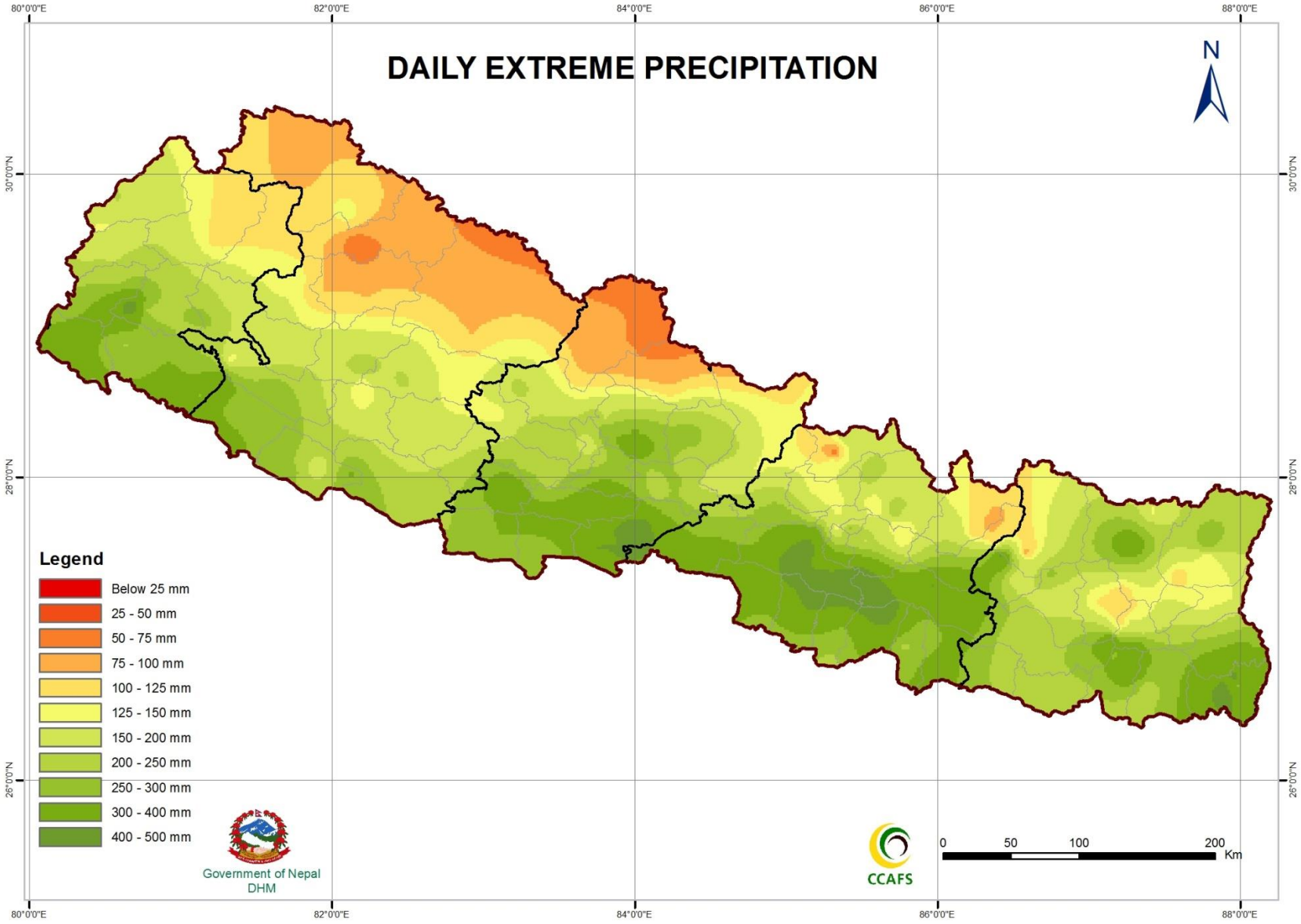

MEAN ANNUAL PRECIPITATION
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 200 mm
200 - 400 mm
400 - 600 mm
600 - 800 mm
800 - 1000 mm
1000 - 1200 mm
1200 - 1400 mm
1400 - 1600 mm
1600 - 1800 mm
1800 - 2000 mm
2000 - 2500 mm
2500 - 3000 mm
3000 - 3500 mm
3500 - 4000 mm
4000 - 4500 mm
4500 - 5000 mm
5000 - 5500 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

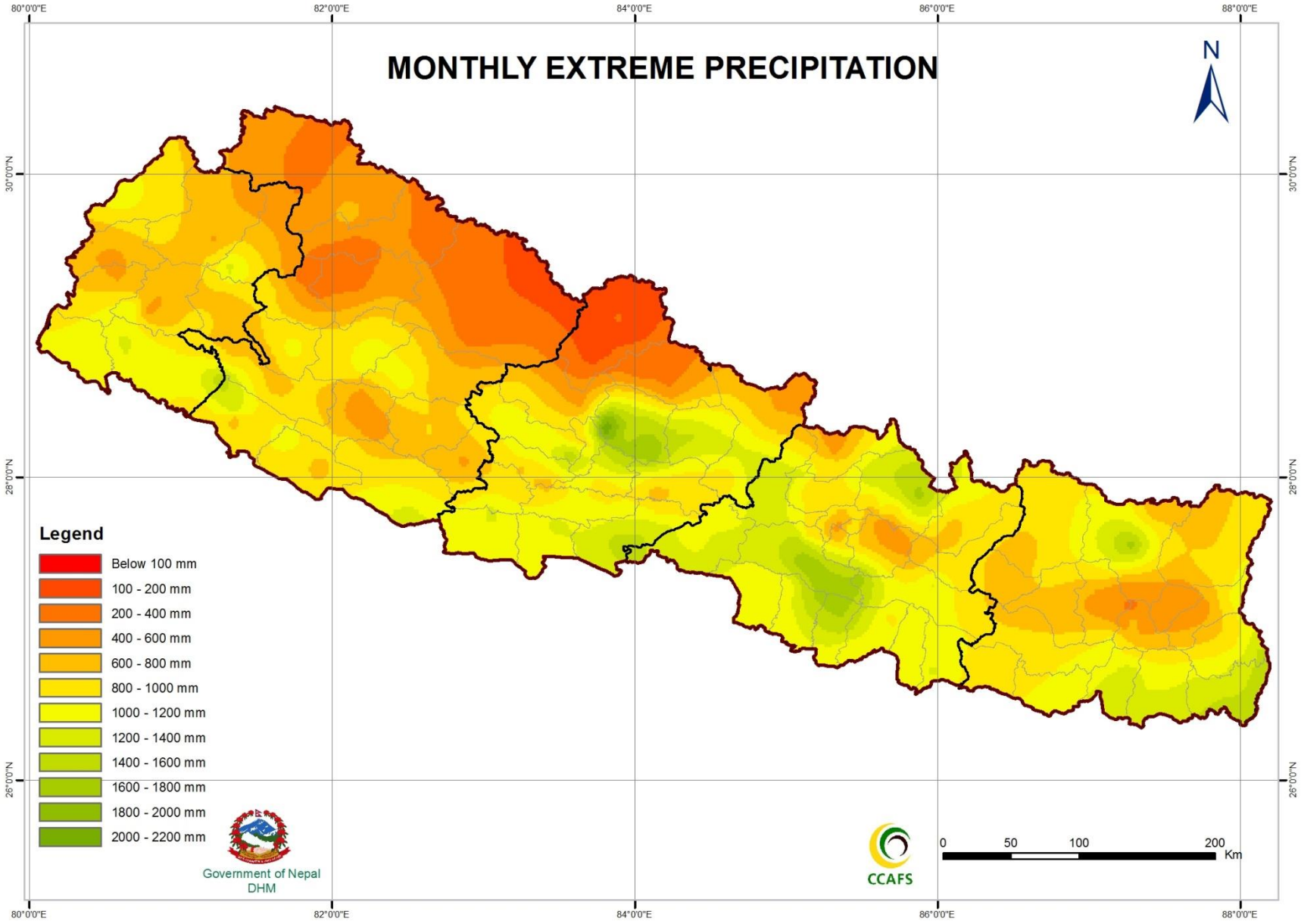

MEAN PREMONSOON PRECIPITATION
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 25 mm
25 - 50 mm
50 - 75 mm
75 - 100 mm
100 - 125 mm
125 - 150 mm
150 - 200 mm
200 - 250 mm
250 - 300 mm
300 - 400 mm
400 - 500 mm
500 - 600 mm
600 - 700 mm
700 - 800 mm
800 - 900 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

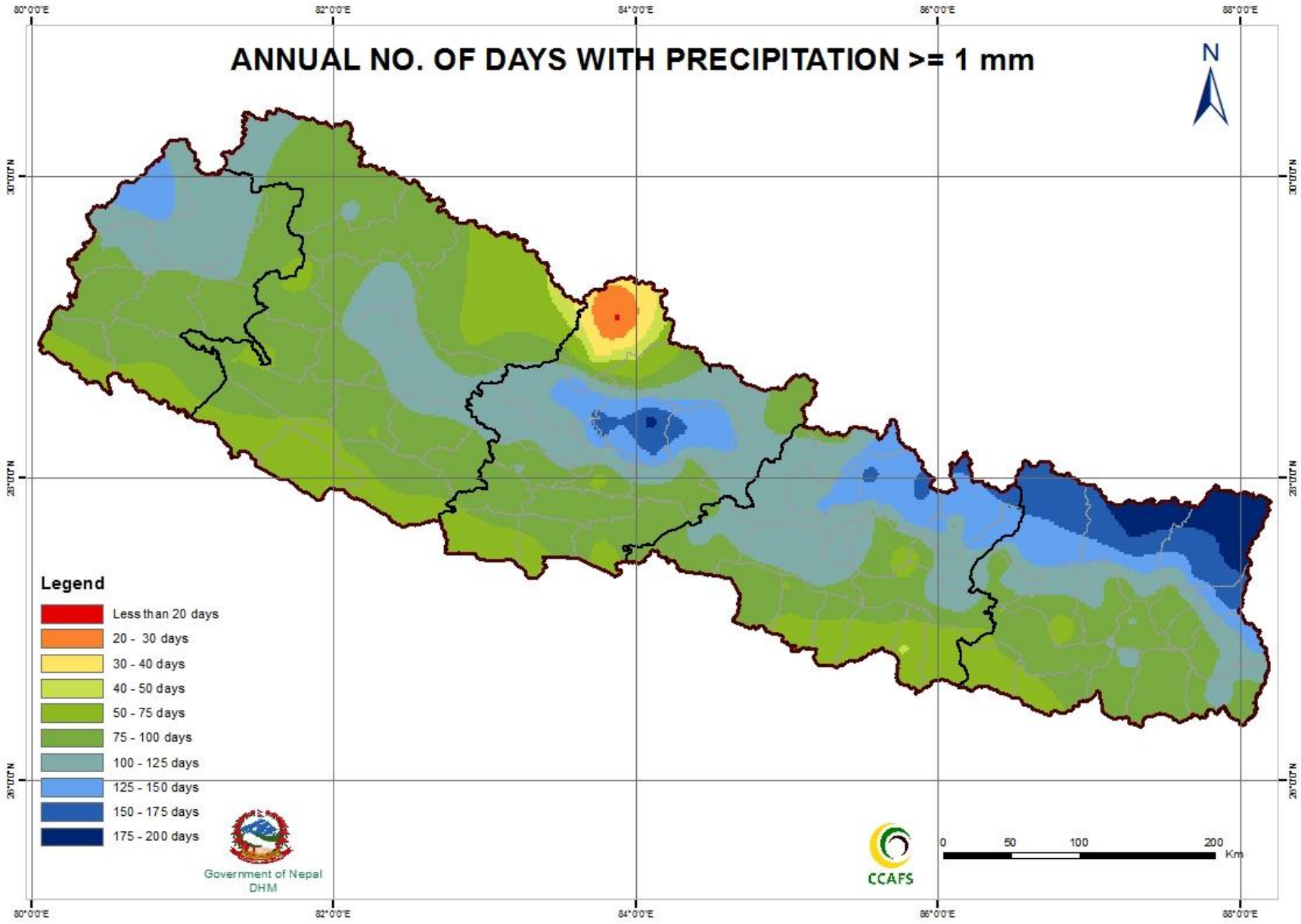

MEAN MONSOON PRECIPITATION
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 100 mm
100 - 200 mm
200 - 400 mm
400 - 600 mm
600 - 800 mm
800 - 1000 mm
1000 - 1200 mm
1200 - 1400 mm
1400 - 1600 mm
1600 - 1800 mm
1800 - 2000 mm
2000 - 2500 mm
2500 - 3000 mm
3000 - 3500 mm
3500 - 4000 mm
4000 - 4500 mm
4500 - 5000 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

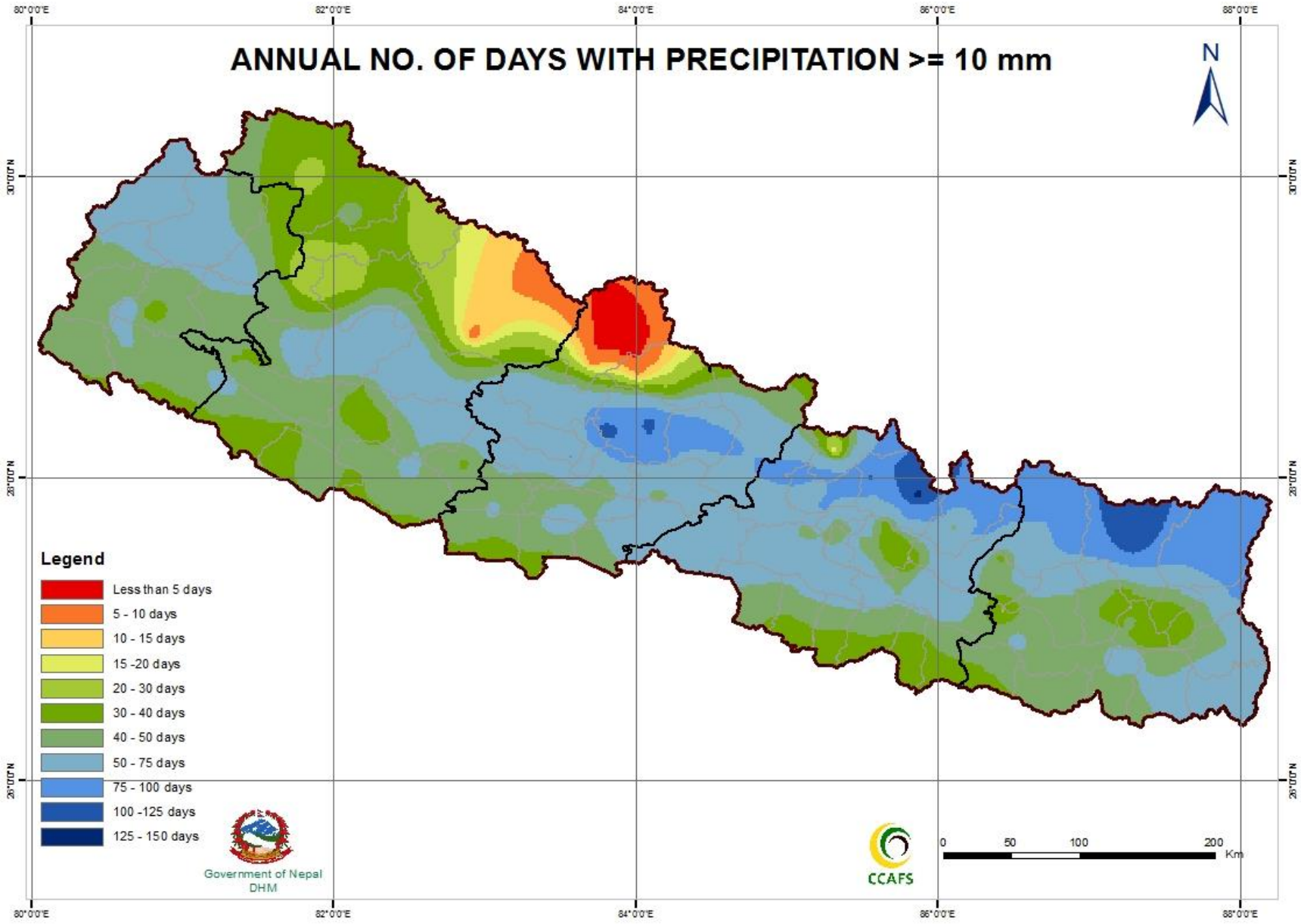

MEAN POST-MONSOON PRECIPITATION
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 25 mm
25 - 50 mm
50 - 75 mm
75 - 100 mm
100 - 125 mm
125 - 150 mm
150 - 200 mm
200 - 250 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

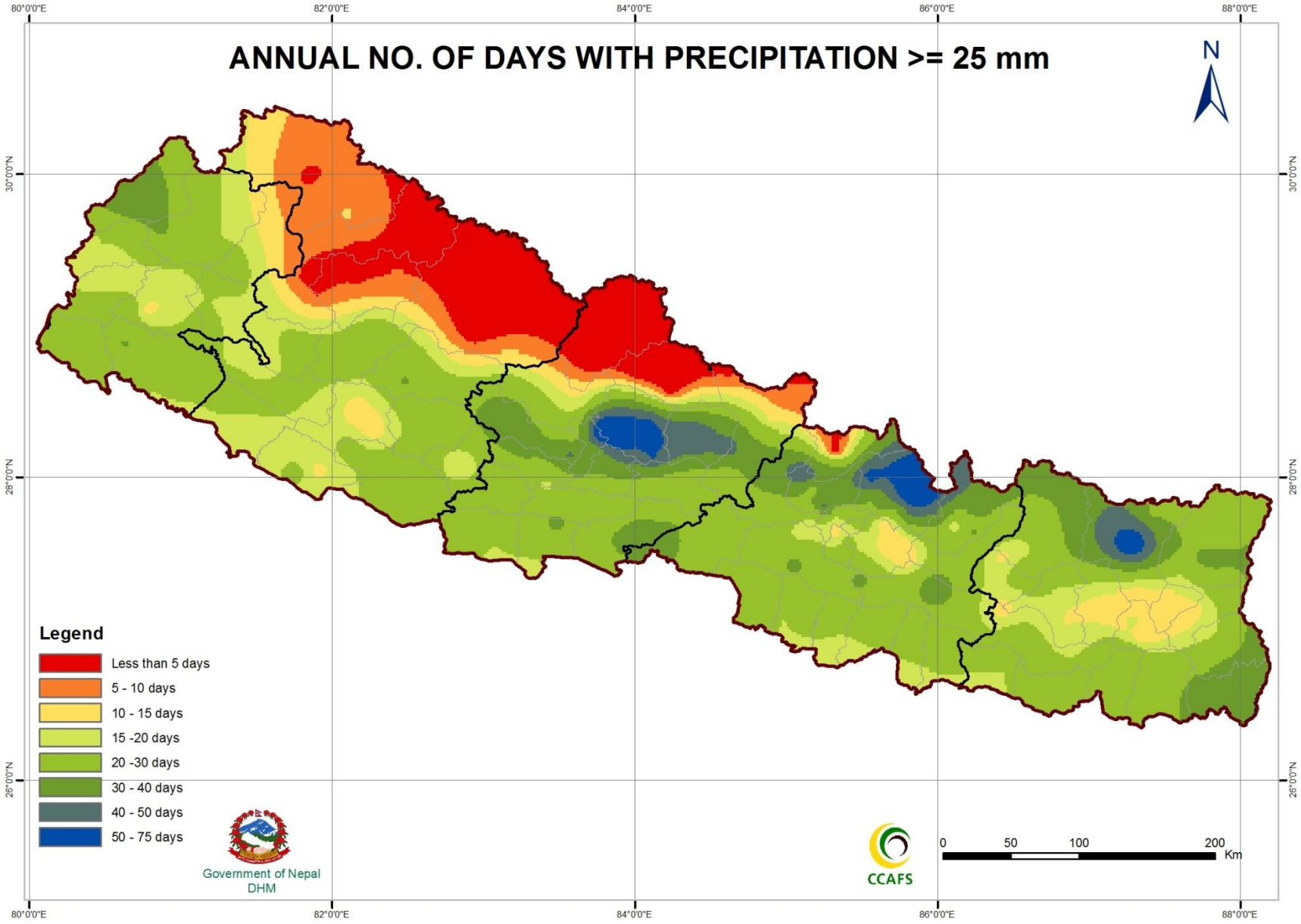

MEAN WINTER PRECIPITATION
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 25 mm
25 - 50 mm
50 - 75 mm
75 - 100 mm
100 - 125 mm
125 - 150 mm
150 - 200 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

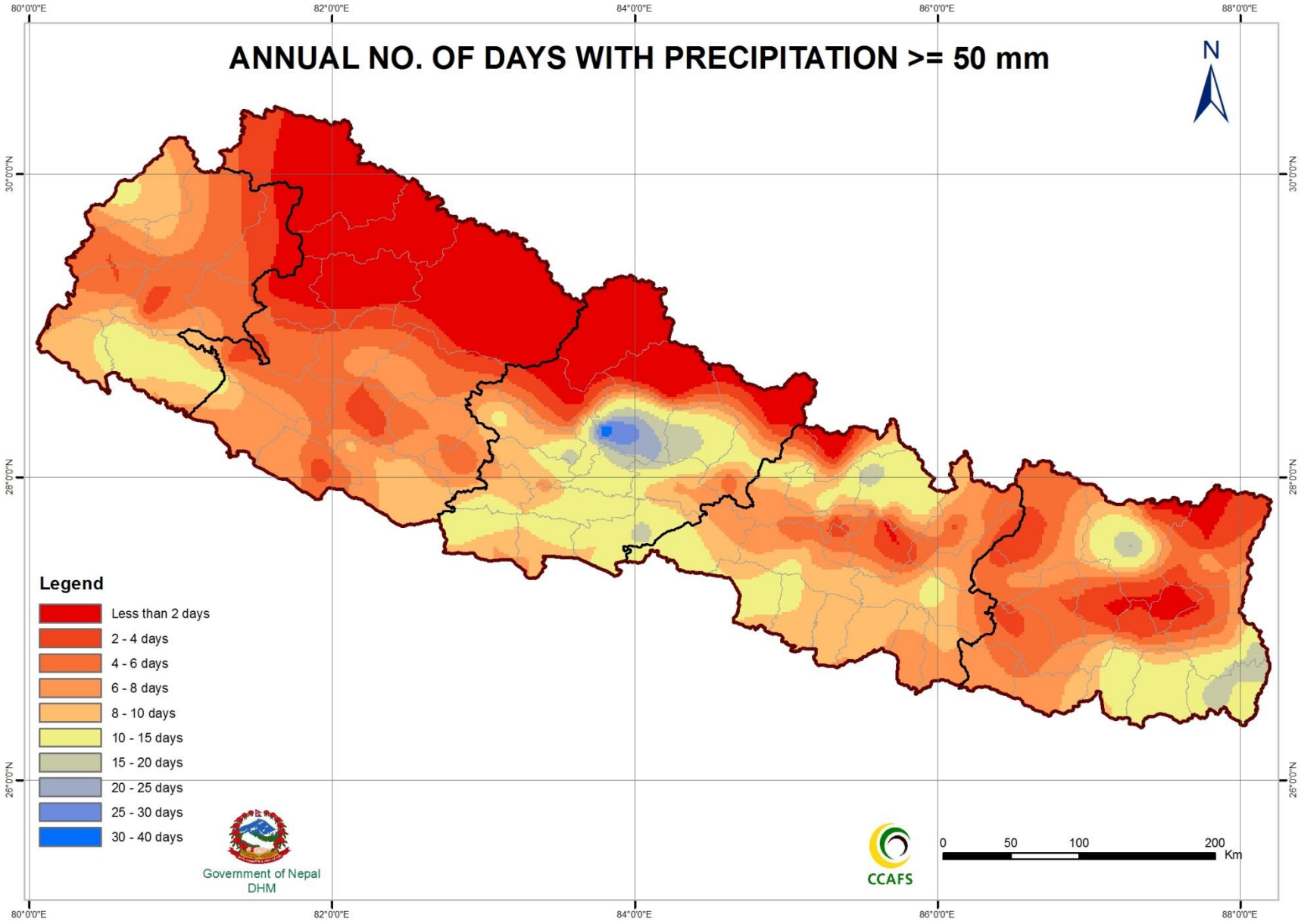

DAILY EXTREME PRECIPITATION
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 25 mm
25 - 50 mm
50 - 75 mm
75 - 100 mm
100 - 125 mm
125 - 150 mm
150 - 200 mm
200 - 250 mm
250 - 300 mm
300 - 400 mm
400 - 500 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

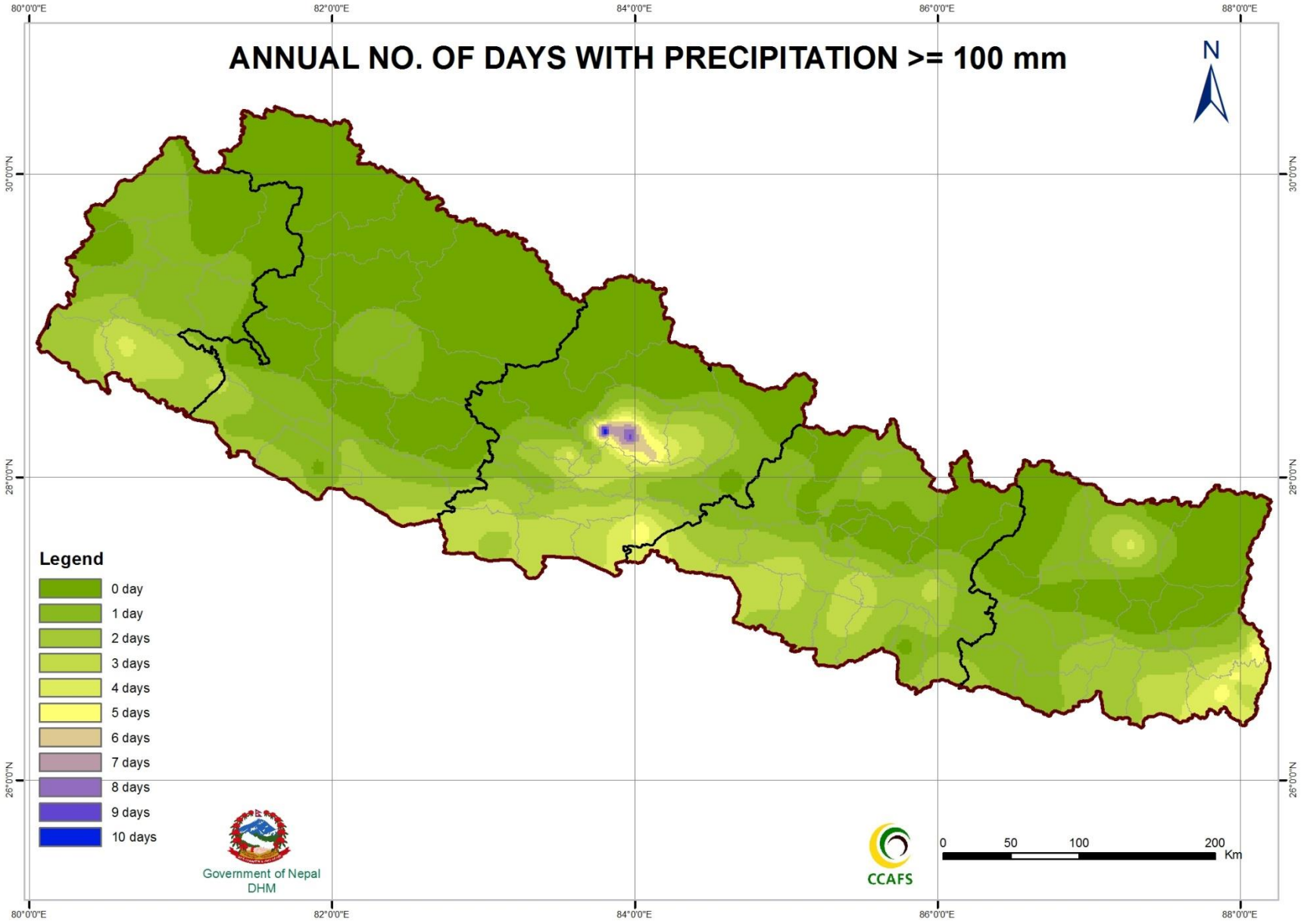

MONTHLY EXTREME PRECIPITATION
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Below 100 mm
100 - 200 mm
200 - 400 mm
400 - 600 mm
600 - 800 mm
800 - 1000 mm
1000 - 1200 mm
1200 - 1400 mm
1400 - 1600 mm
1600 - 1800 mm
1800 - 2000 mm
2000 - 2200 mm
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

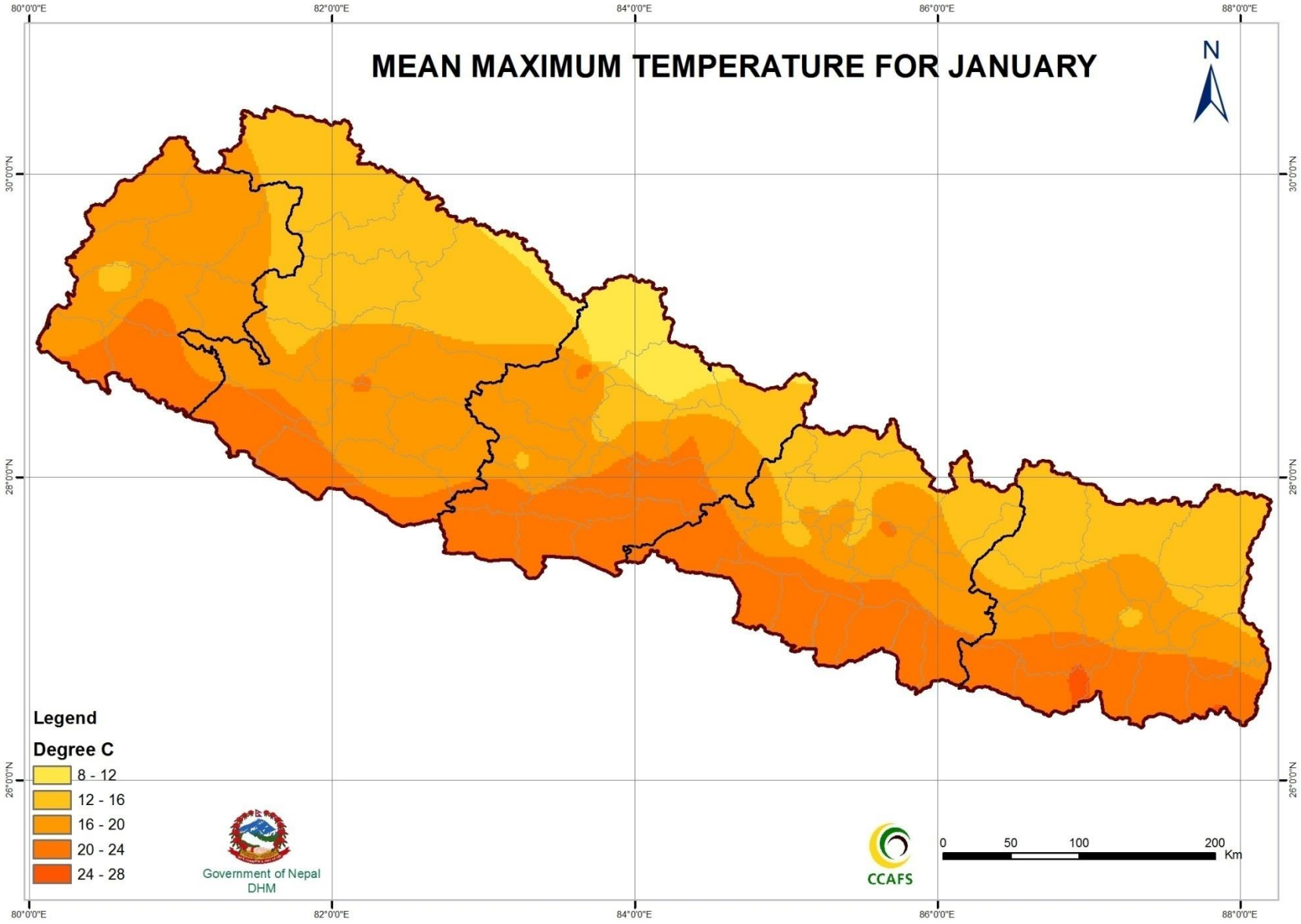

ANNUAL NO. OF DAYS WITH PRECIPITATION >= 1 mm
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Less than 20 days
20 - 30 days
30 - 40 days
40 - 50 days
50 - 75 days
75 - 100 days
100 - 125 days
125 - 150 days
150 - 175 days
175 - 200 days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

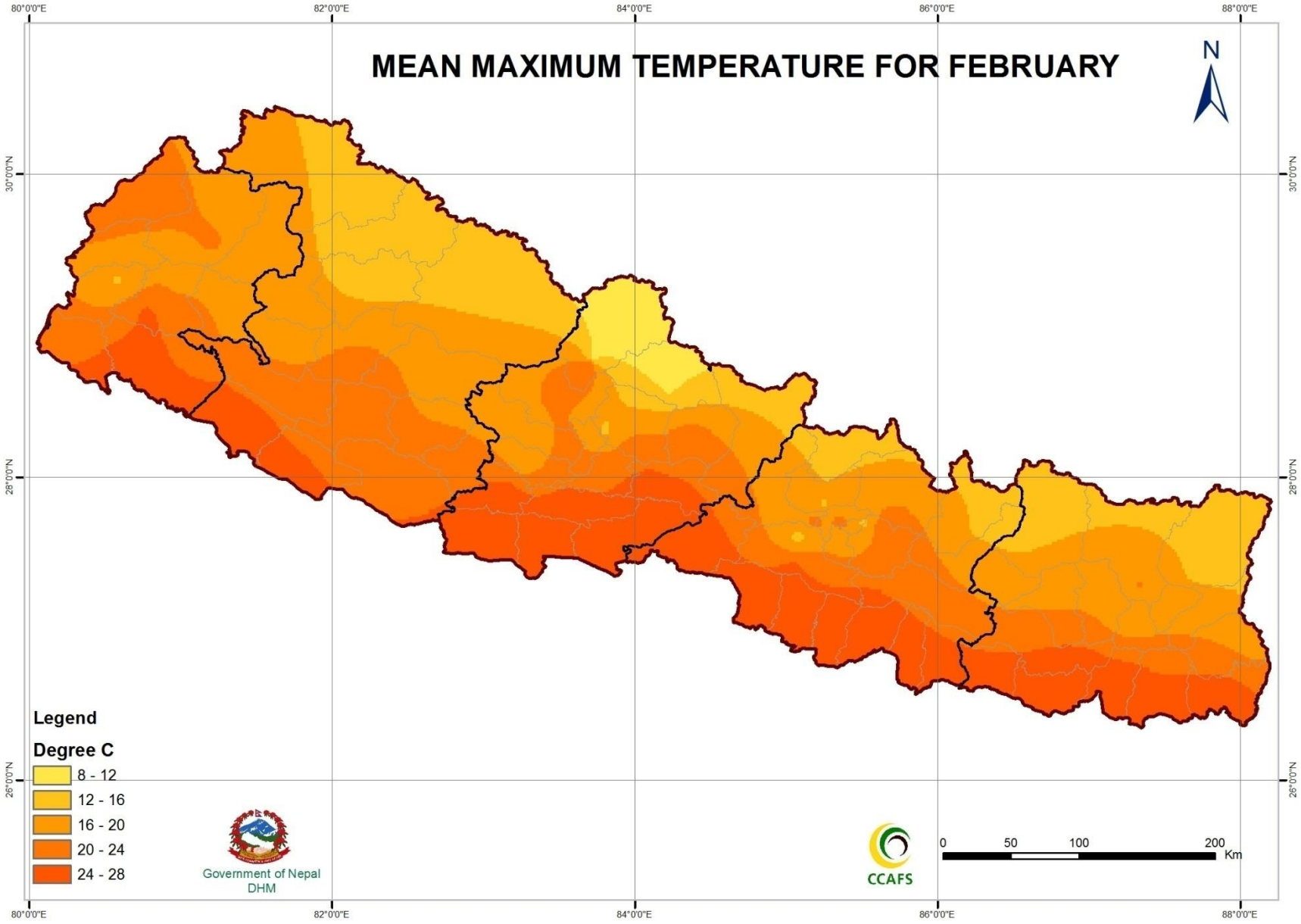

ANNUAL NO. OF DAYS WITH PRECIPITATION >= 10 mm
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Less than 5 days
5 - 10 days
10 - 15 days
15 -20 days
20 - 30 days
30 - 40 days
40 - 50 days
50 - 75 days
75 - 100 days
100 -125 days
125 - 150 days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

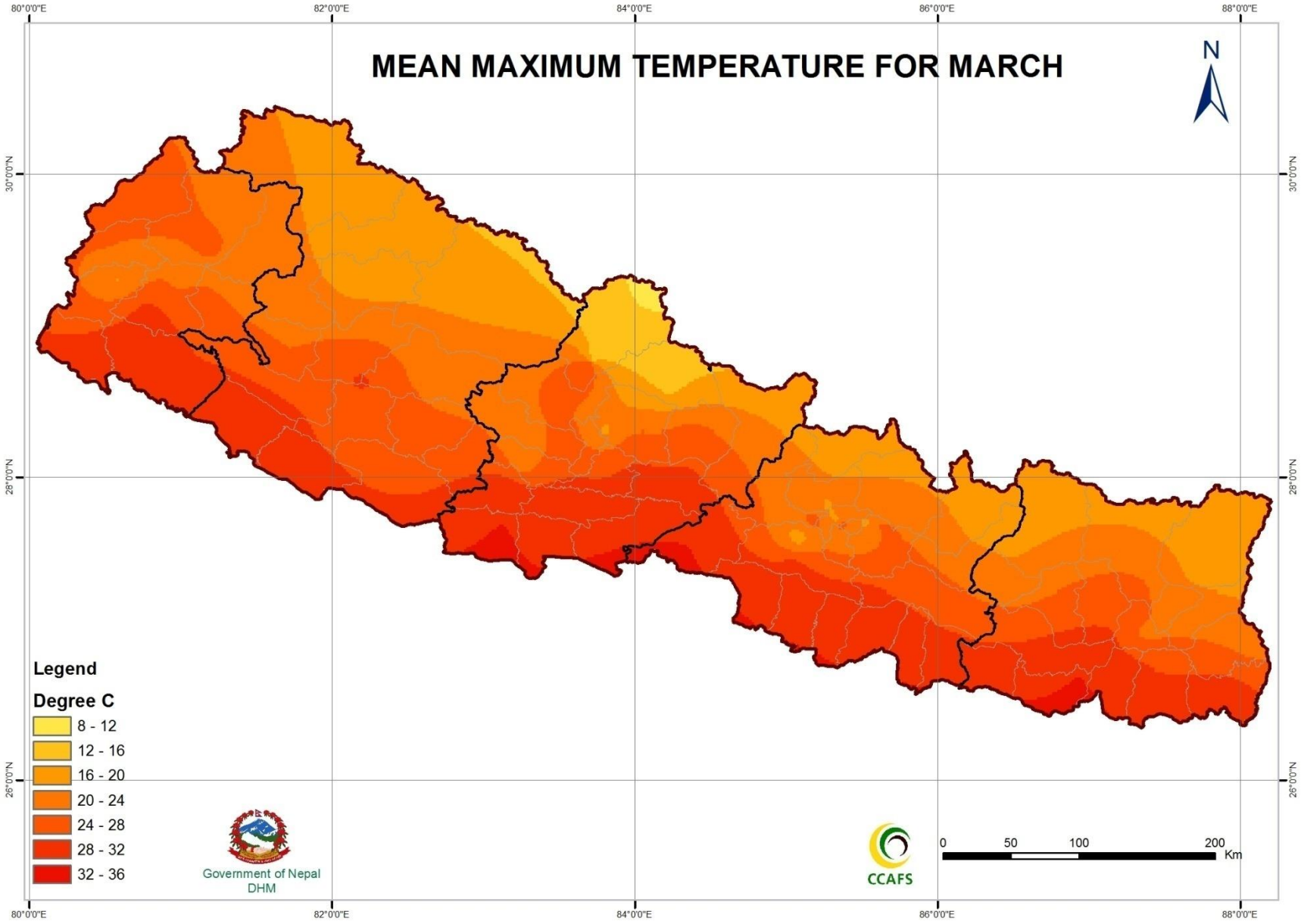

ANNUAL NO. OF DAYS WITH PRECIPITATION >= 25 mm
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Less than 5 days
5 - 10 days
10 - 15 days
15 -20 days
20 -30 days
30 - 40 days
40 - 50 days
50 - 75 days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

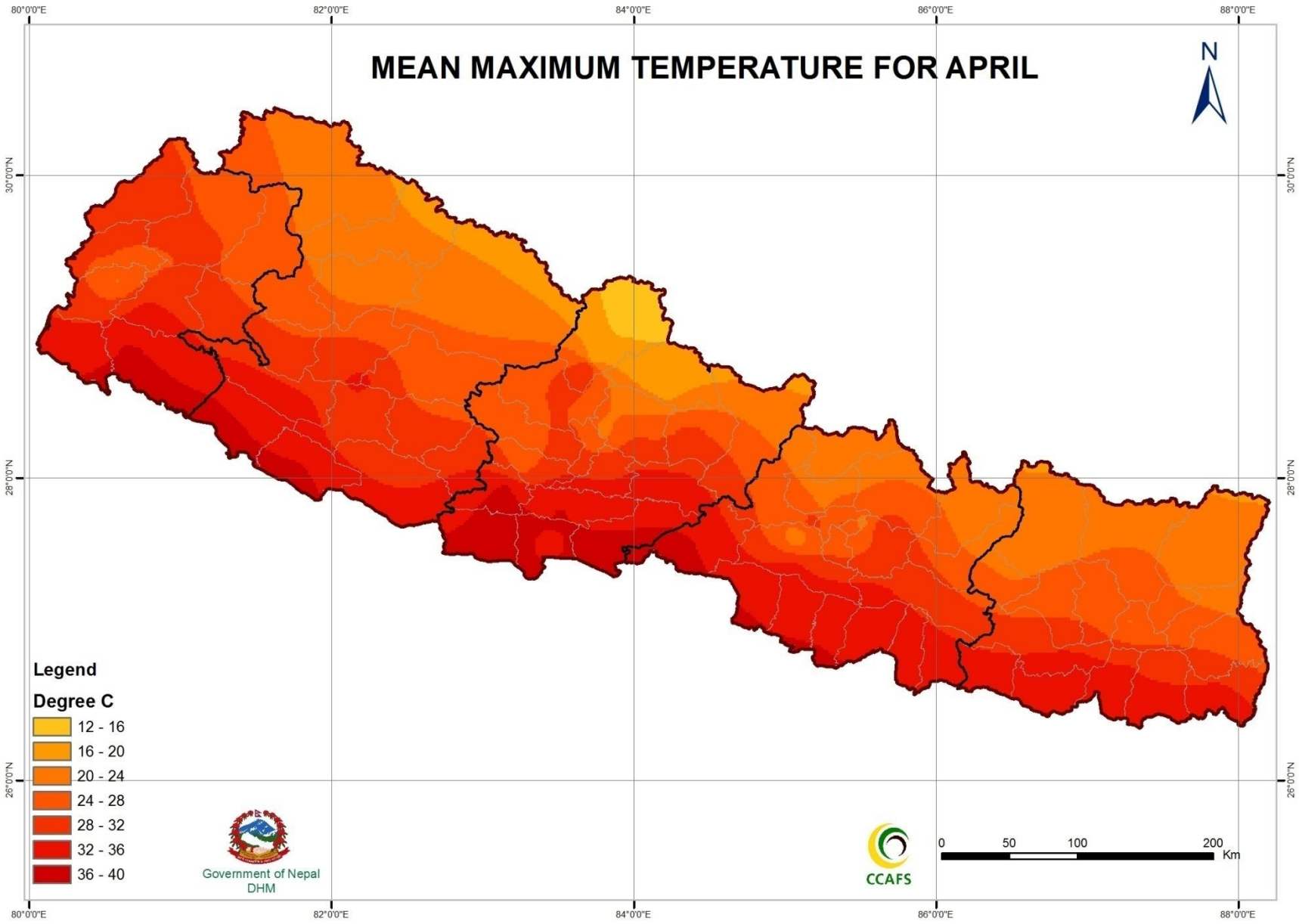

ANNUAL NO. OF DAYS WITH PRECIPITATION >= 50 mm
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Less than 2 days
2 - 4 days
4 - 6 days
6 - 8 days
8 - 10 days
10 - 15 days
15 - 20 days
20 - 25 days
25 - 30 days
30 - 40 days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

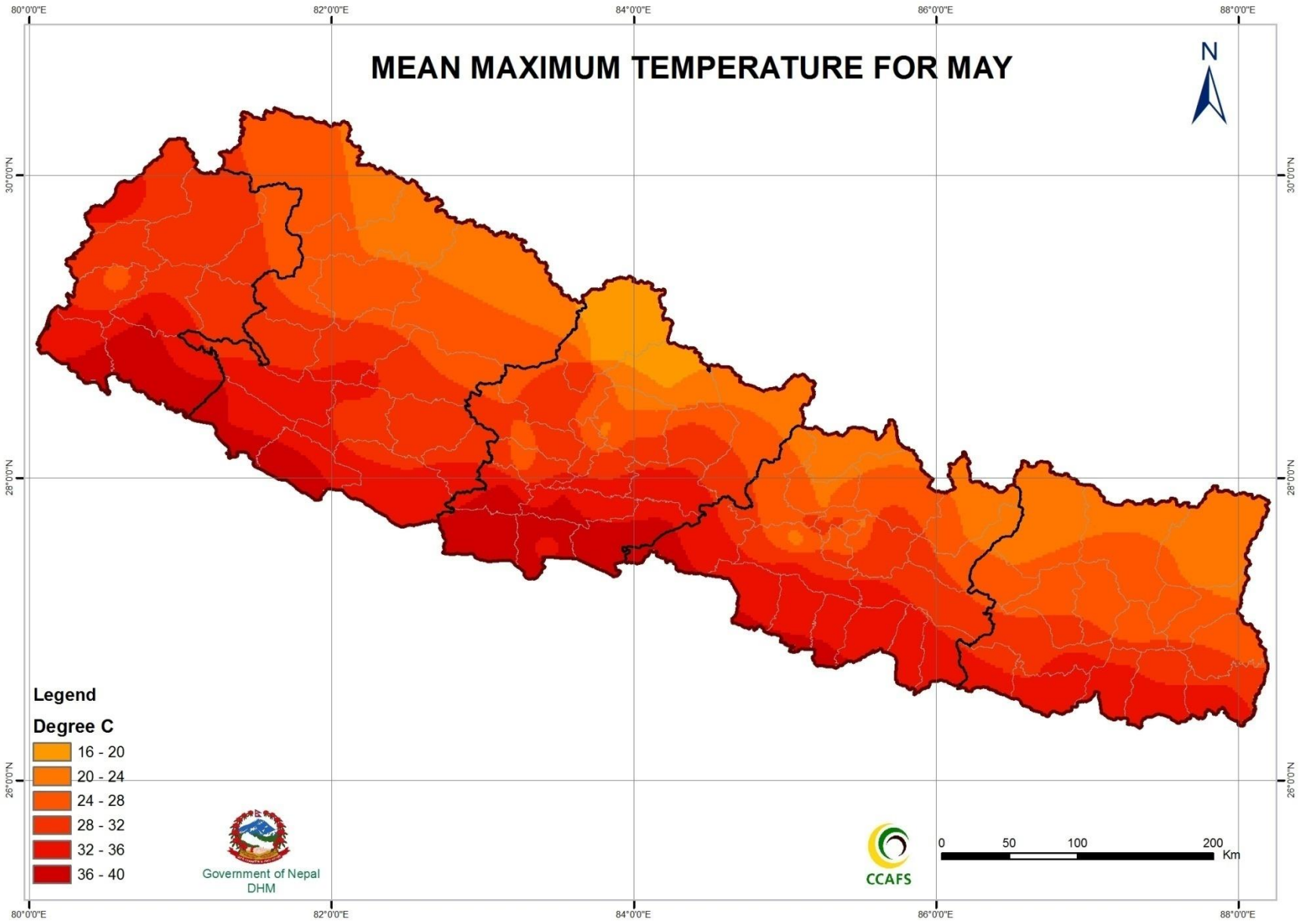

ANNUAL NO. OF DAYS WITH PRECIPITATION >= 100 mm
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
0 day
1 day
2 days
3 days
4 days
5 days
6 days
7 days
8 days
9 days
10 days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

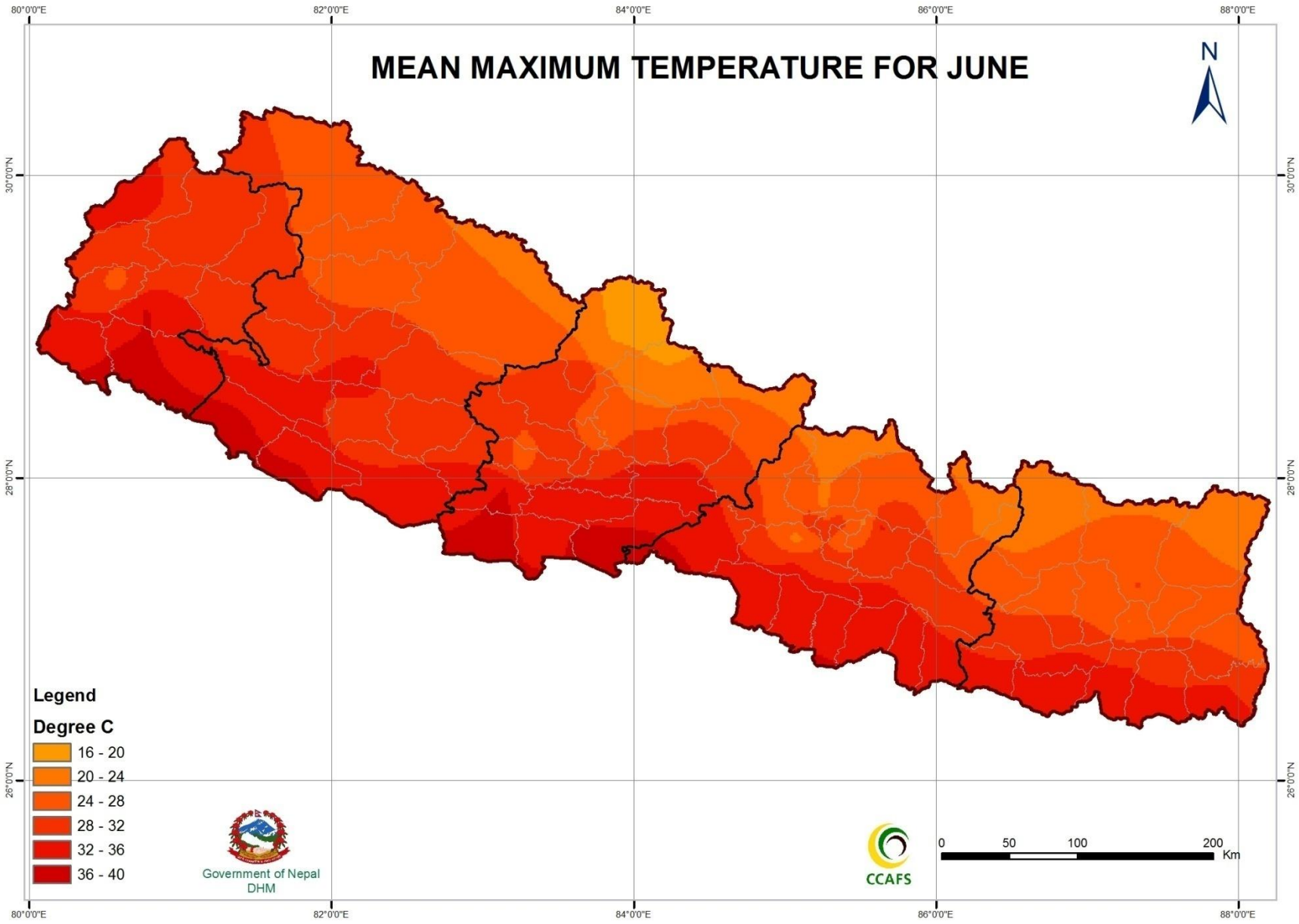

MEAN MAXIMUM TEMPERATURE FOR JANUARY
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
8 - 12
12 - 16
16 - 20
20 - 24
24 - 28
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

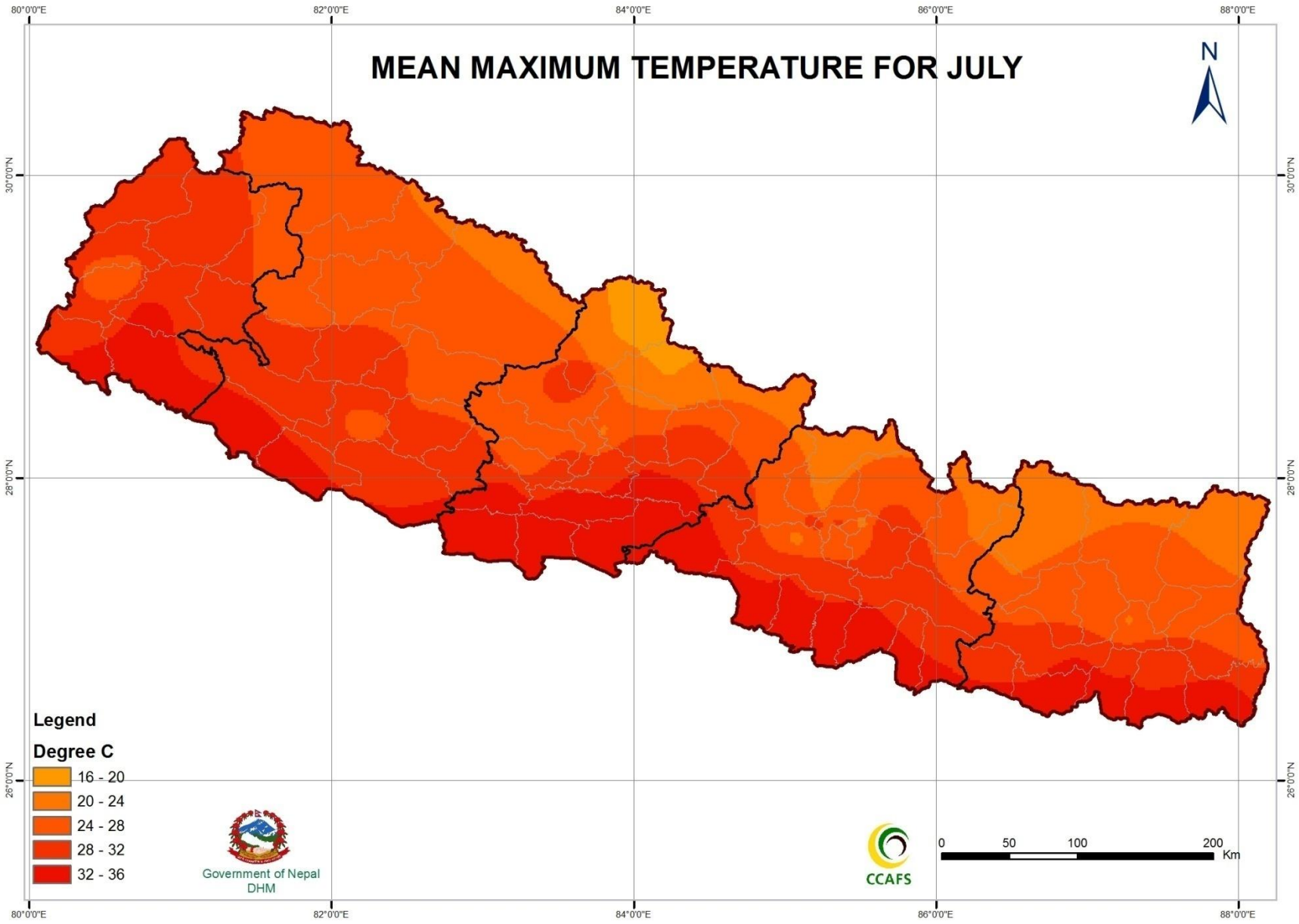

MEAN MAXIMUM TEMPERATURE FOR FEBRUARY
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
8 - 12
12 - 16
16 - 20
20 - 24
24 - 28
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

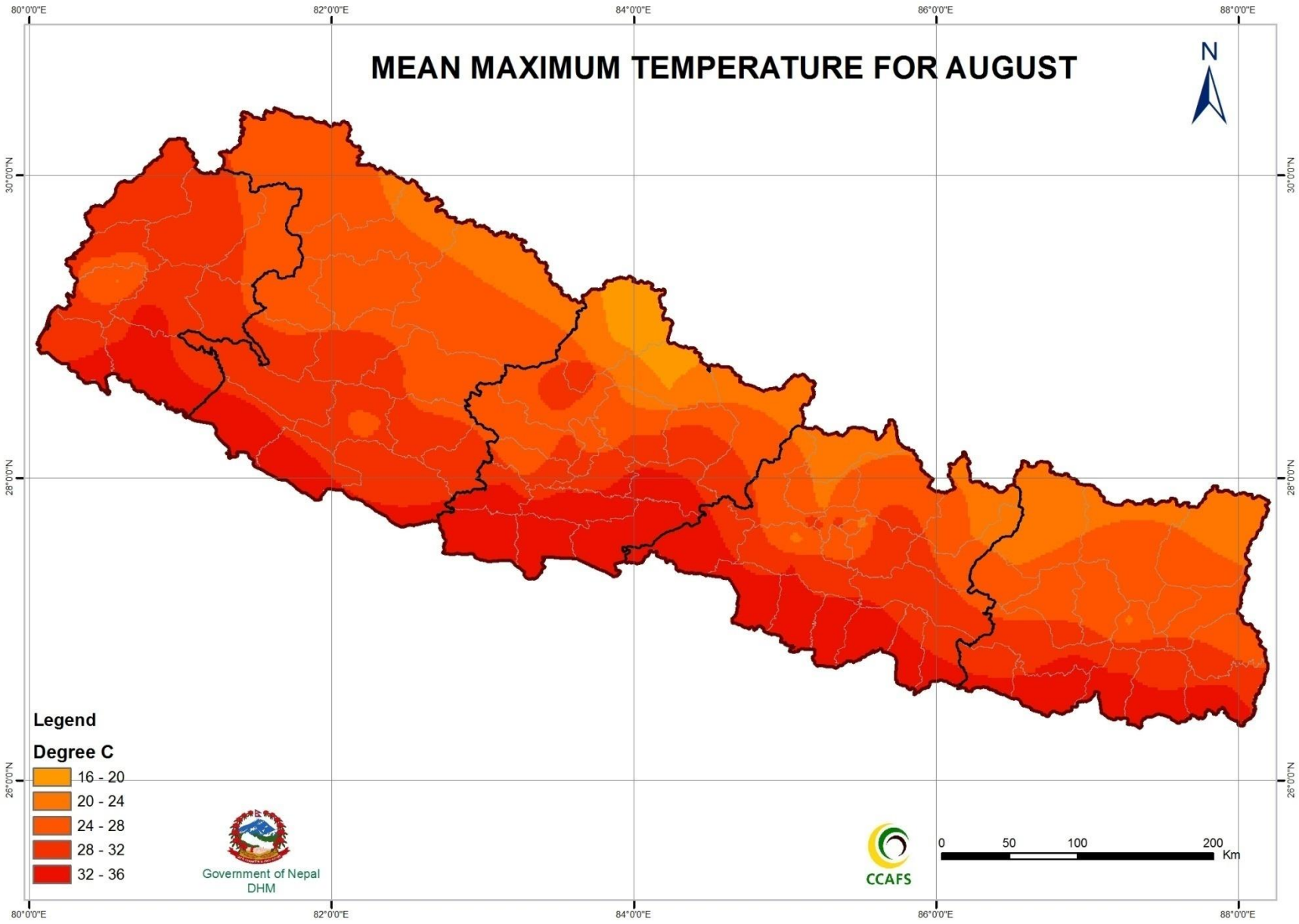

MEAN MAXIMUM TEMPERATURE FOR MARCH
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
8 - 12
12 - 16
16 - 20
20 - 24
24 - 28
28 - 32
32 - 36
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN MAXIMUM TEMPERATURE FOR APRIL
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
12 - 16
16 - 20
20 - 24
24 - 28
28 - 32
32 - 36
36 - 40
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN MAXIMUM TEMPERATURE FOR MAY
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
16 - 20
20 - 24
24 - 28
28 - 32
32 - 36
36 - 40
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN MAXIMUM TEMPERATURE FOR JUNE
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
16 - 20
20 - 24
24 - 28
28 - 32
32 - 36
36 - 40
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN MAXIMUM TEMPERATURE FOR JULY
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
16 - 20
20 - 24
24 - 28
28 - 32
32 - 36
Government of Nepal
DHM
CCAFS
0
50
100
200
Km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26°0'0"N
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Government of Nepal
DHM
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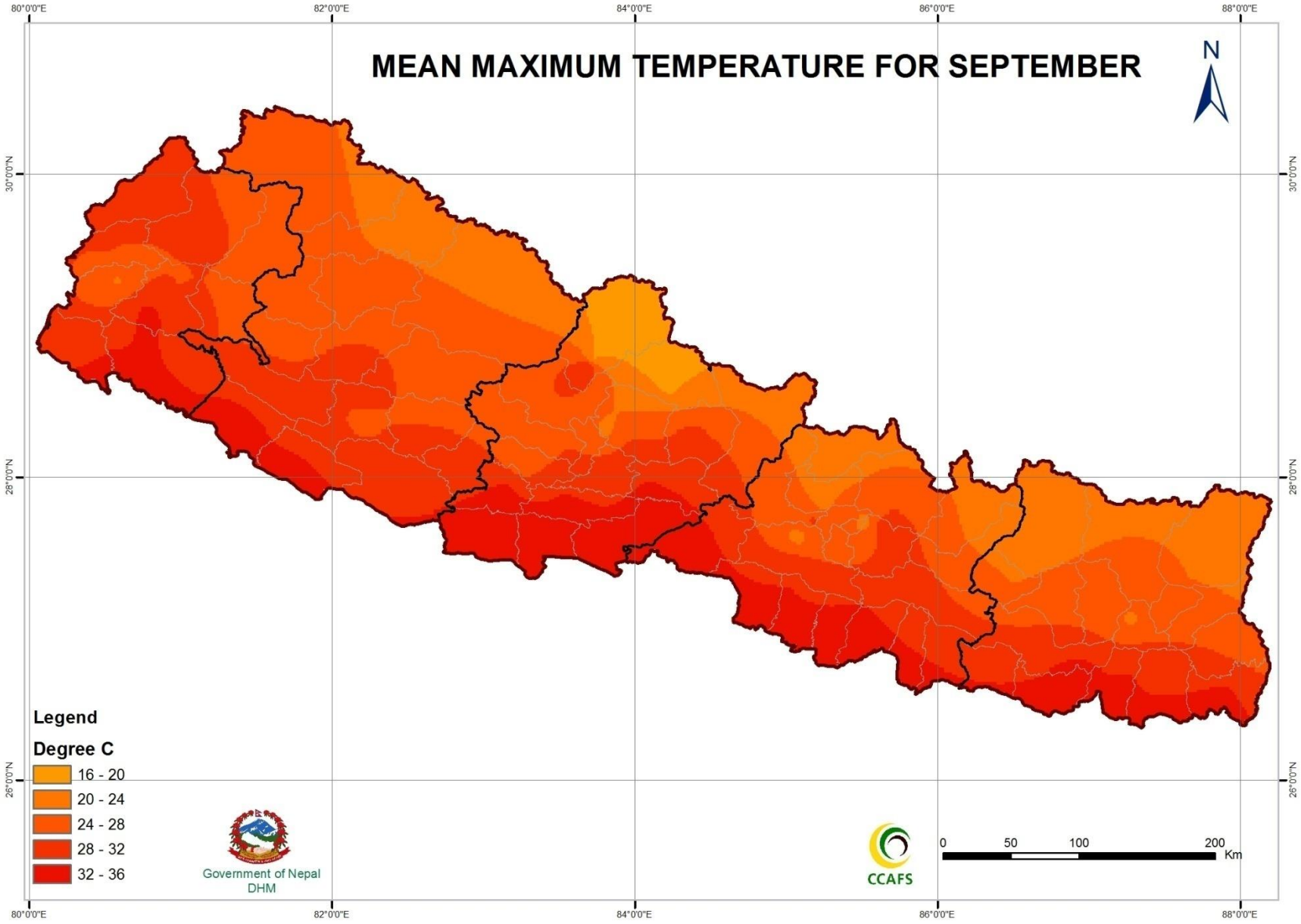
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Government of Nepal
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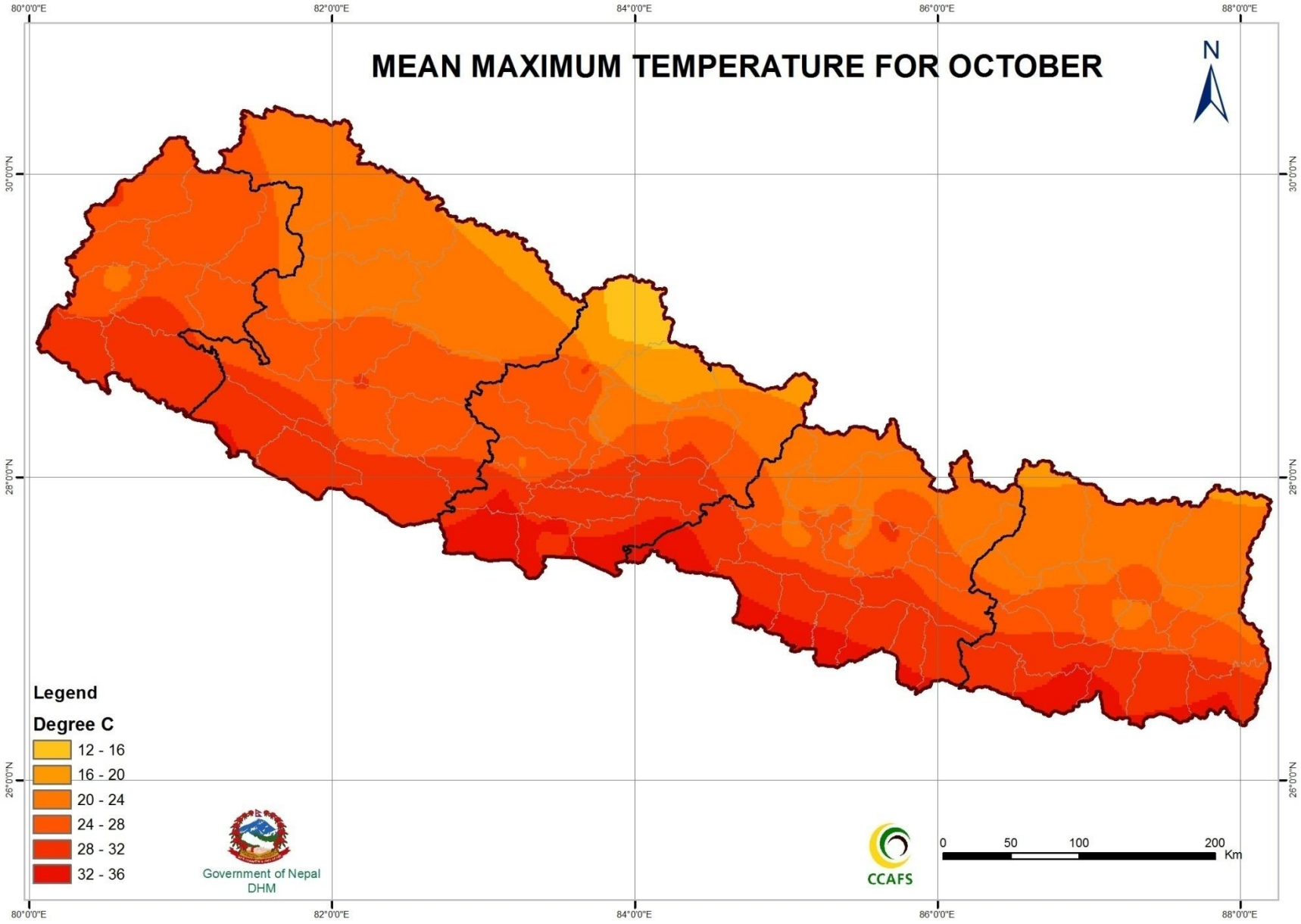
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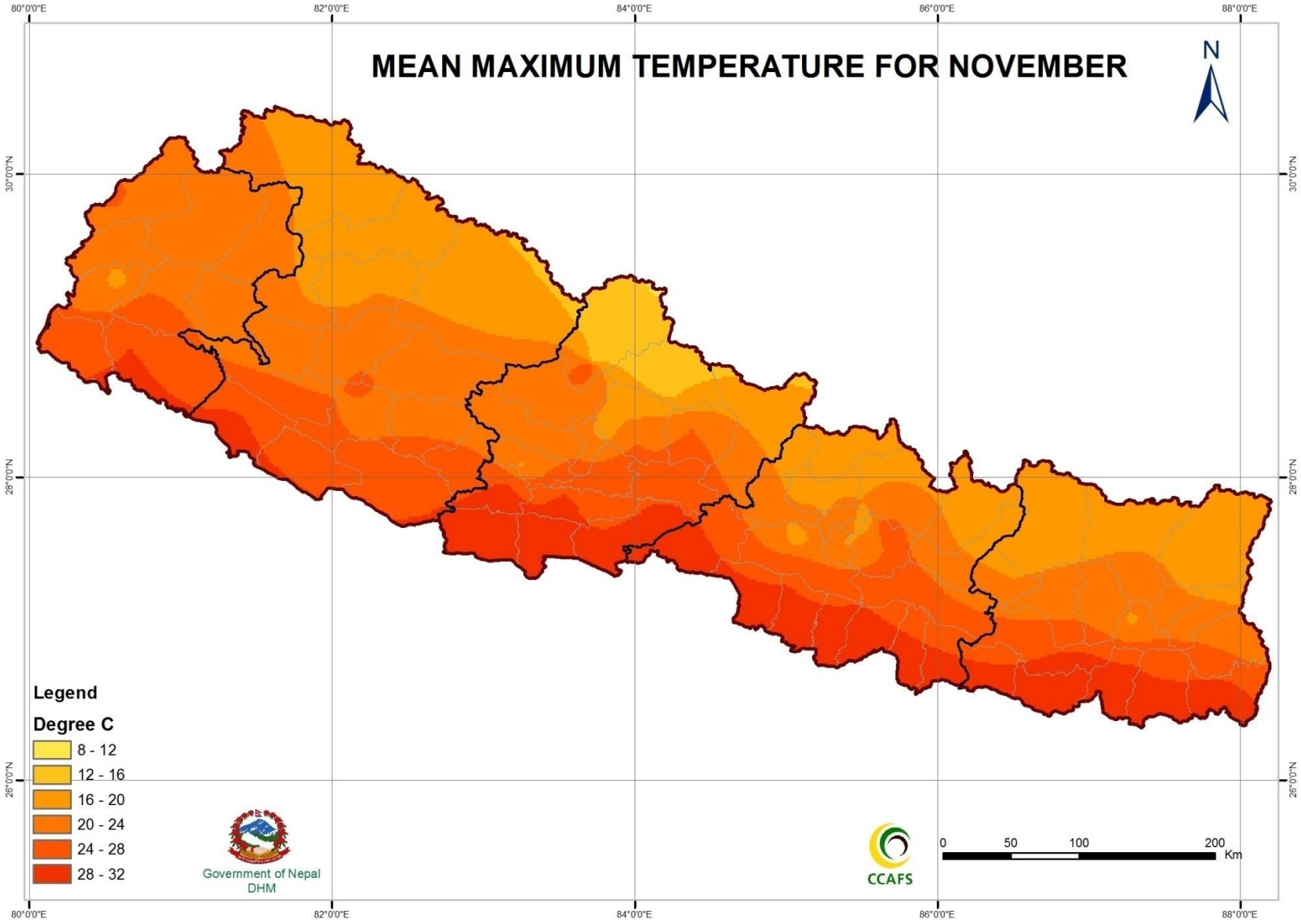
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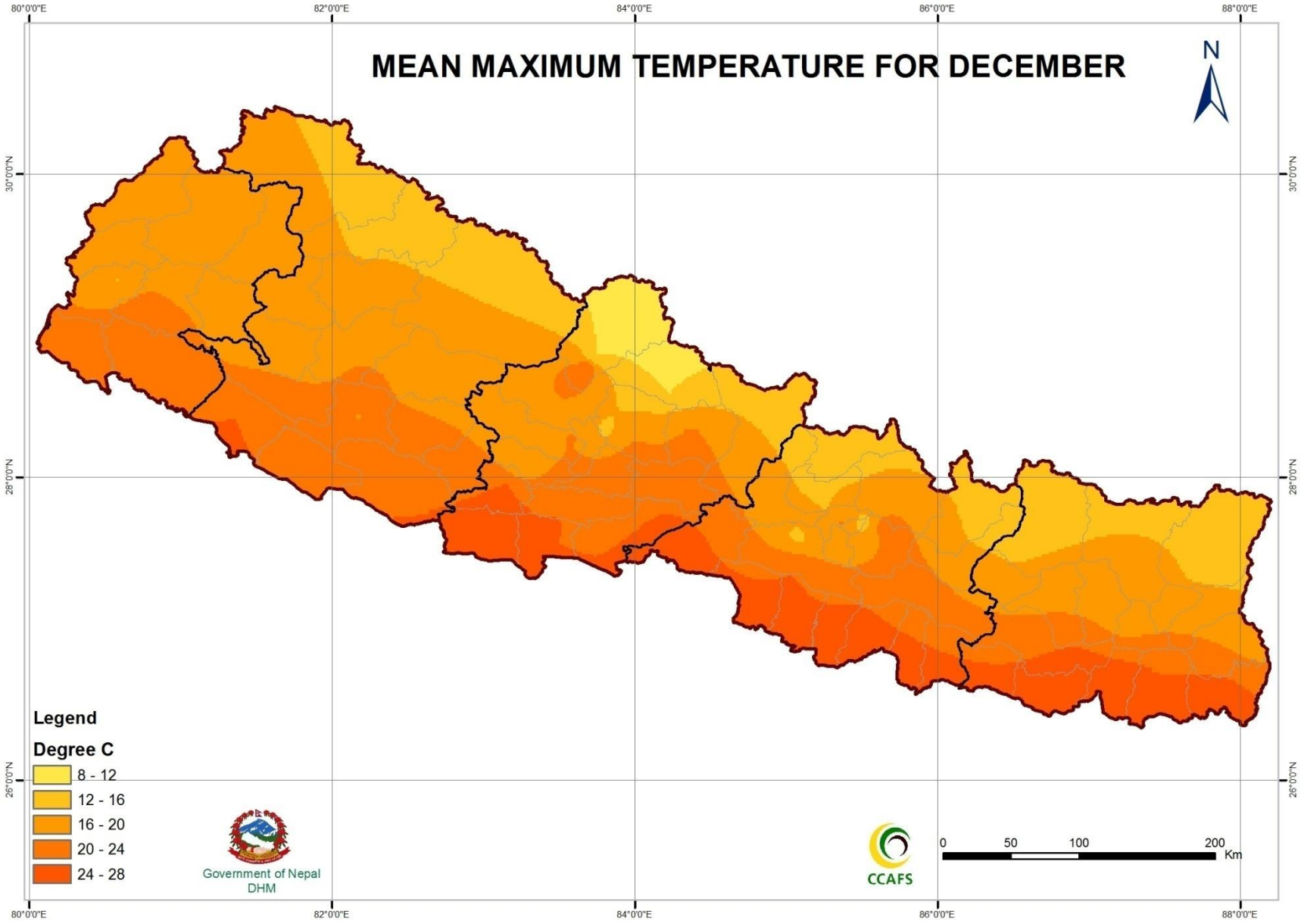
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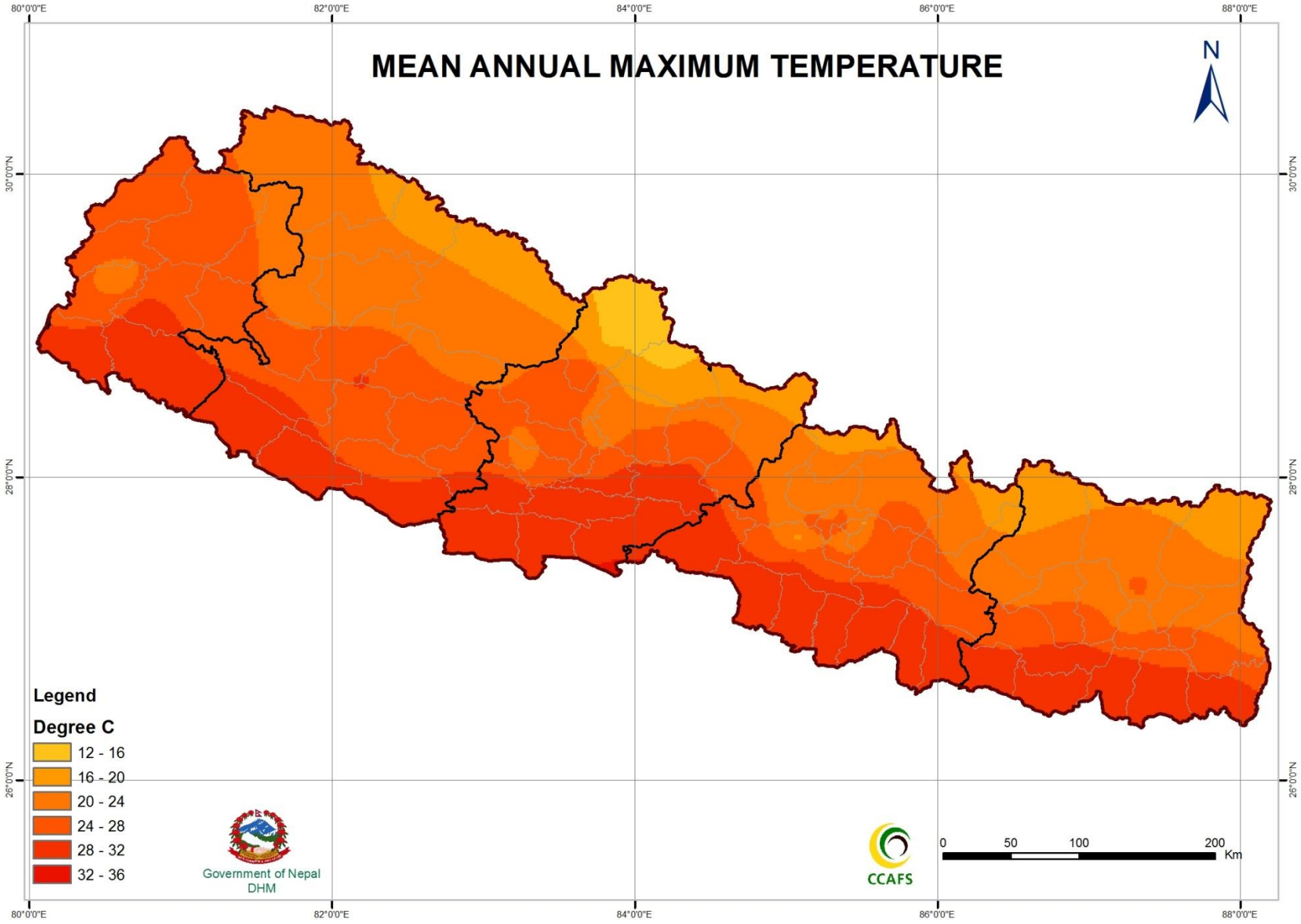
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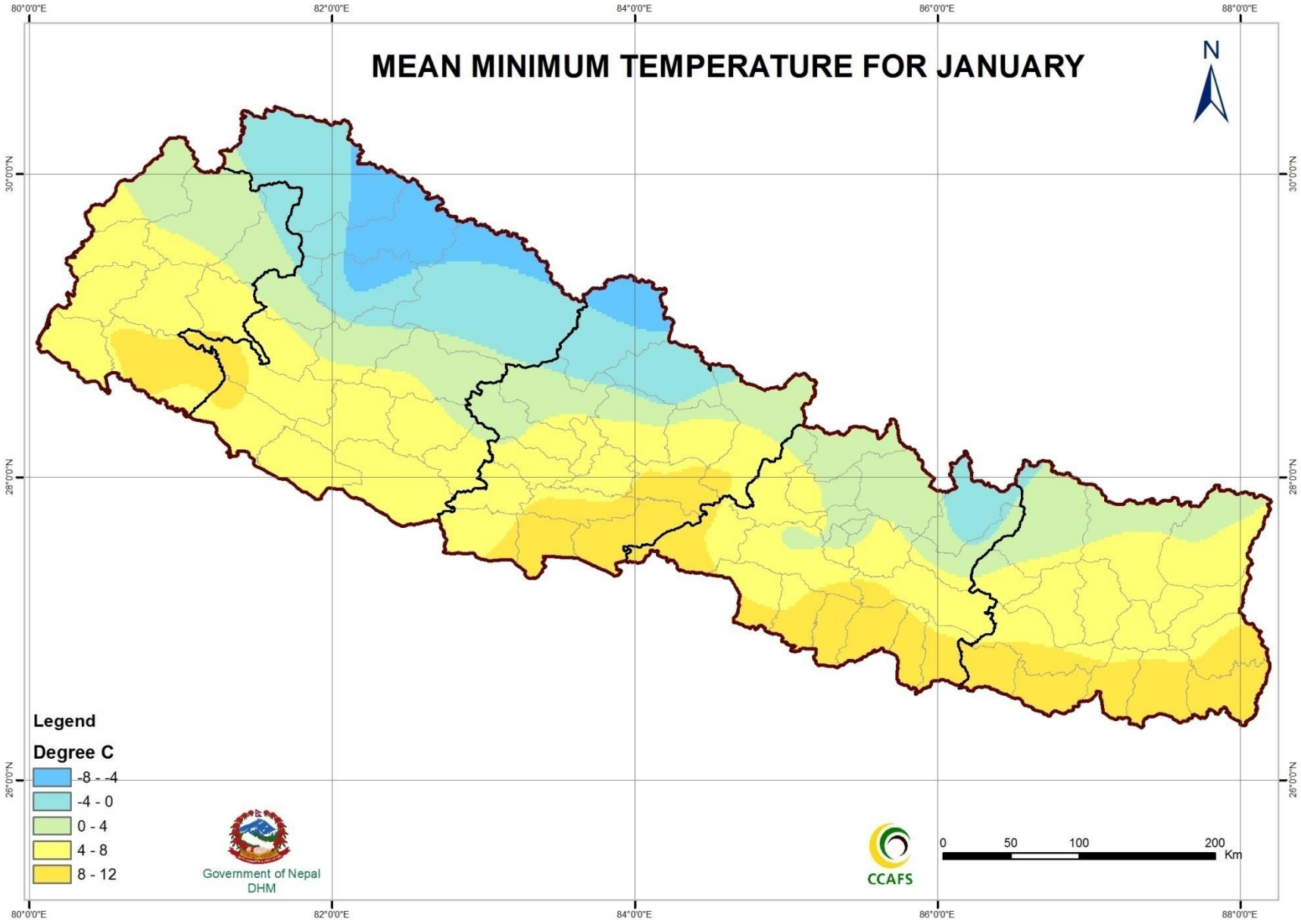
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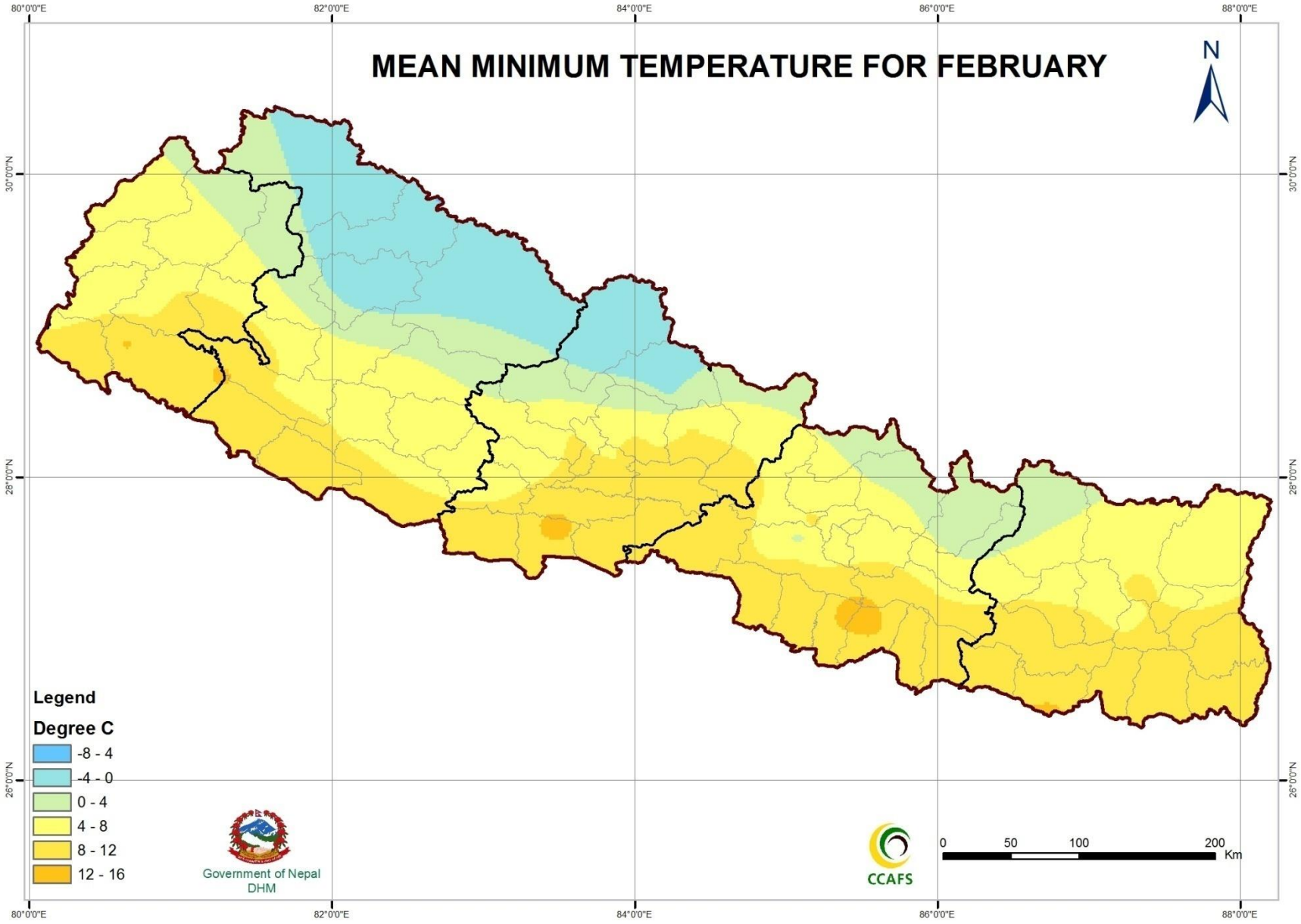
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Government of Nepal
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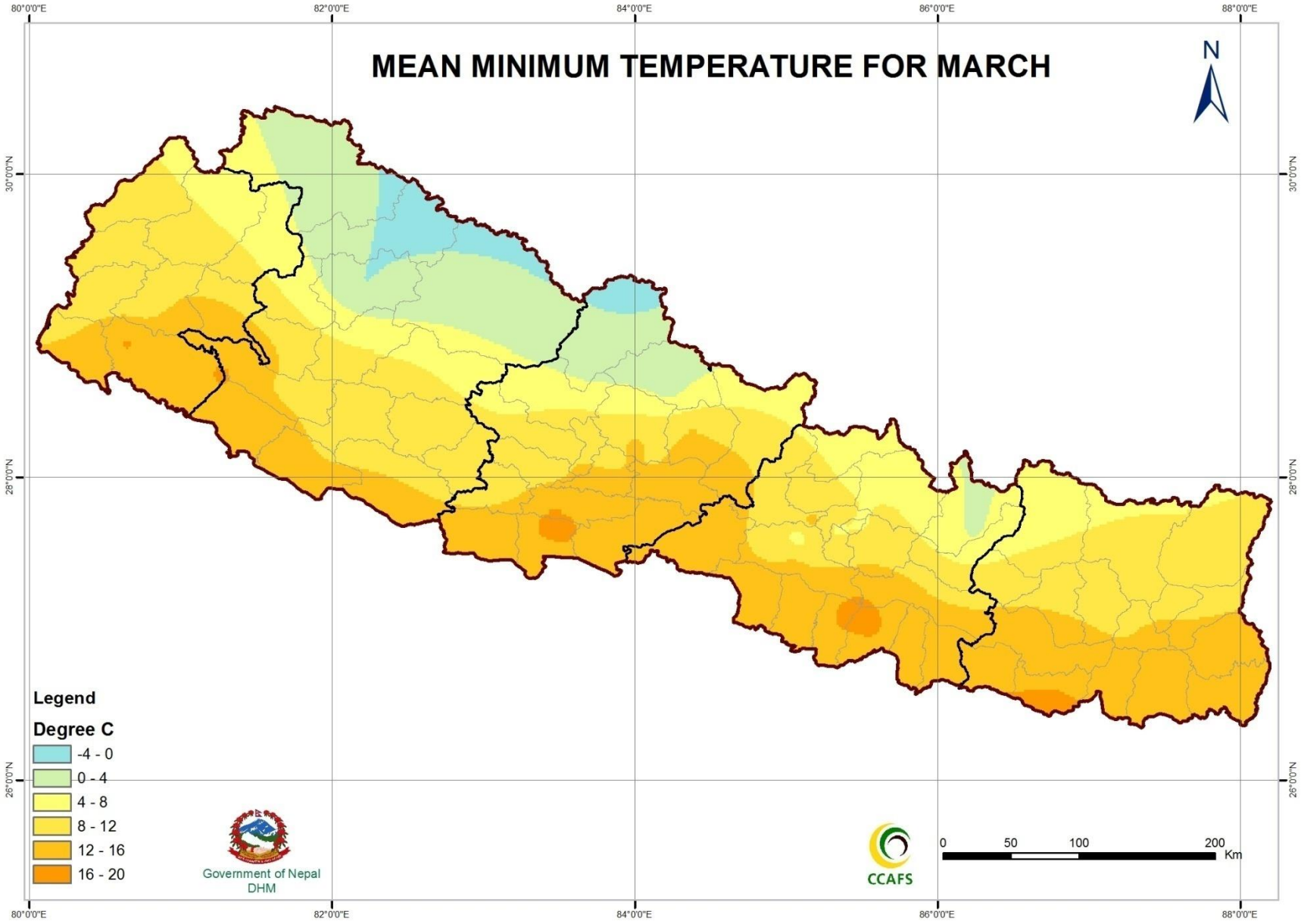
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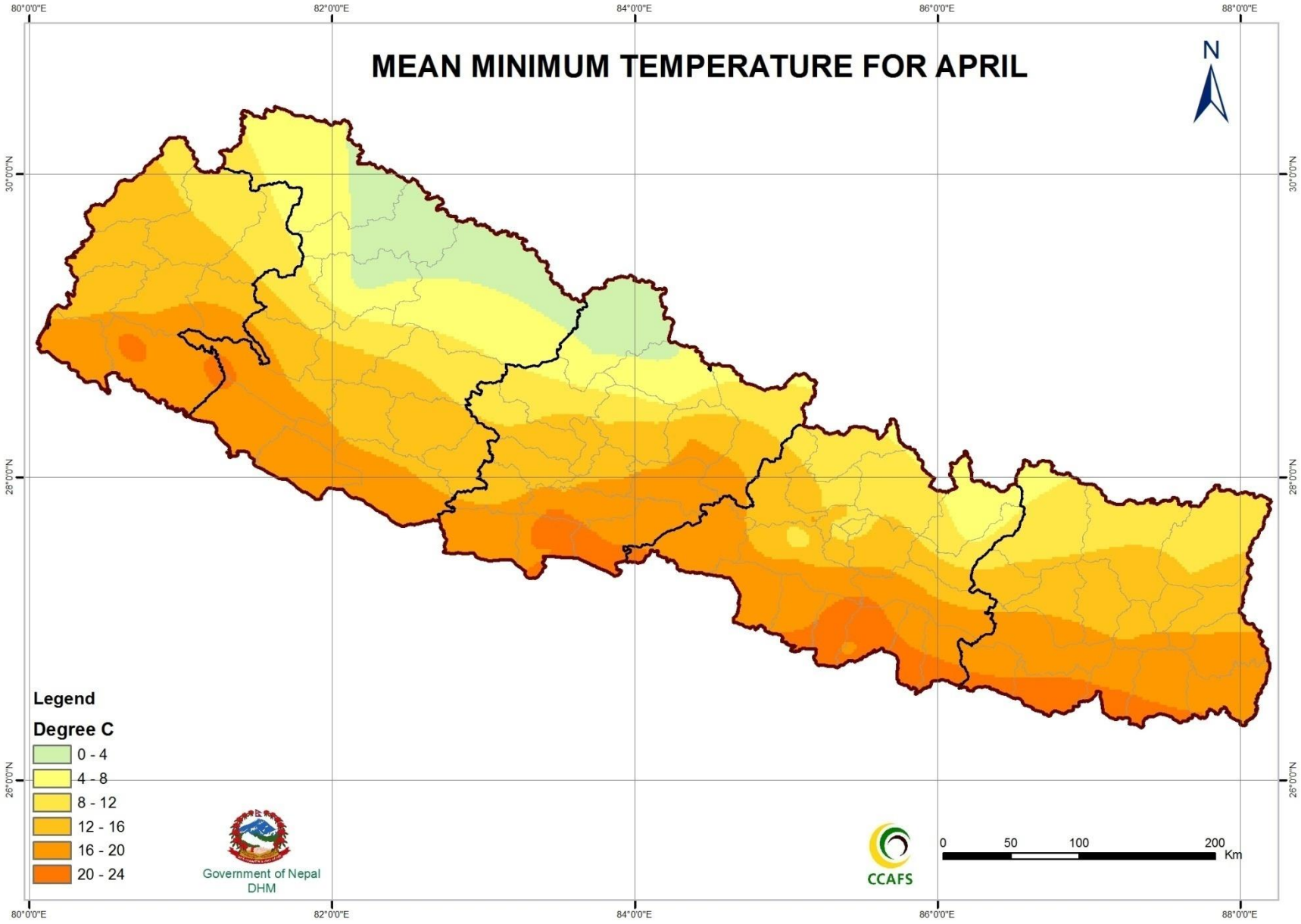
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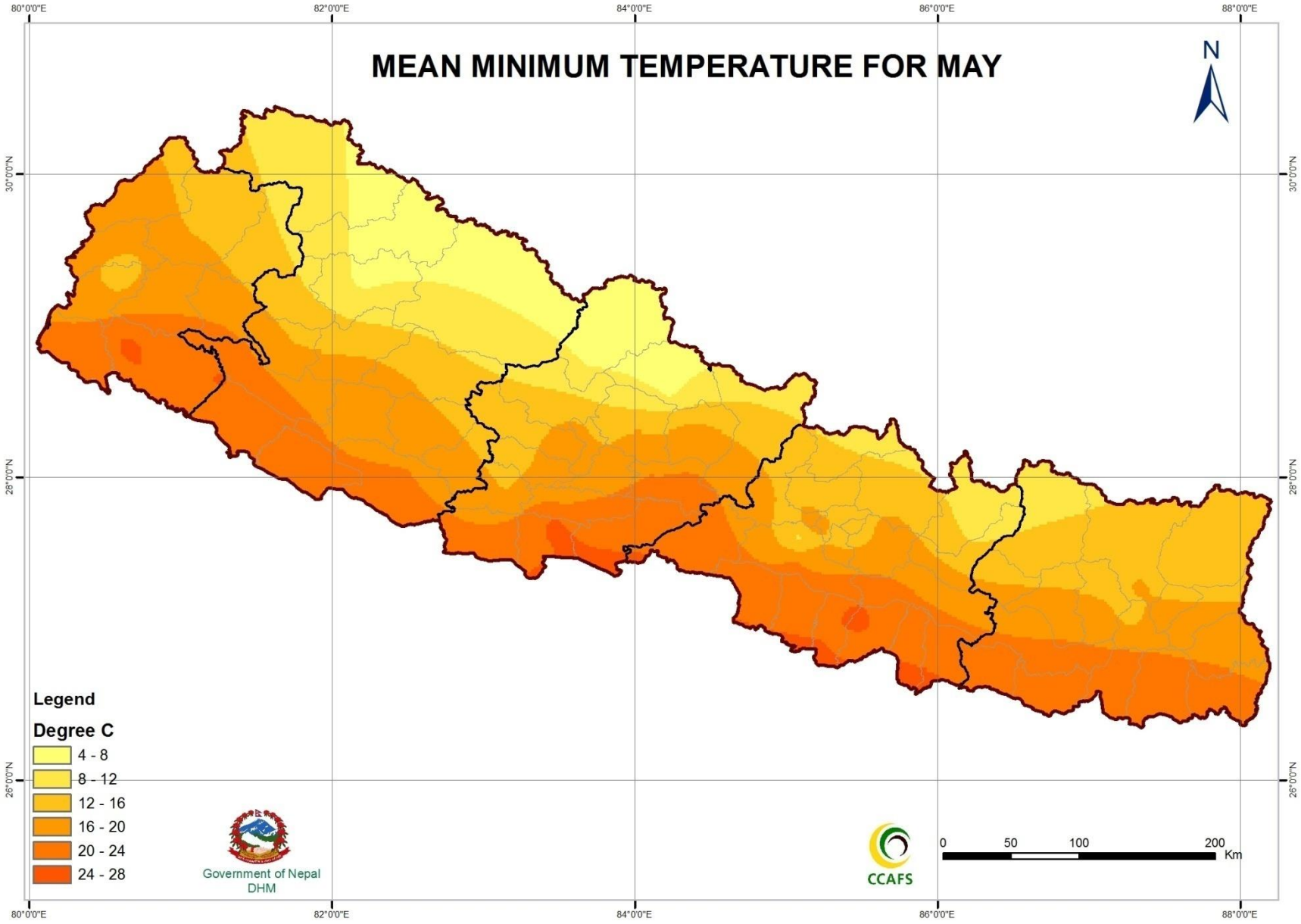
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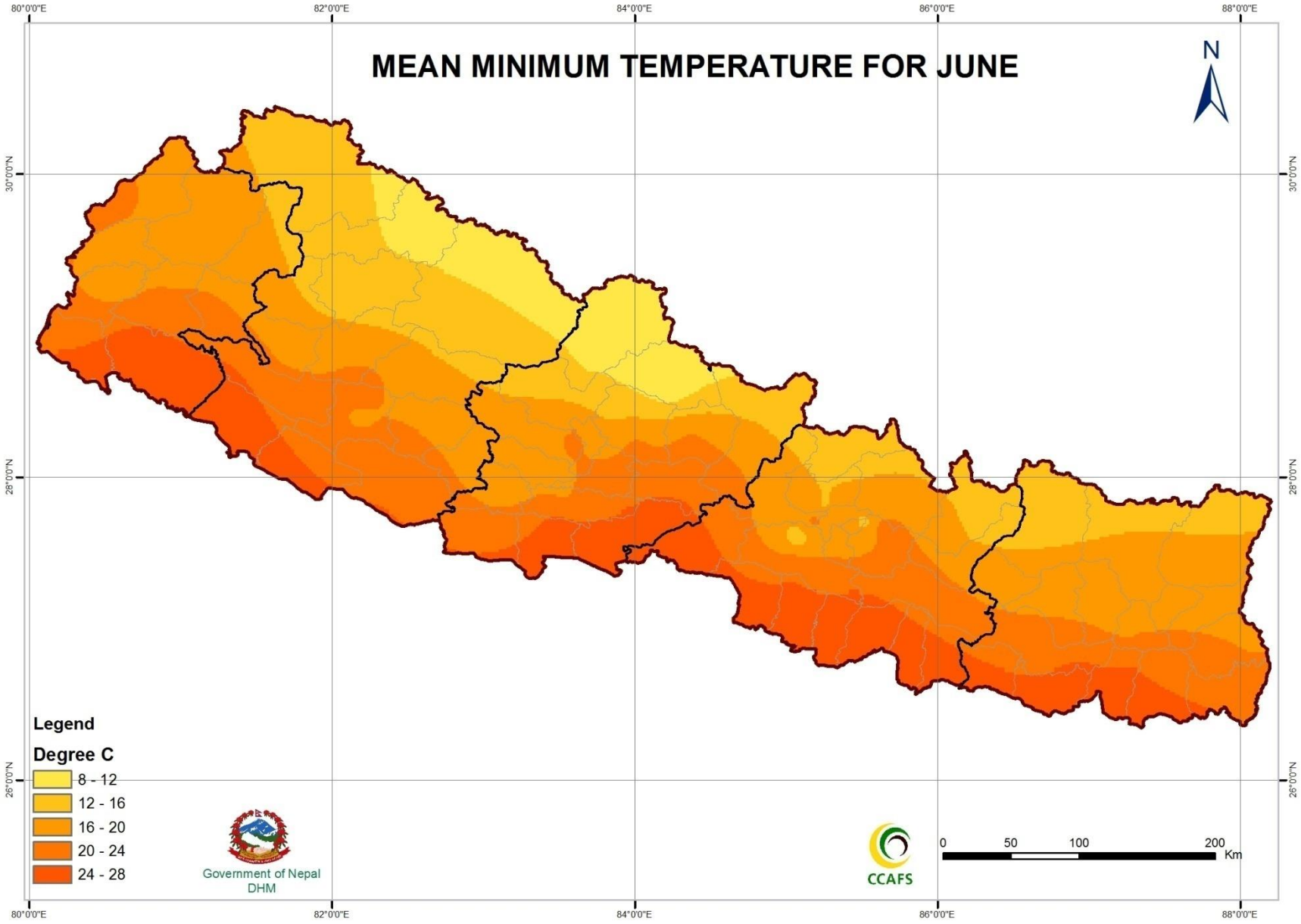
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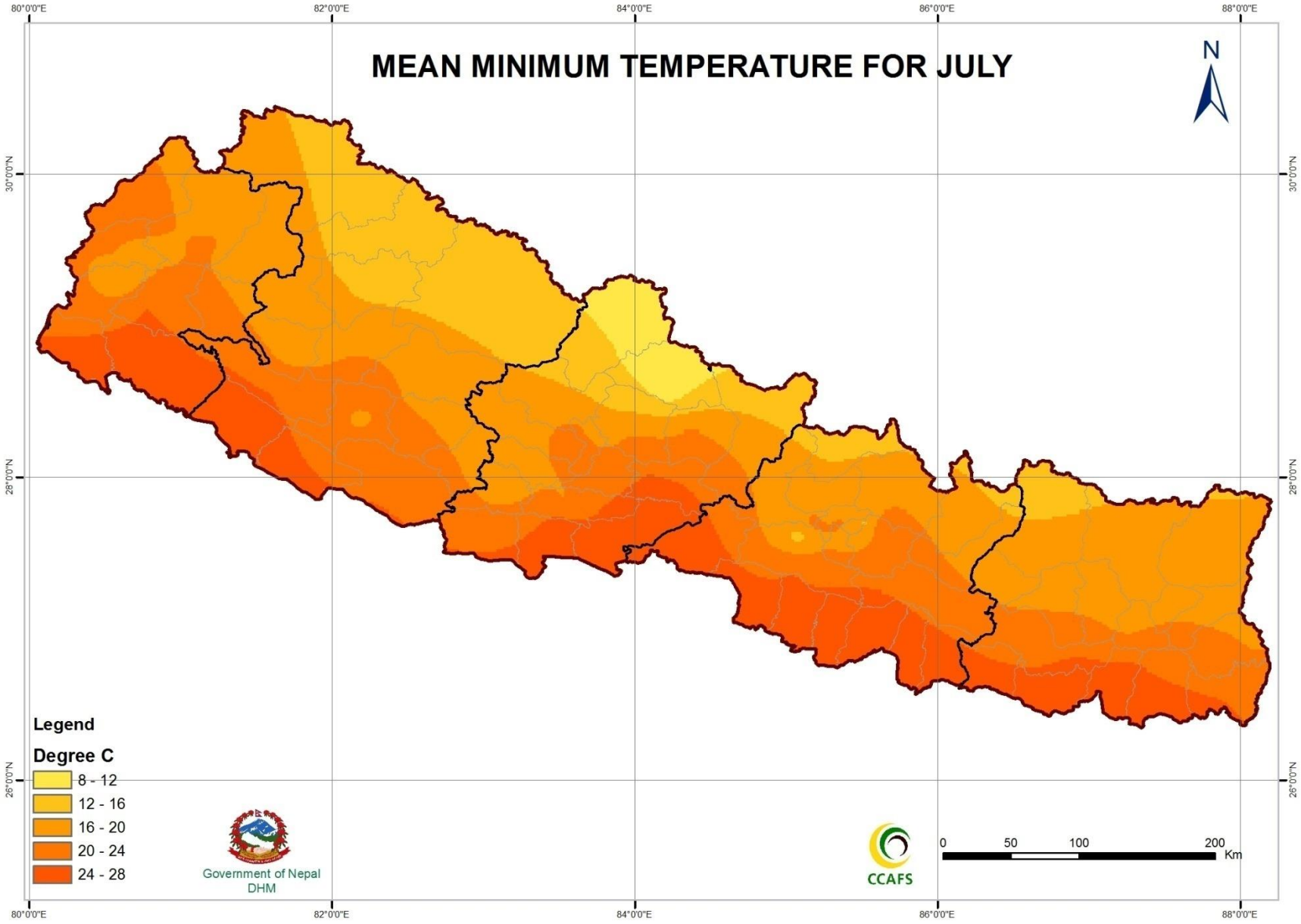
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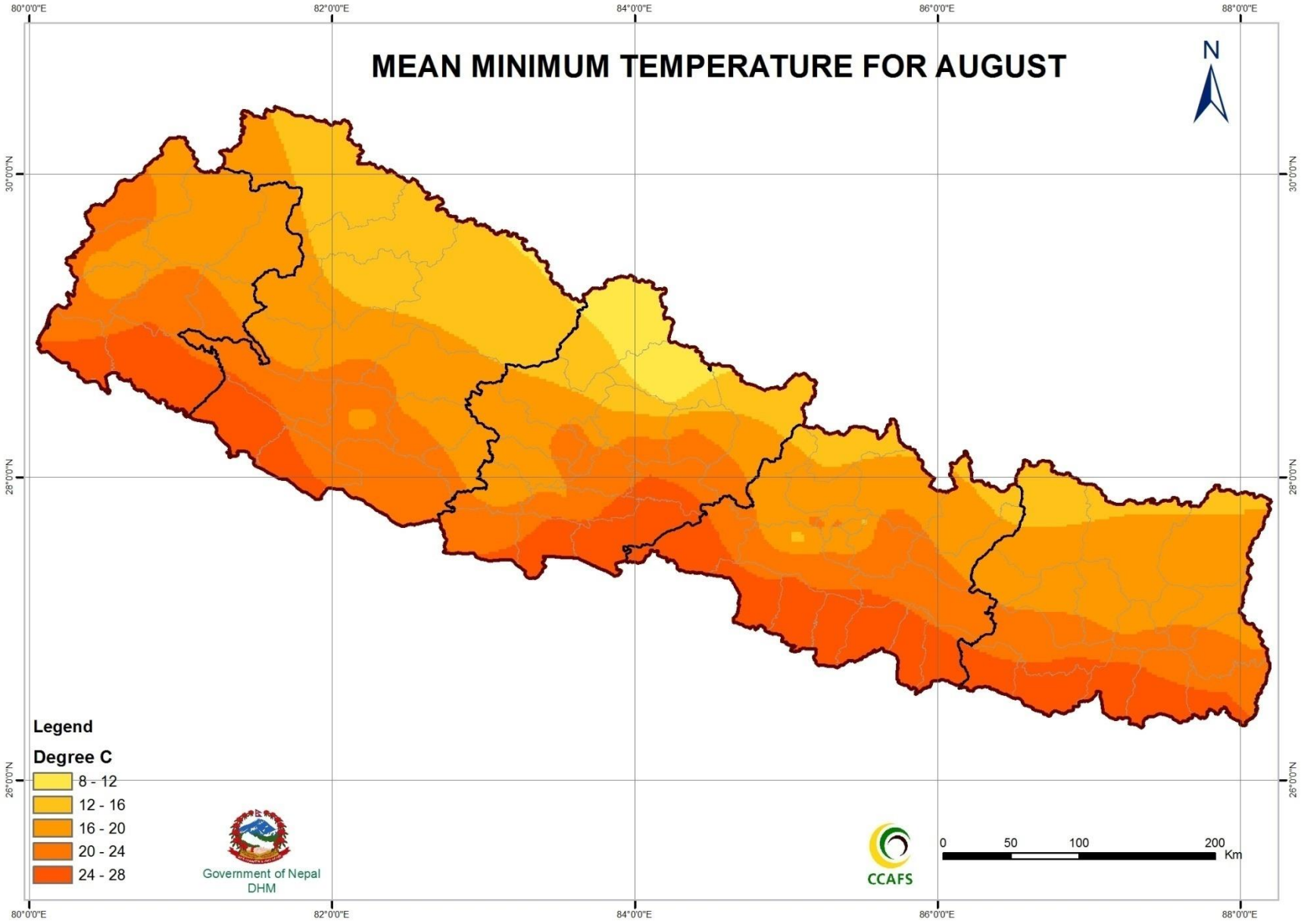
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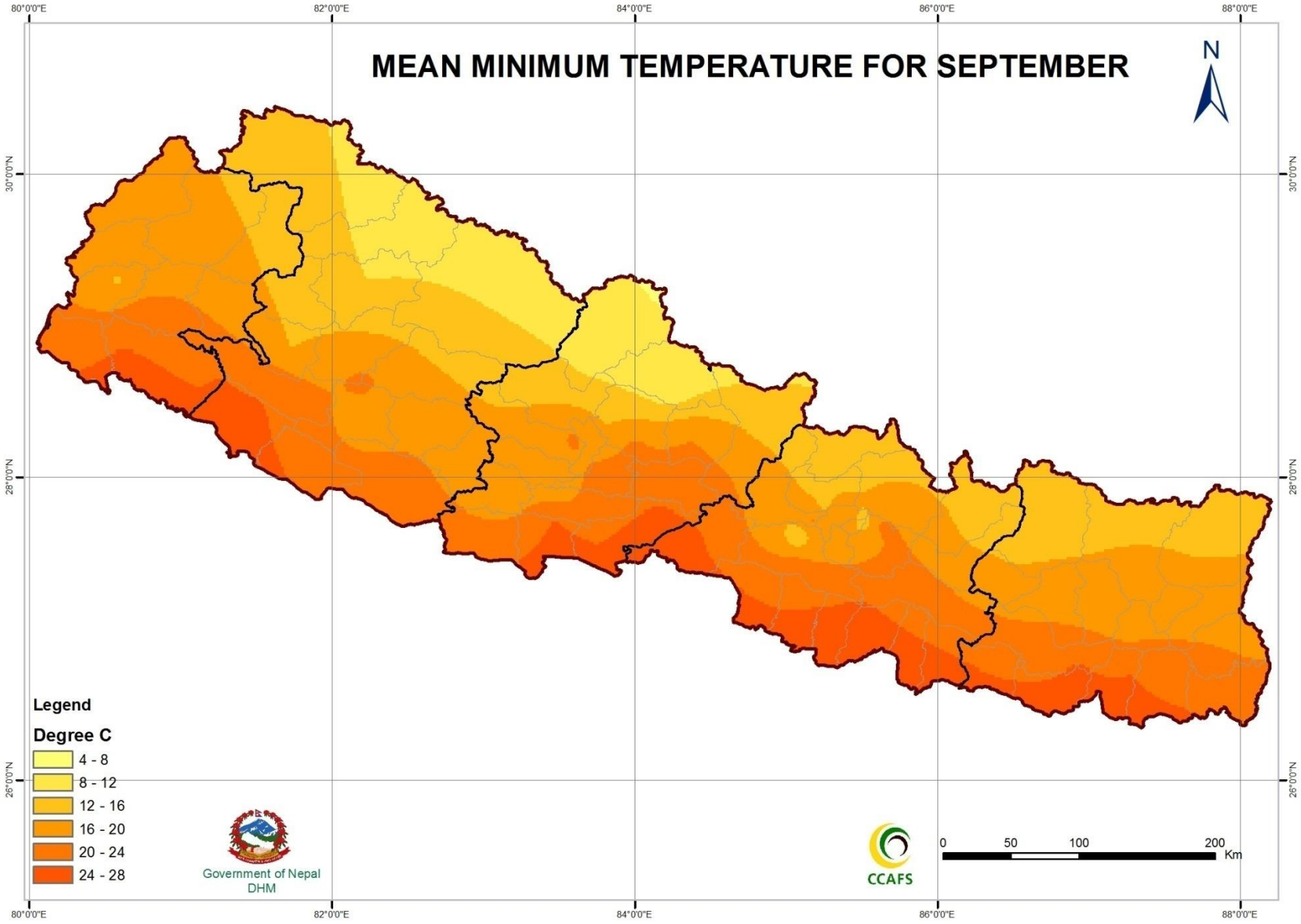
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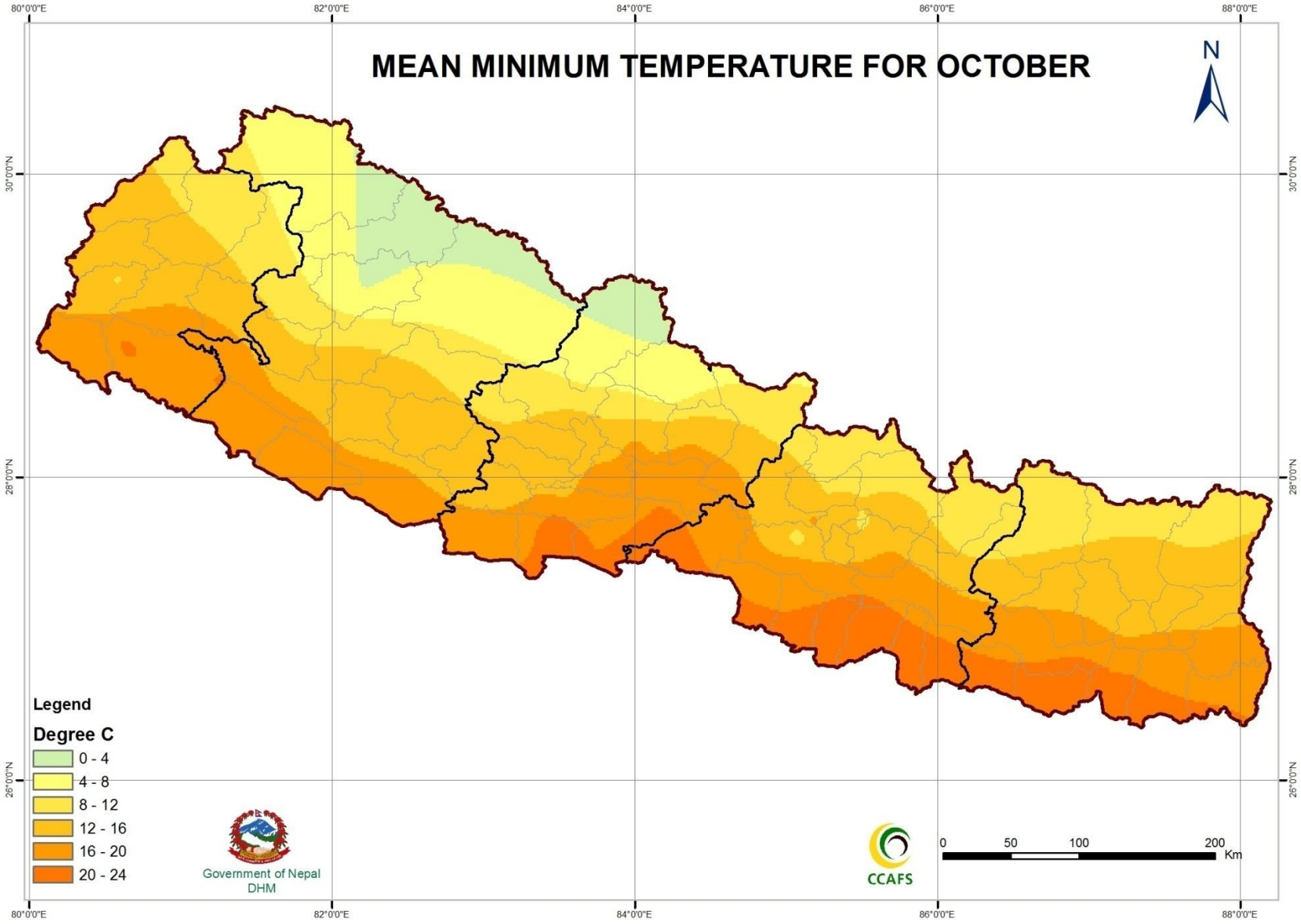
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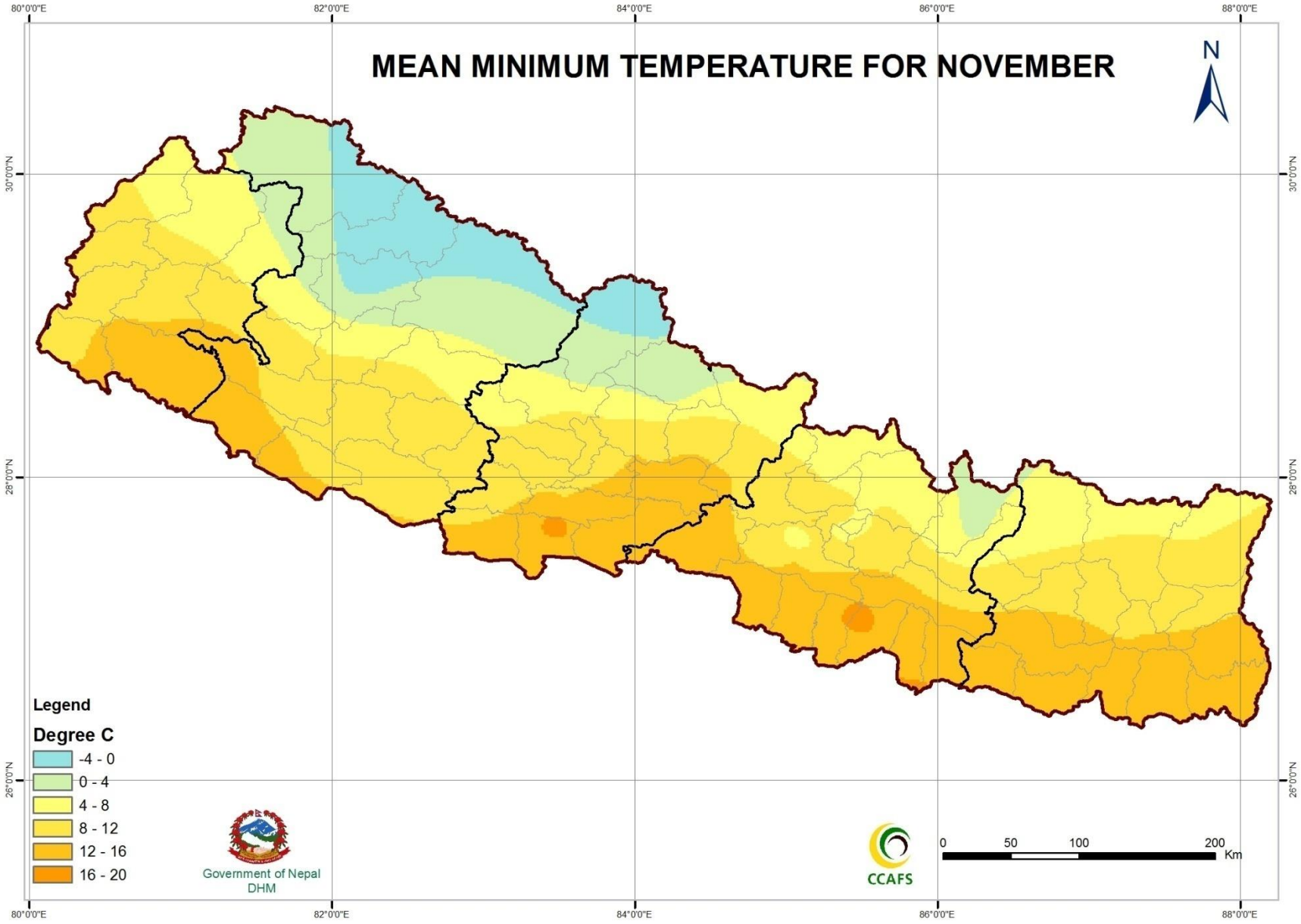
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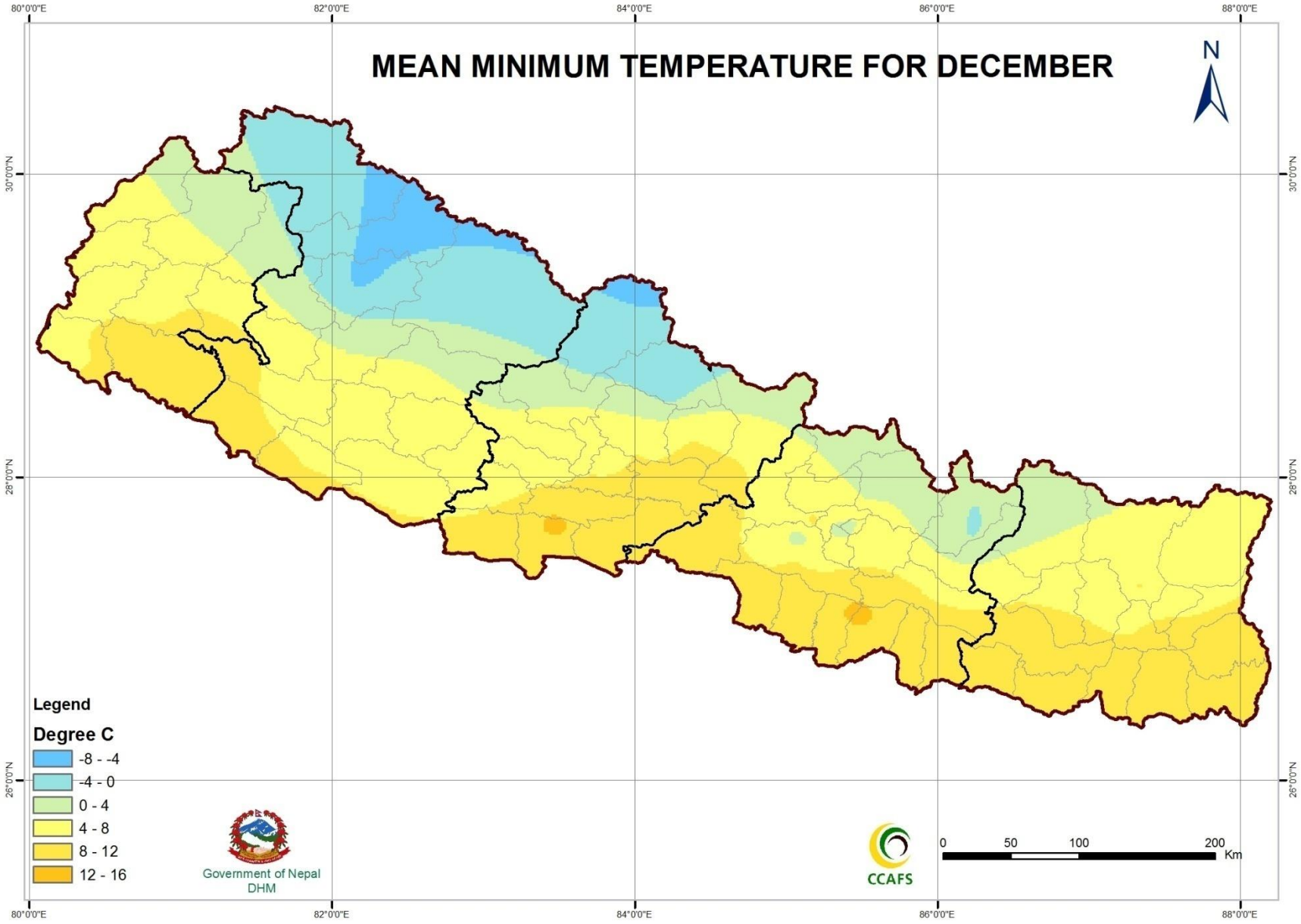
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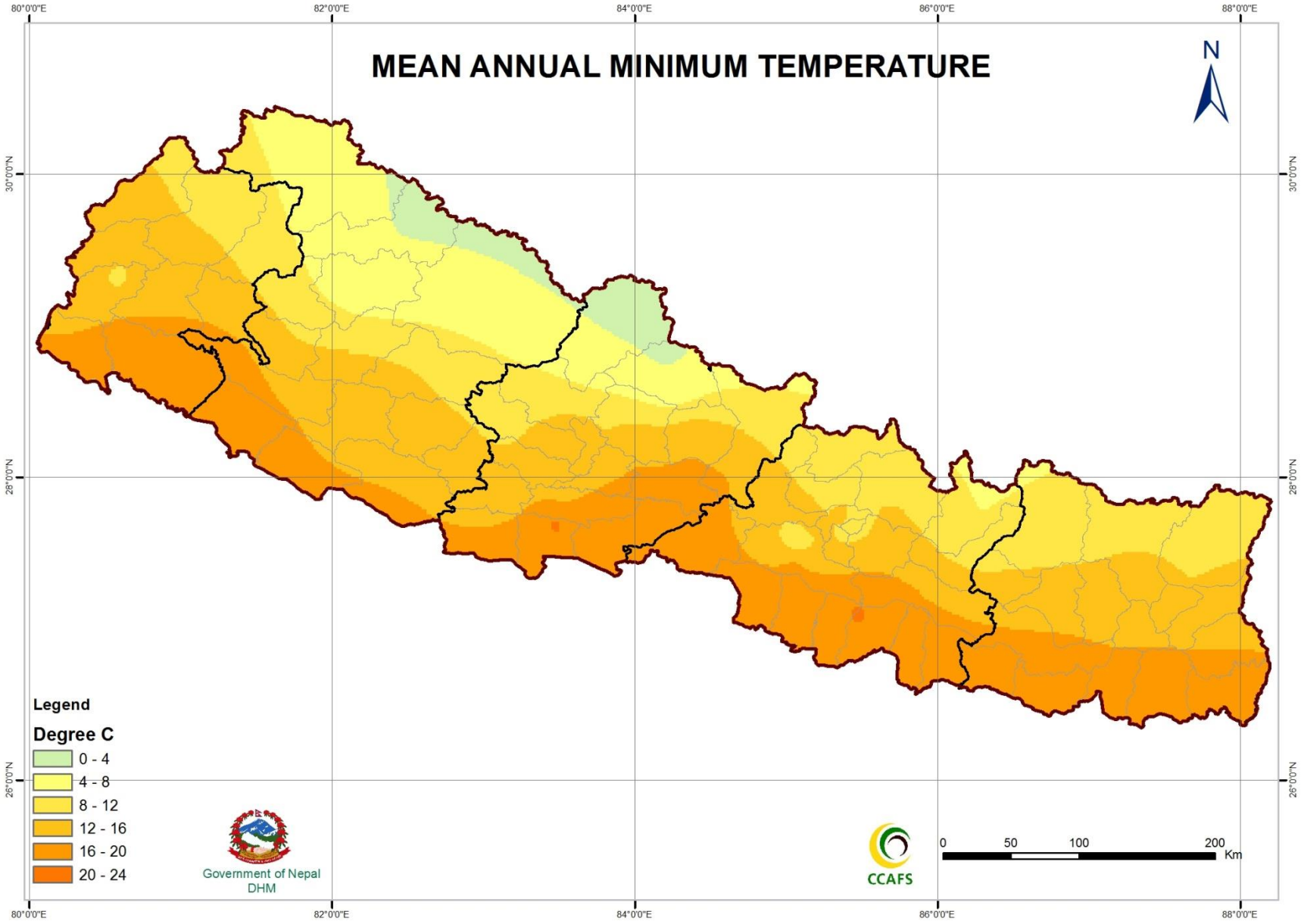
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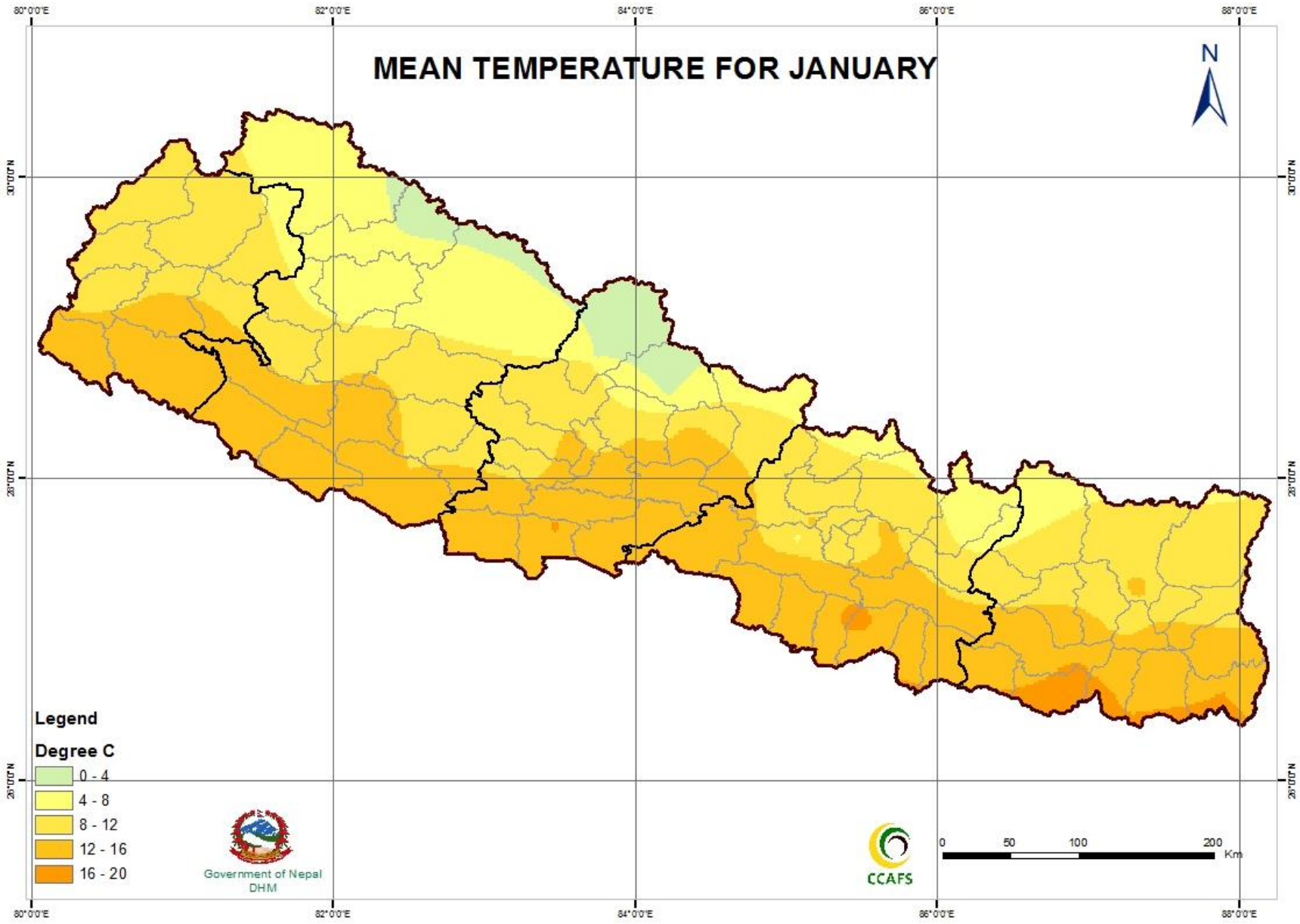
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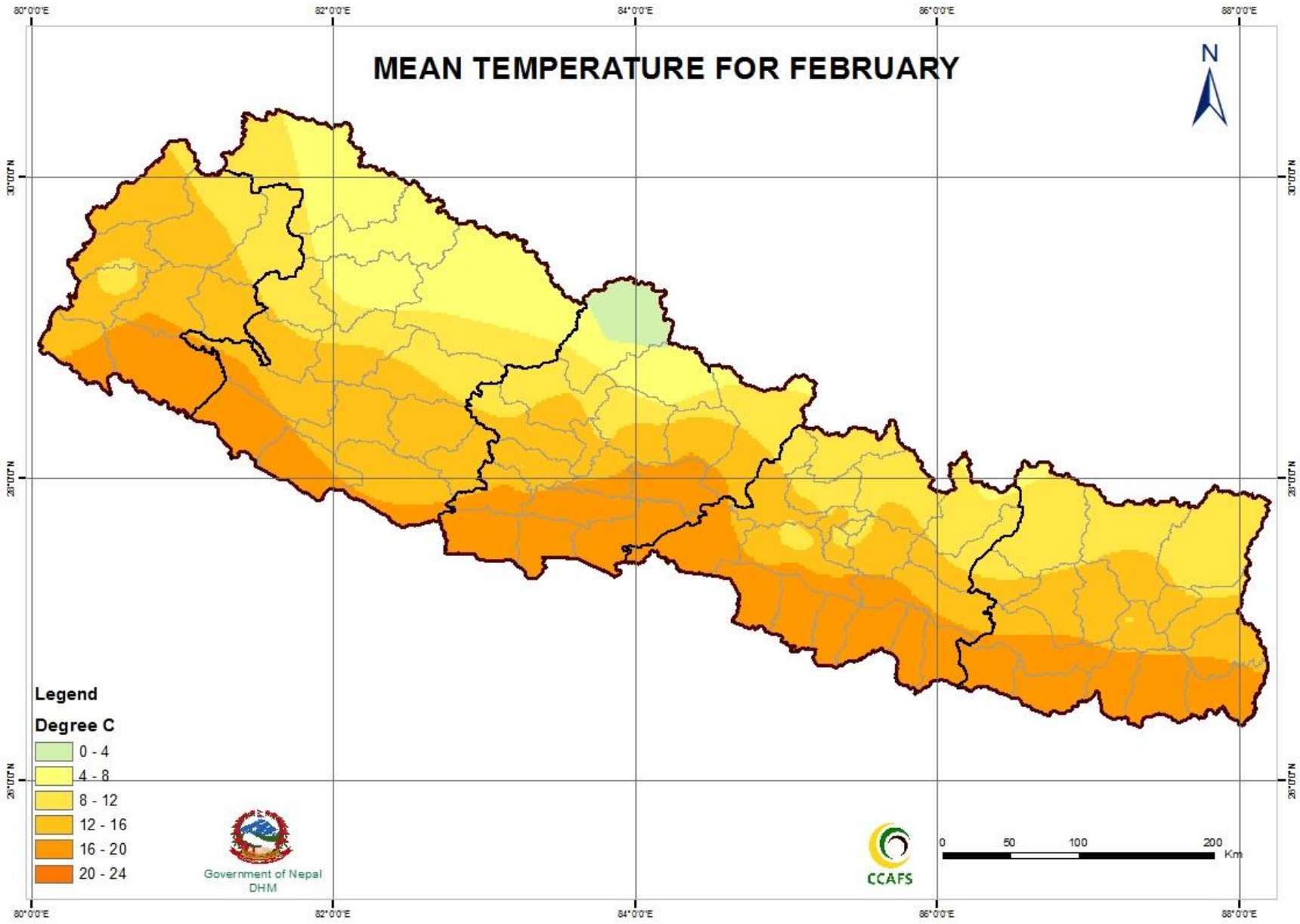
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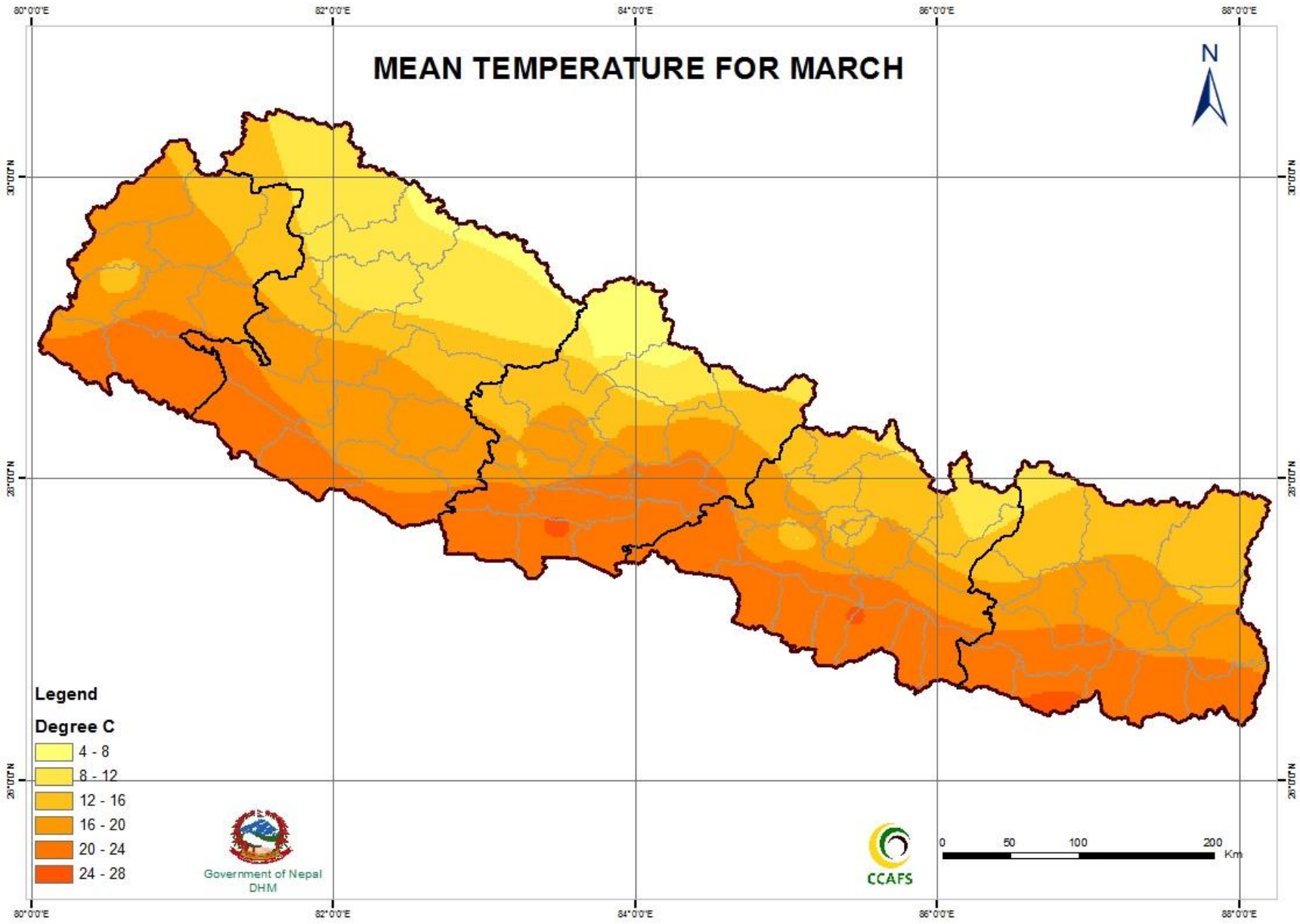
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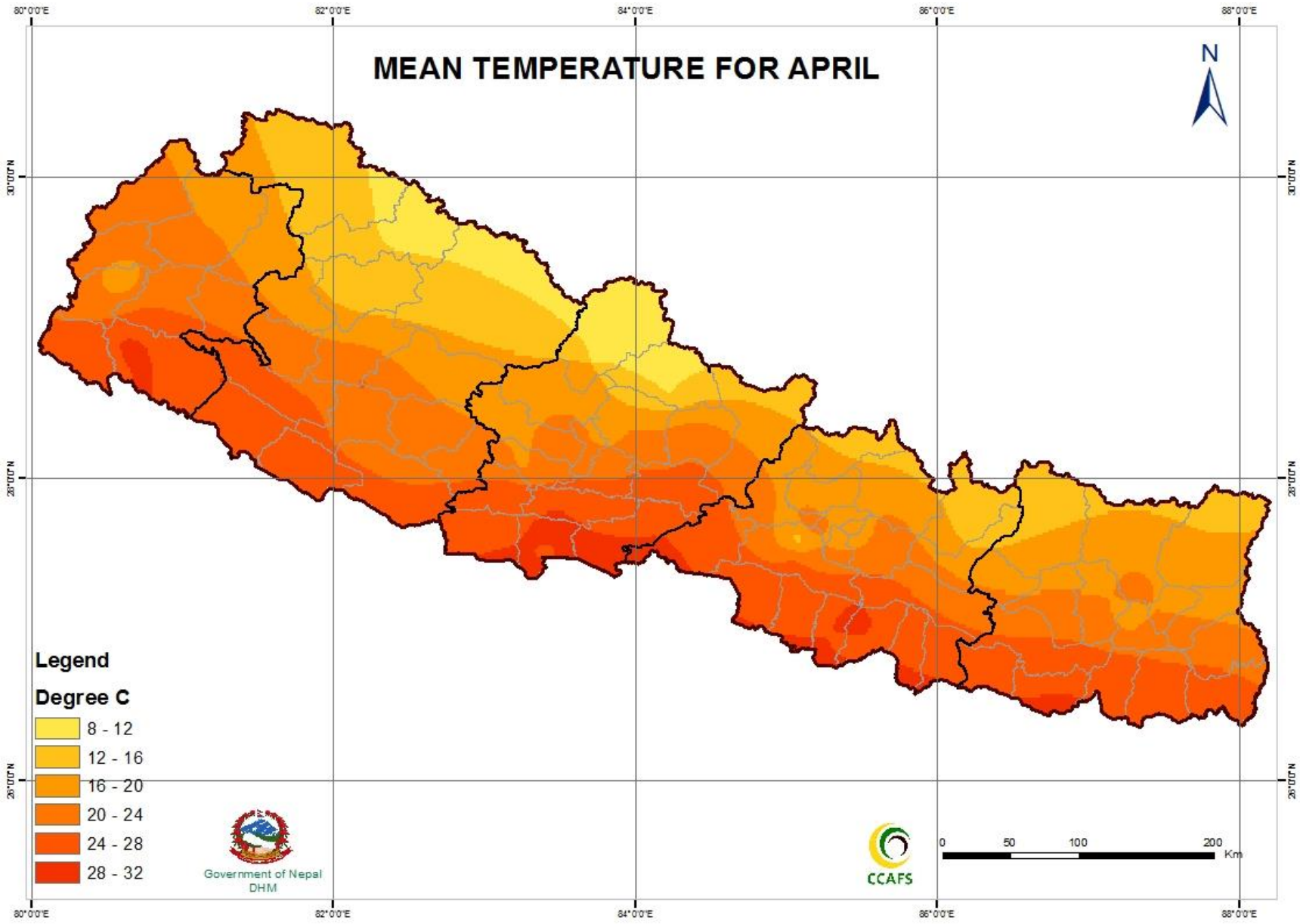
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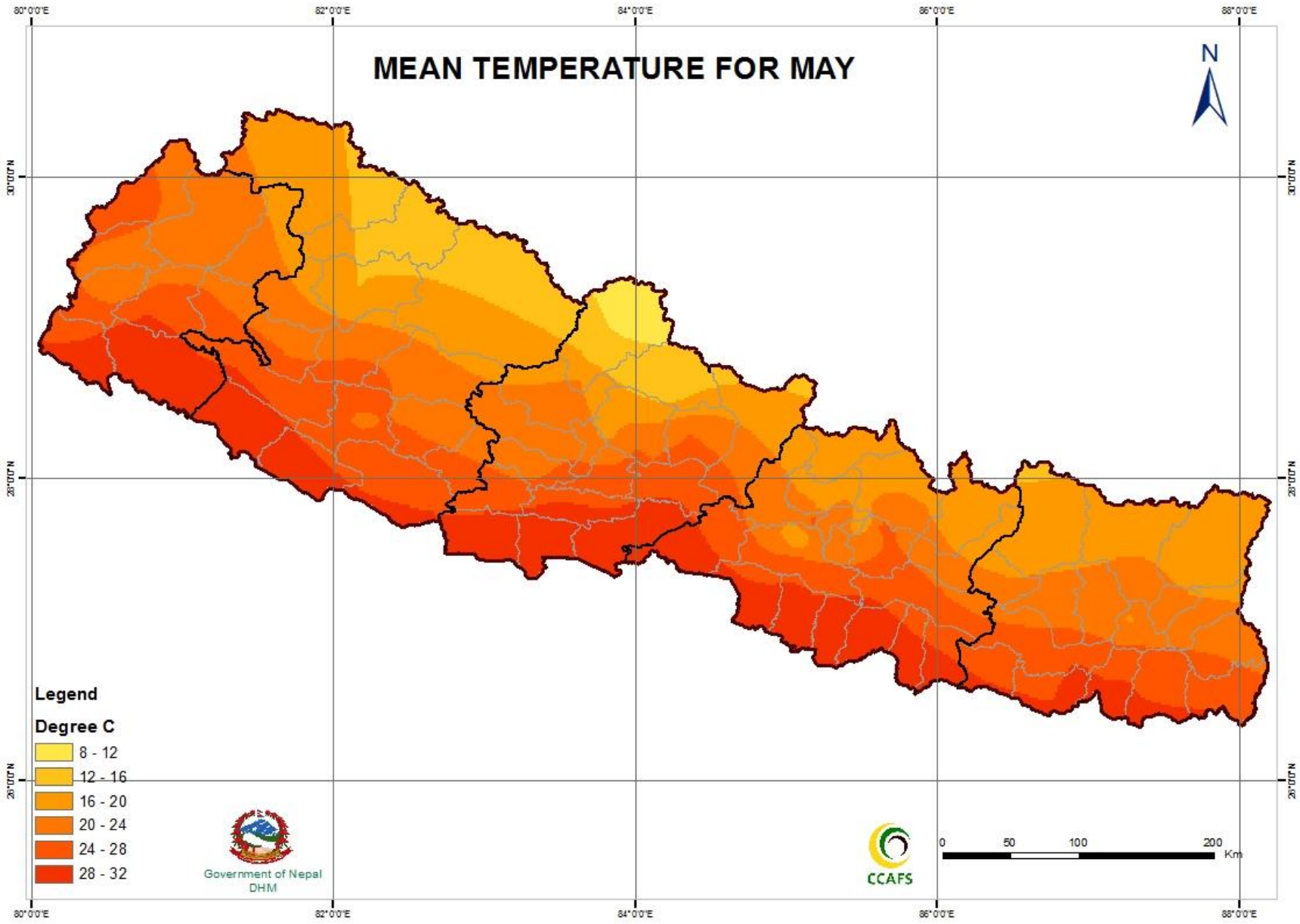
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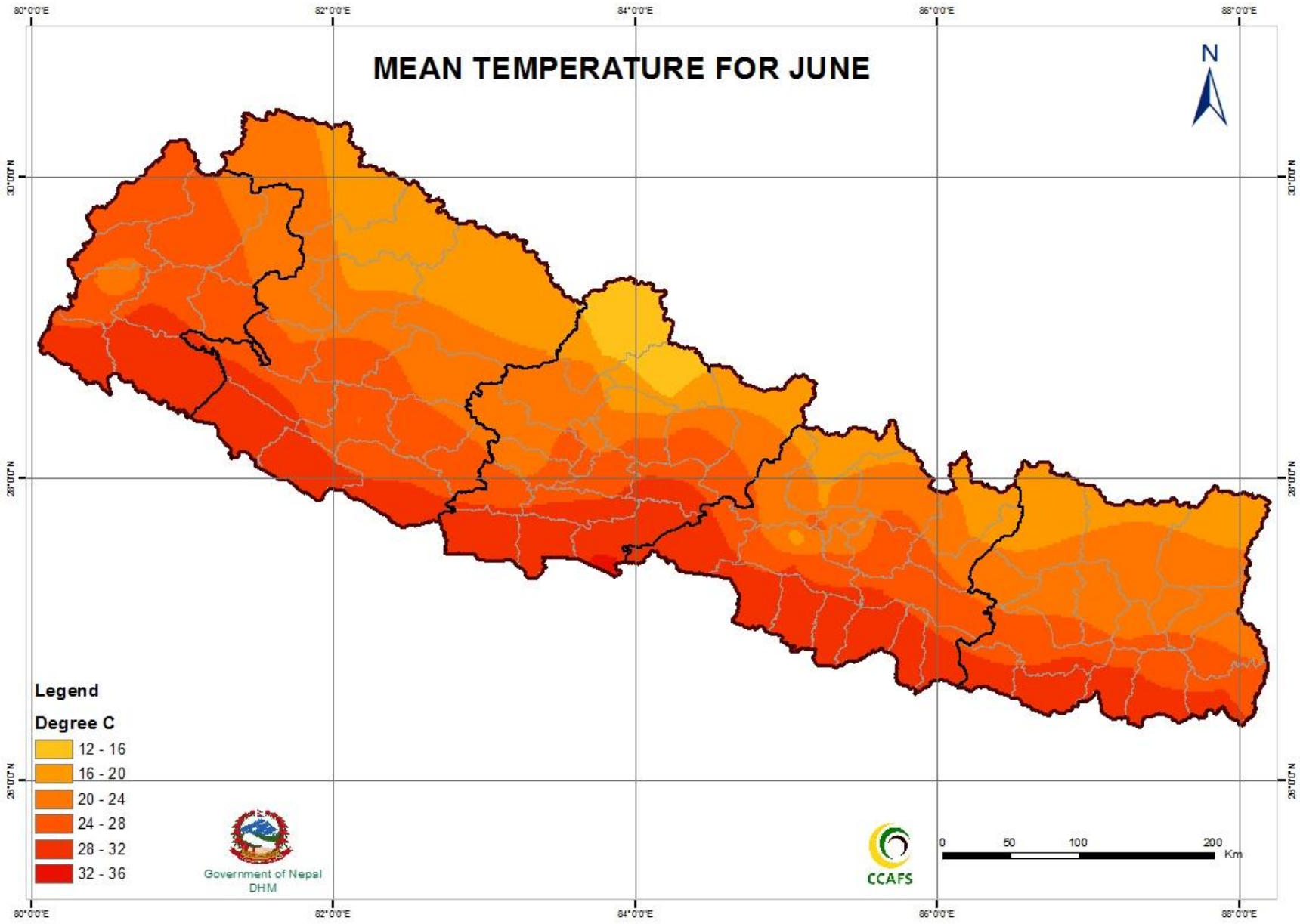
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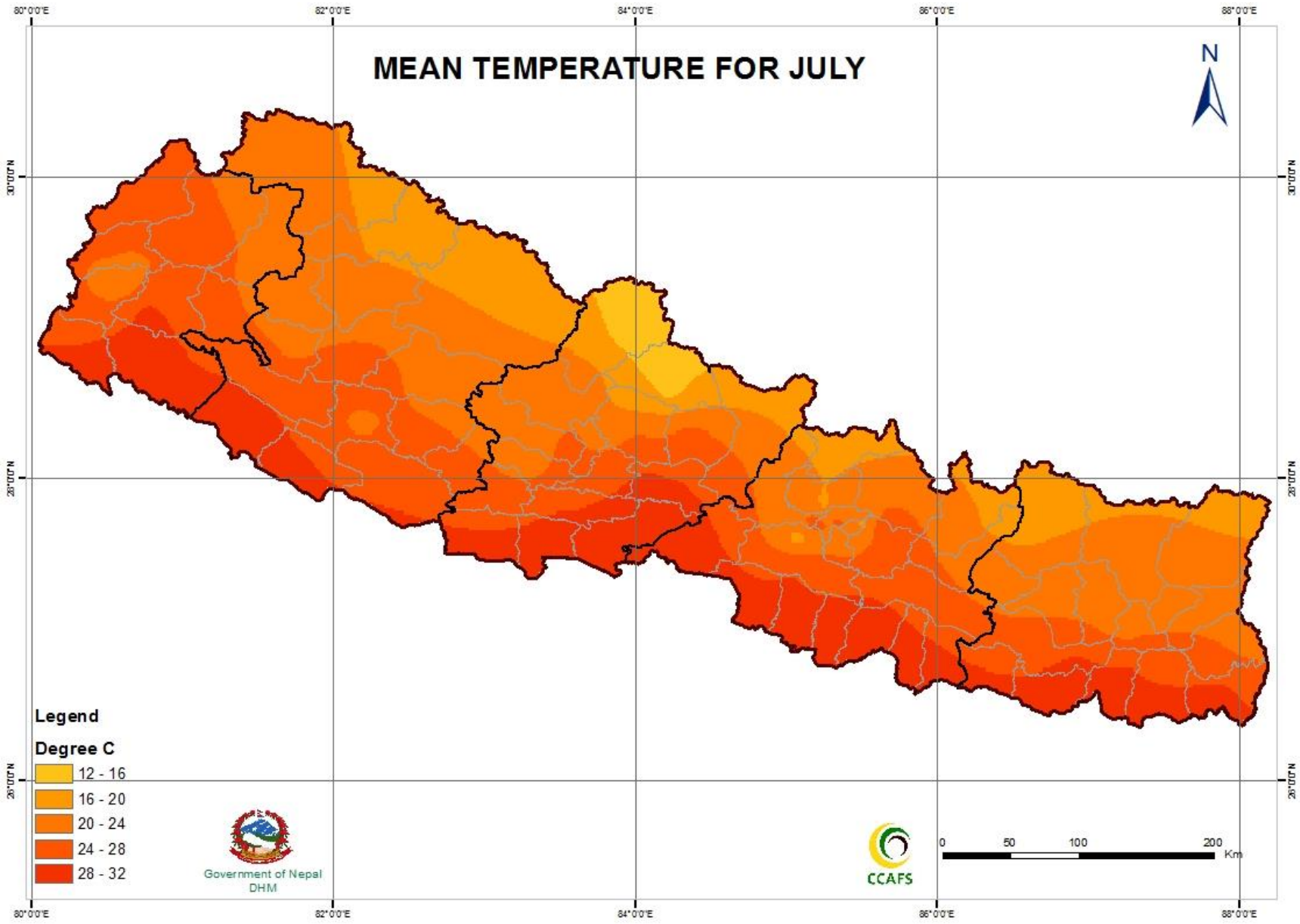
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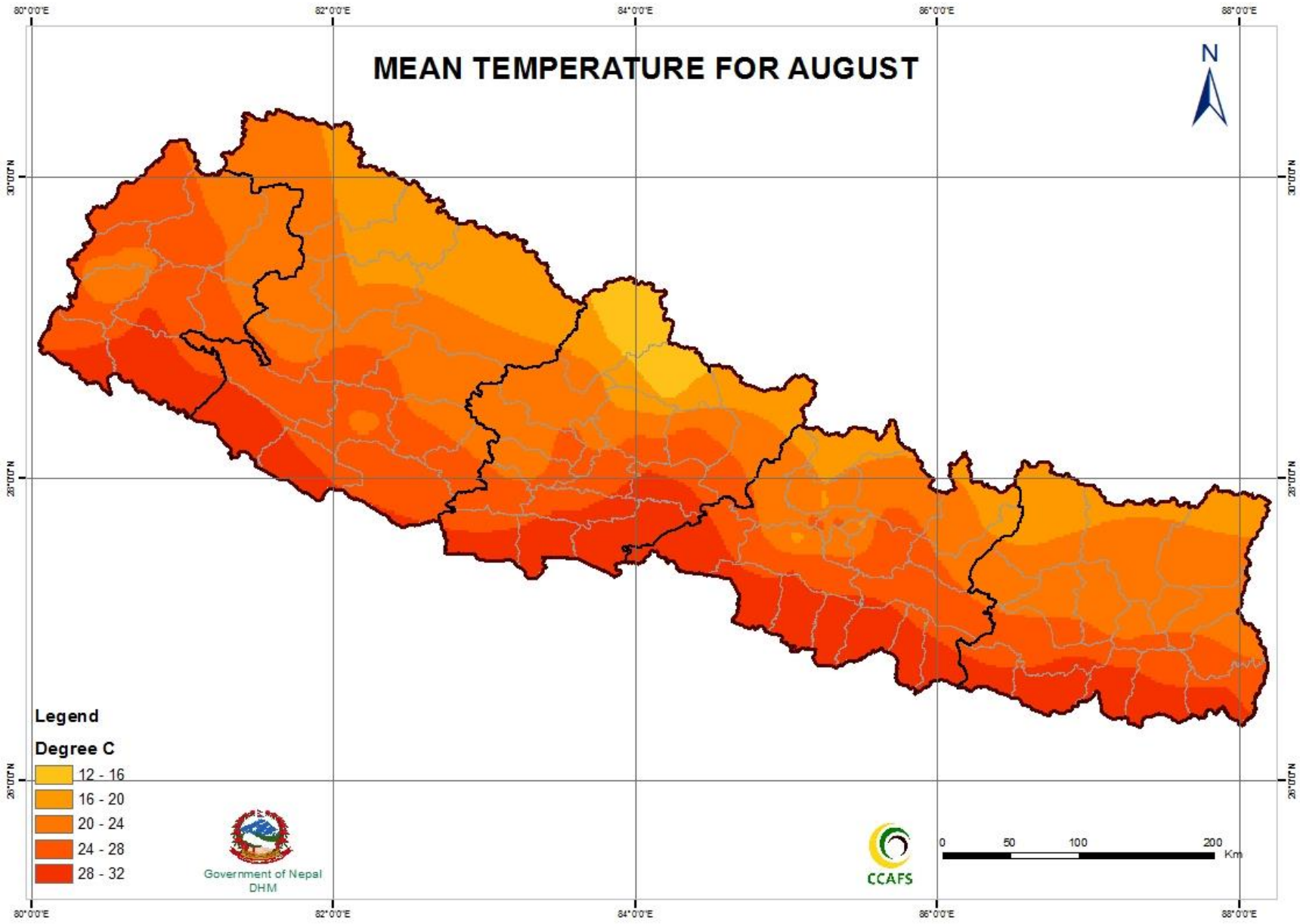
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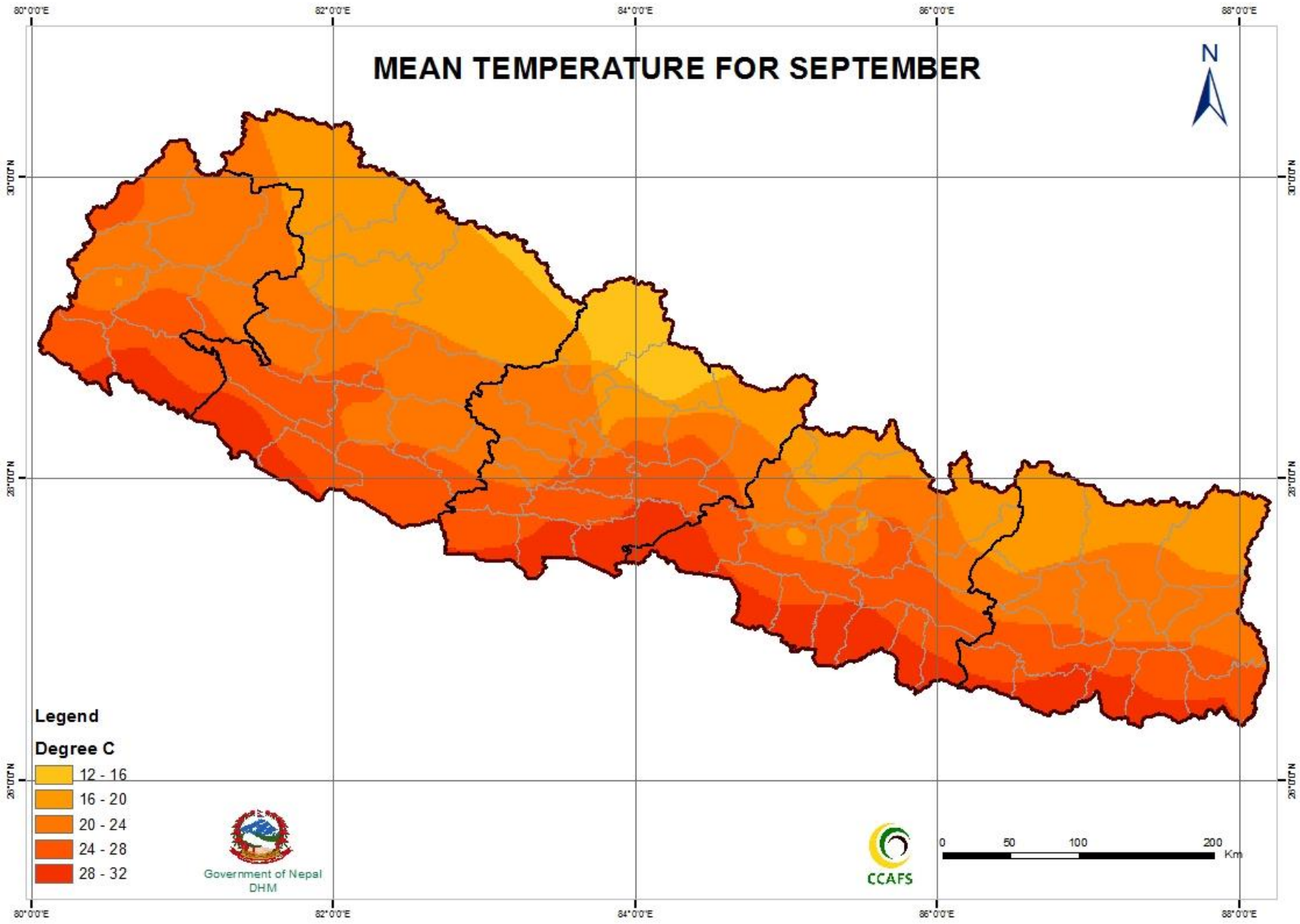
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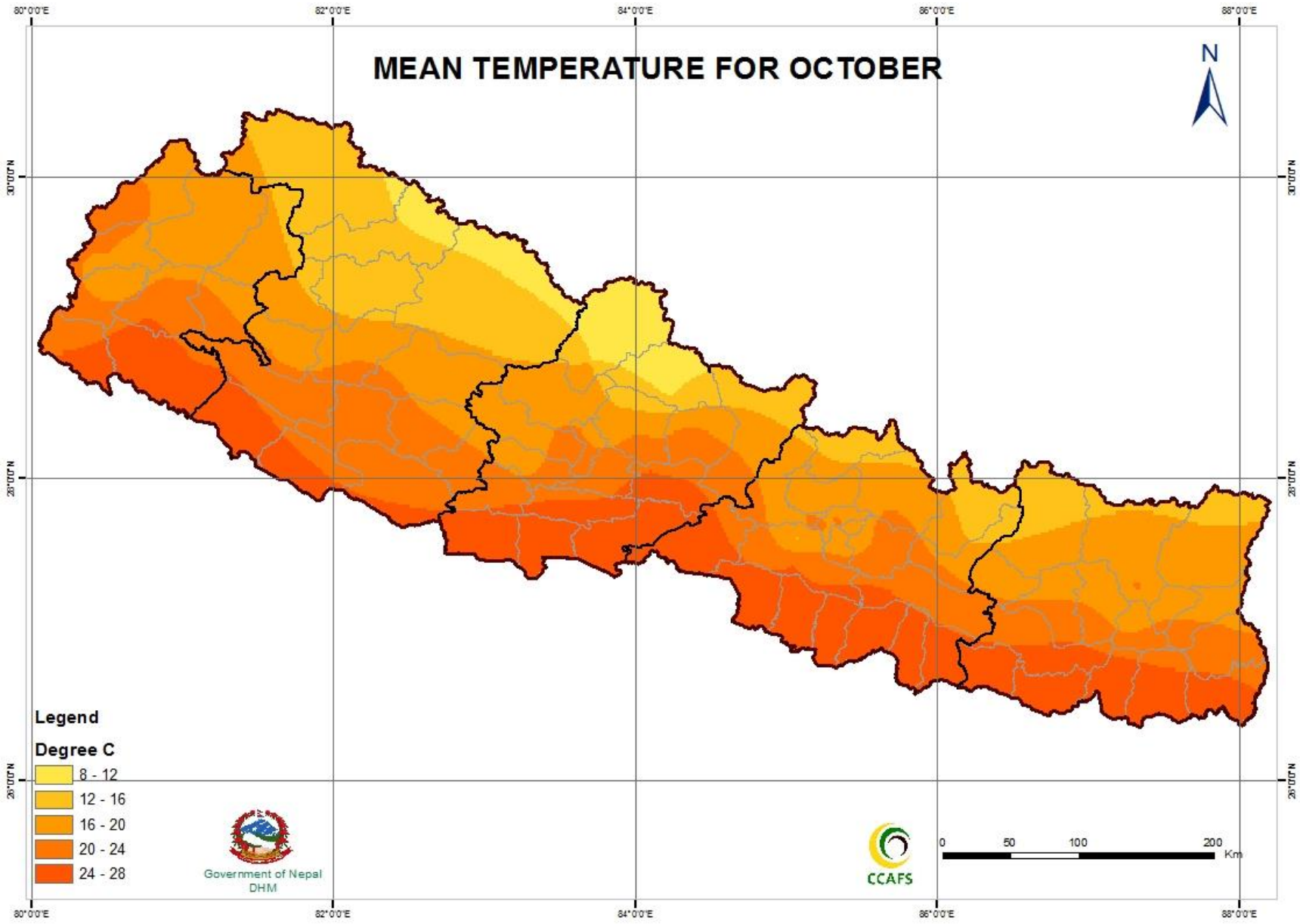
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Government of Nepal
DHM
CCAFS
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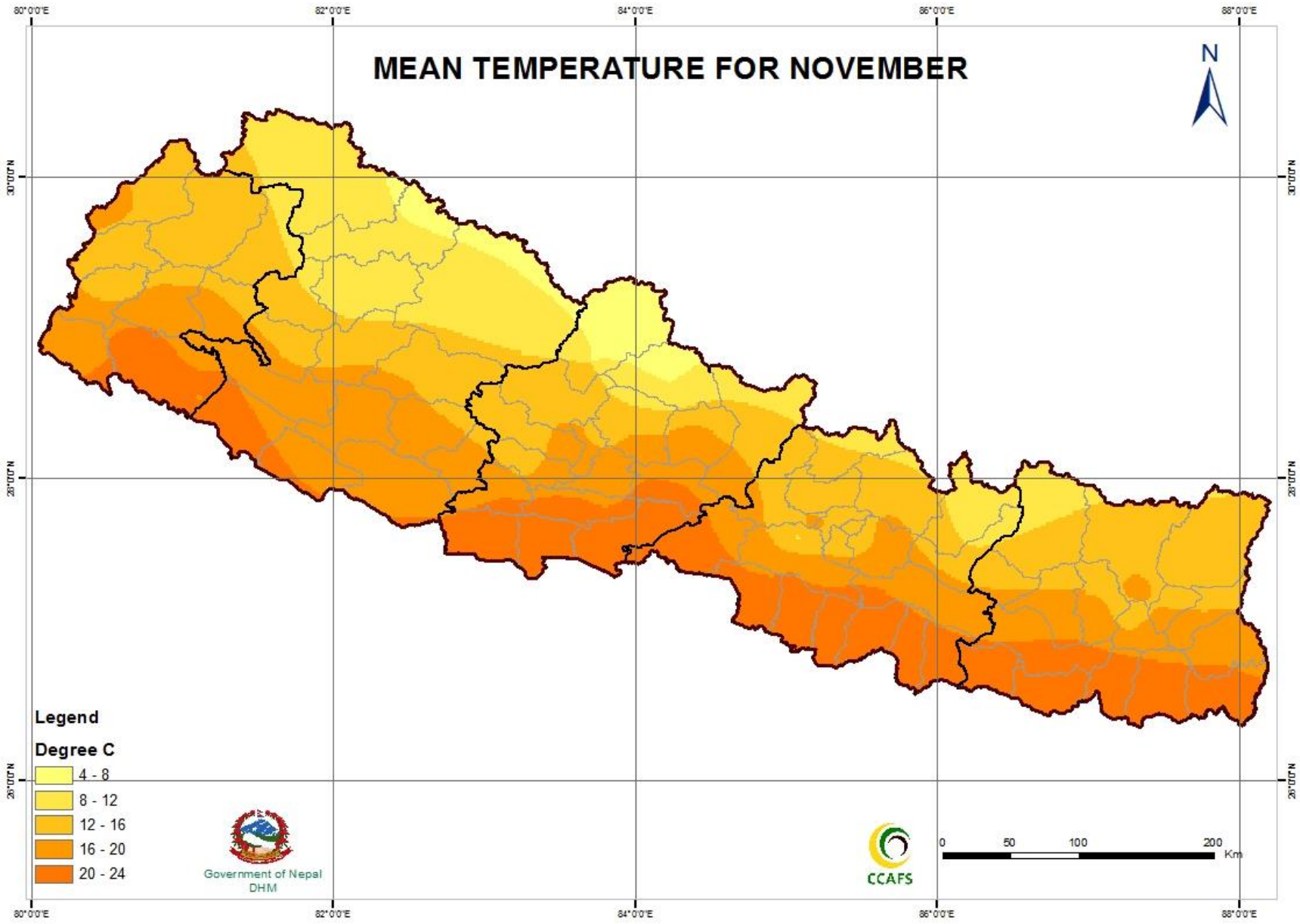
200
Km


MEAN TEMPERATURE FOR NOVEMBER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
4 - 8
8 - 12
12 - 16
16 - 20
20 - 24
Government of Nepal
DHM
CCAFS
0
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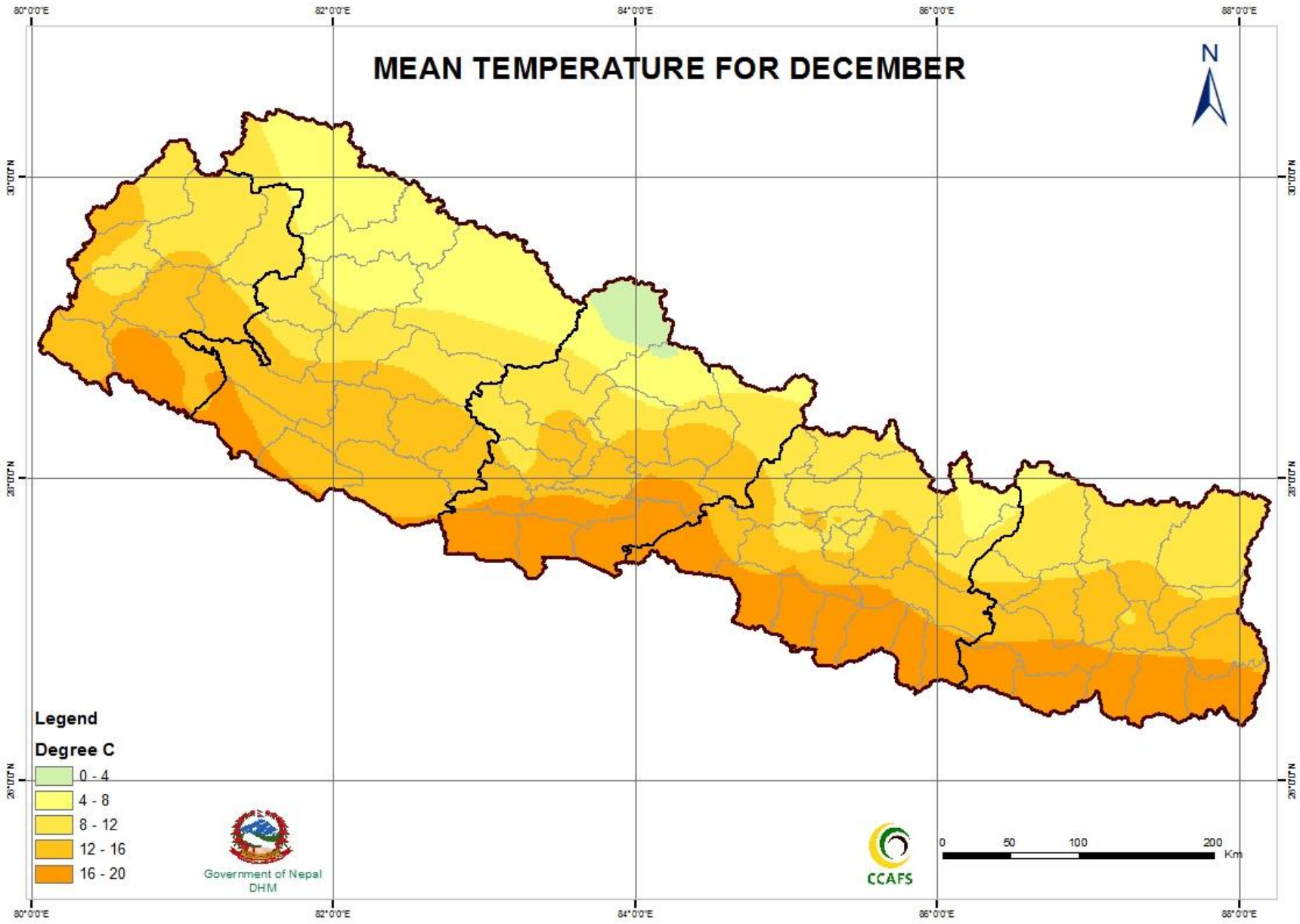
100
200
Km


MEAN TEMPERATURE FOR DECEMBER
N
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82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
0 - 4
4 - 8
8 - 12
12 - 16
16 - 20
Government of Nepal
DHM
CCAFS
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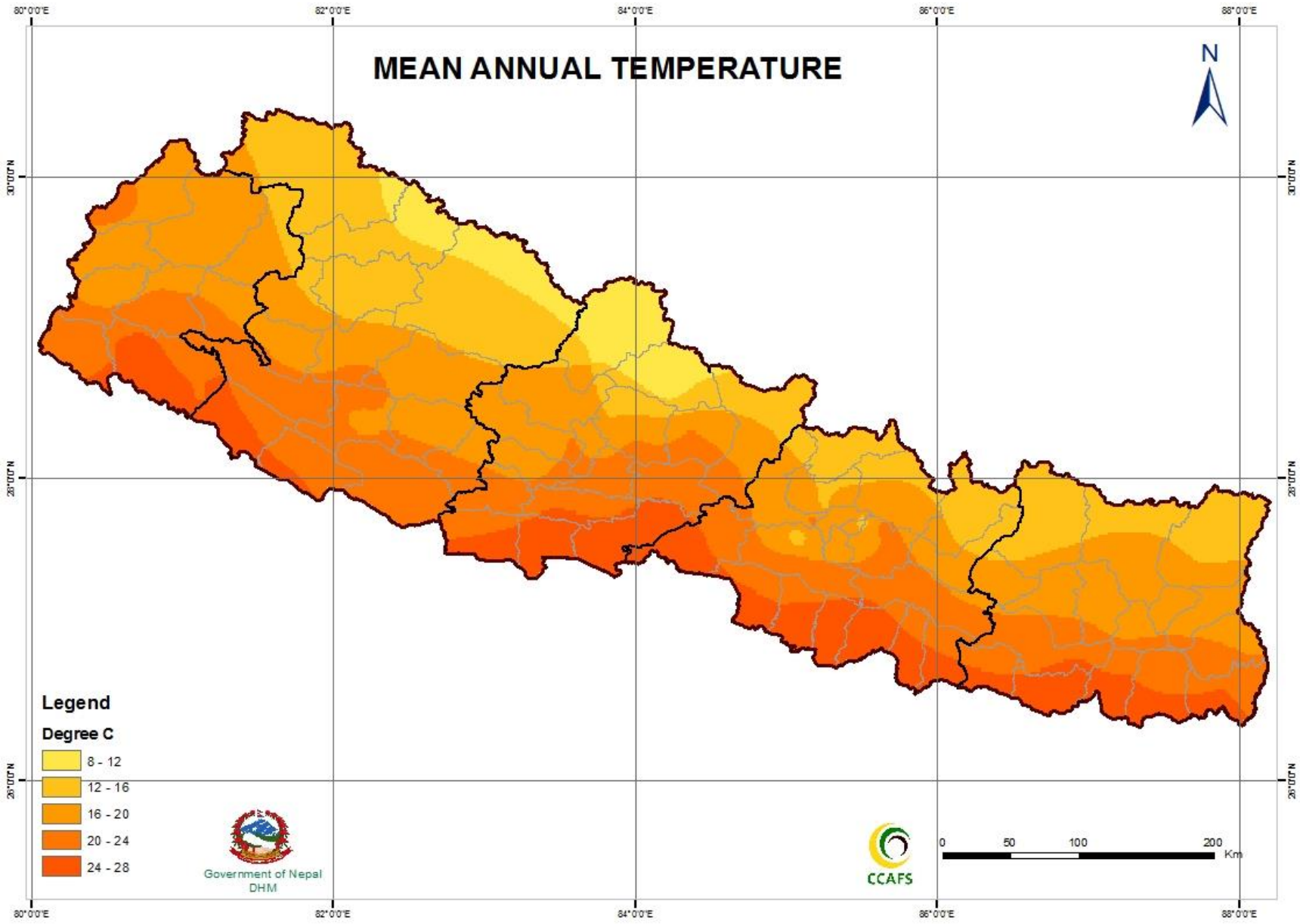
200
Km


MEAN ANNUAL TEMPERATURE
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84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
8 - 12
12 - 16
16 - 20
20 - 24
24 - 28
Government of Nepal
DHM
CCAFS
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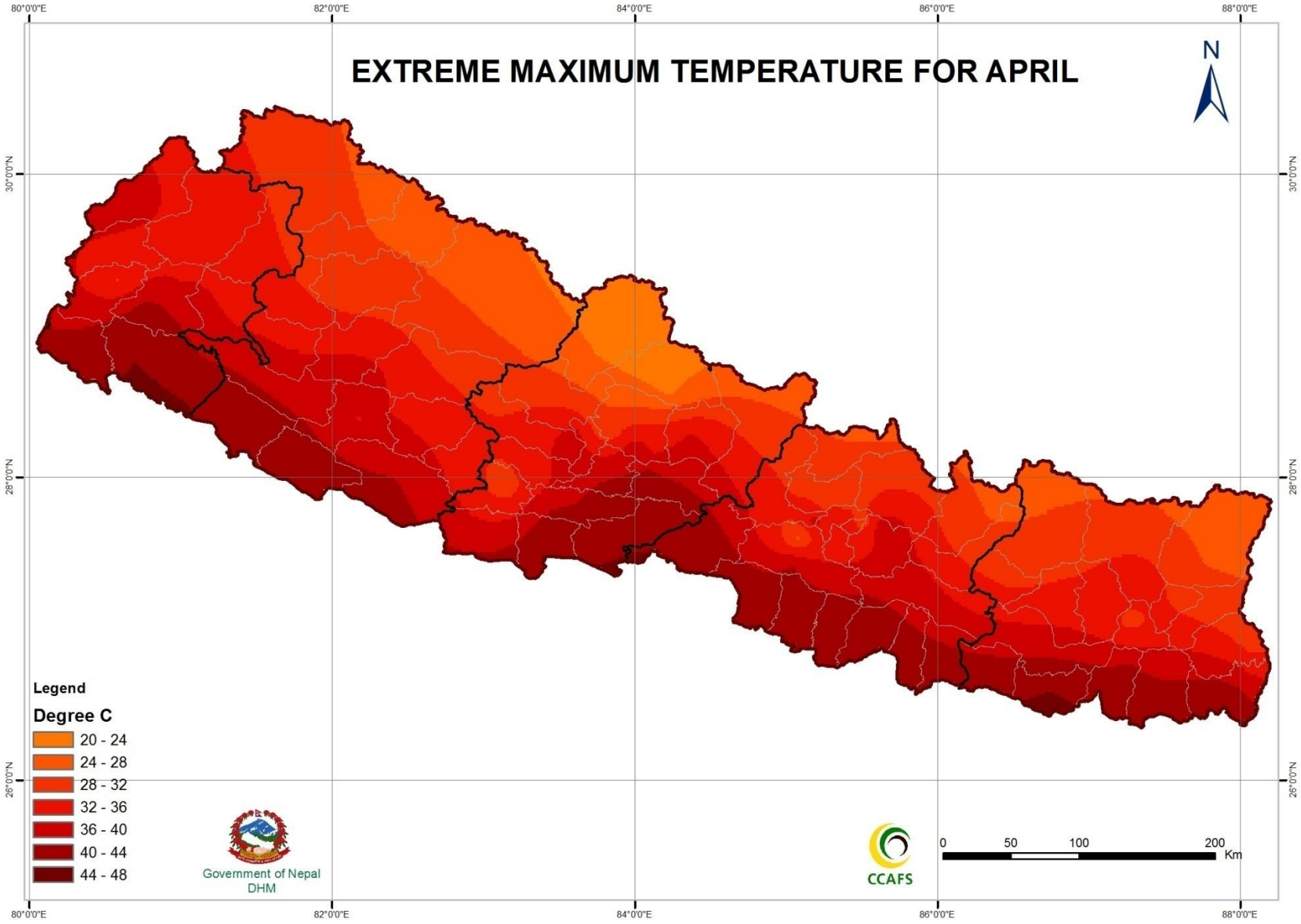
100
200
Km


EXTREME MAXIMUM TEMPERATURE FOR APRIL
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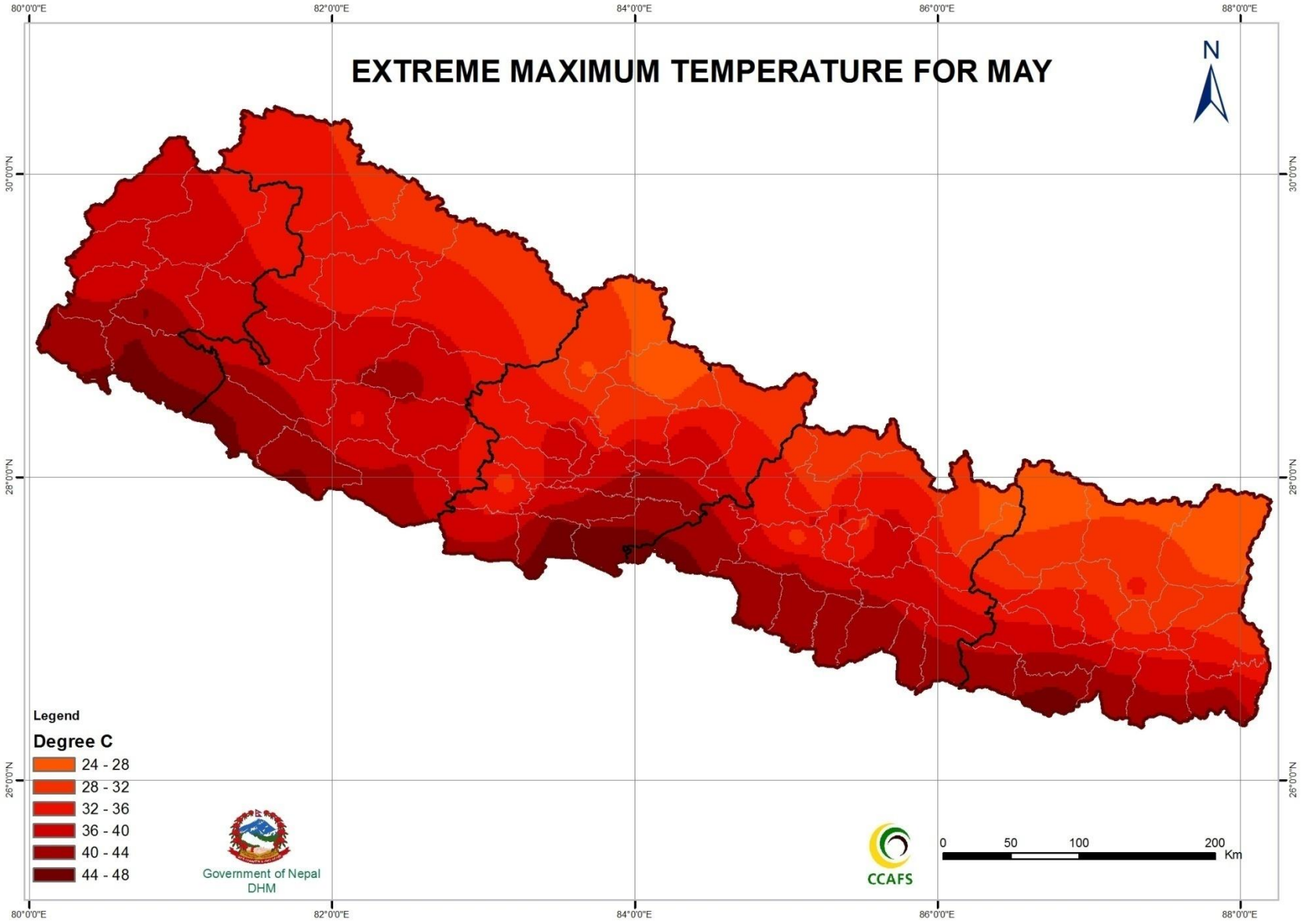
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
20 - 24
24 - 28
28 - 32
32 - 36
36 - 40
40 - 44
44 - 48
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


EXTREME MAXIMUM TEMPERATURE FOR MAY
N
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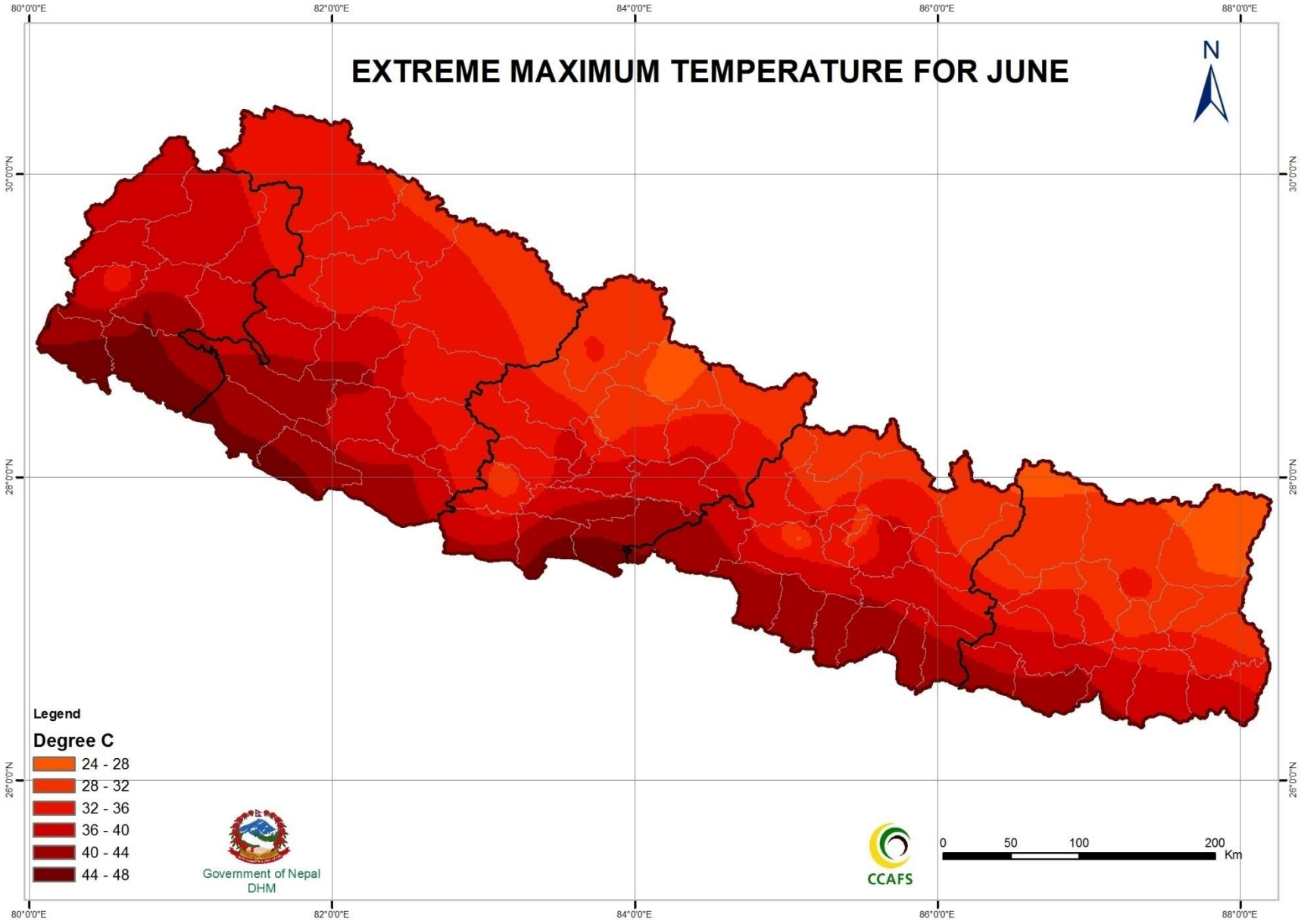
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
24 - 28
28 - 32
32 - 36
36 - 40
40 - 44
44 - 48
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


EXTREME MAXIMUM TEMPERATURE FOR JUNE
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
24 - 28
28 - 32
32 - 36
36 - 40
40 - 44
44 - 48
Government of Nepal
DHM
CCAFS
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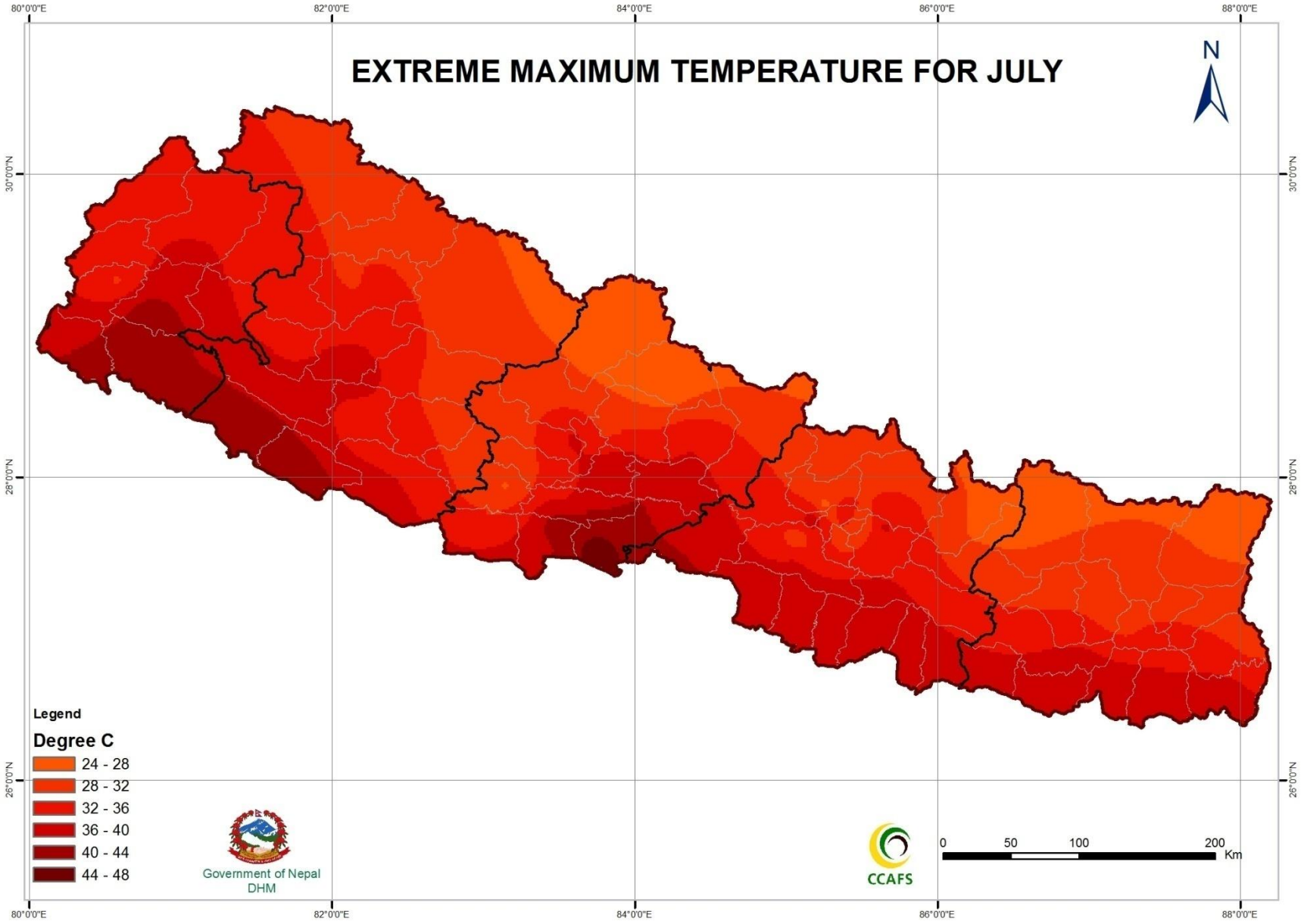
100
200
Km


EXTREME MAXIMUM TEMPERATURE FOR JULY
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
24 - 28
28 - 32
32 - 36
36 - 40
40 - 44
44 - 48
Government of Nepal
DHM
CCAFS
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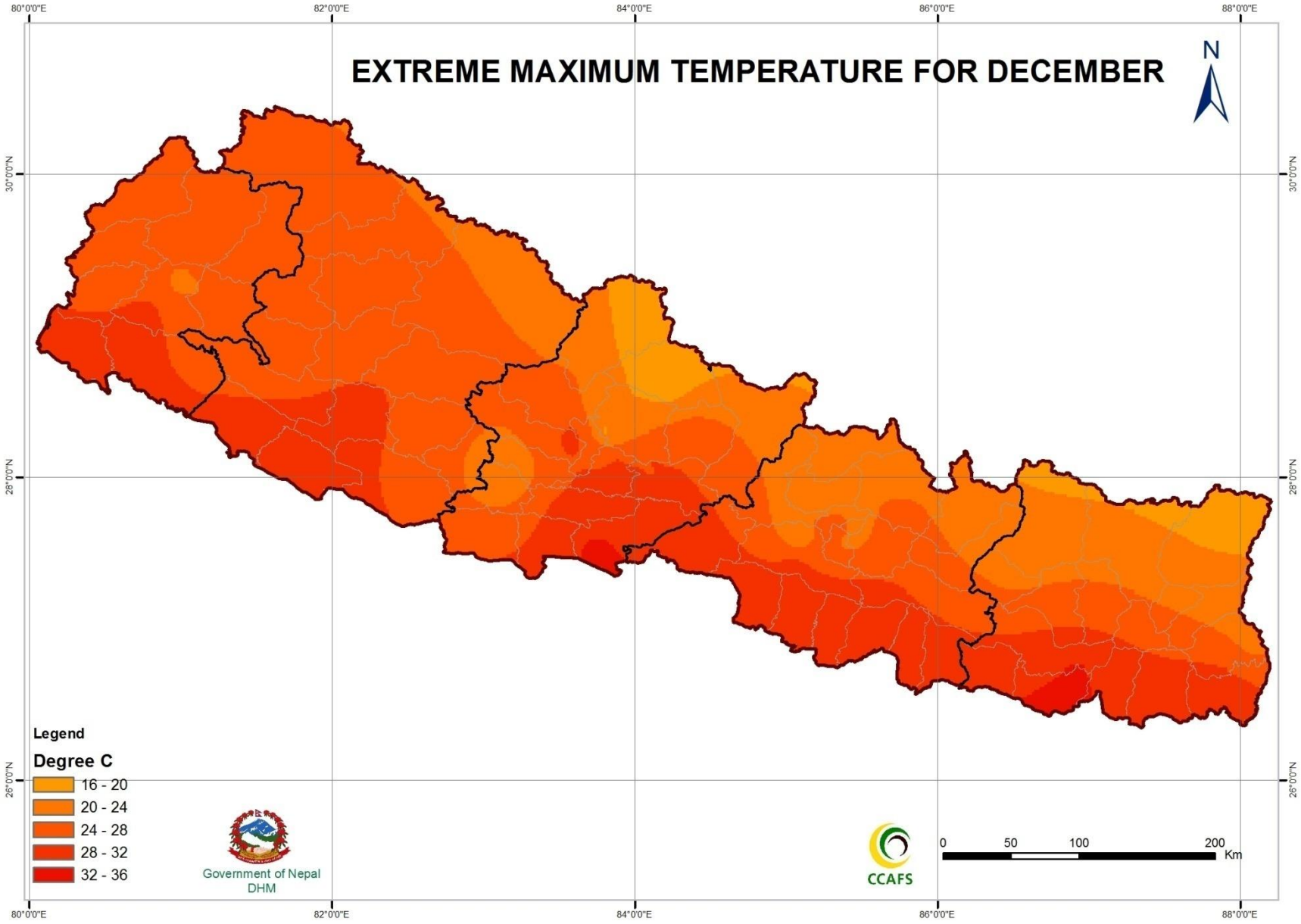
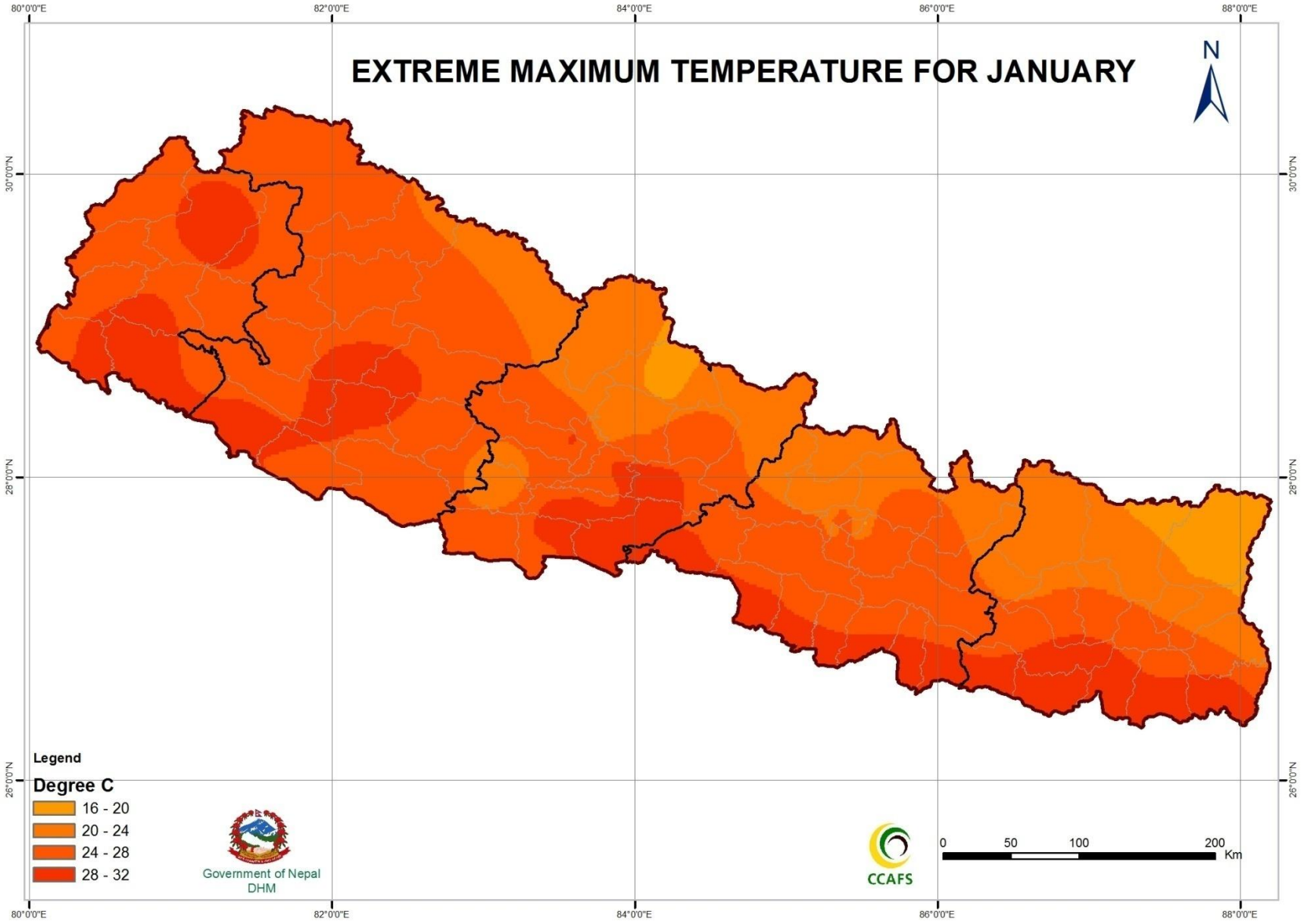
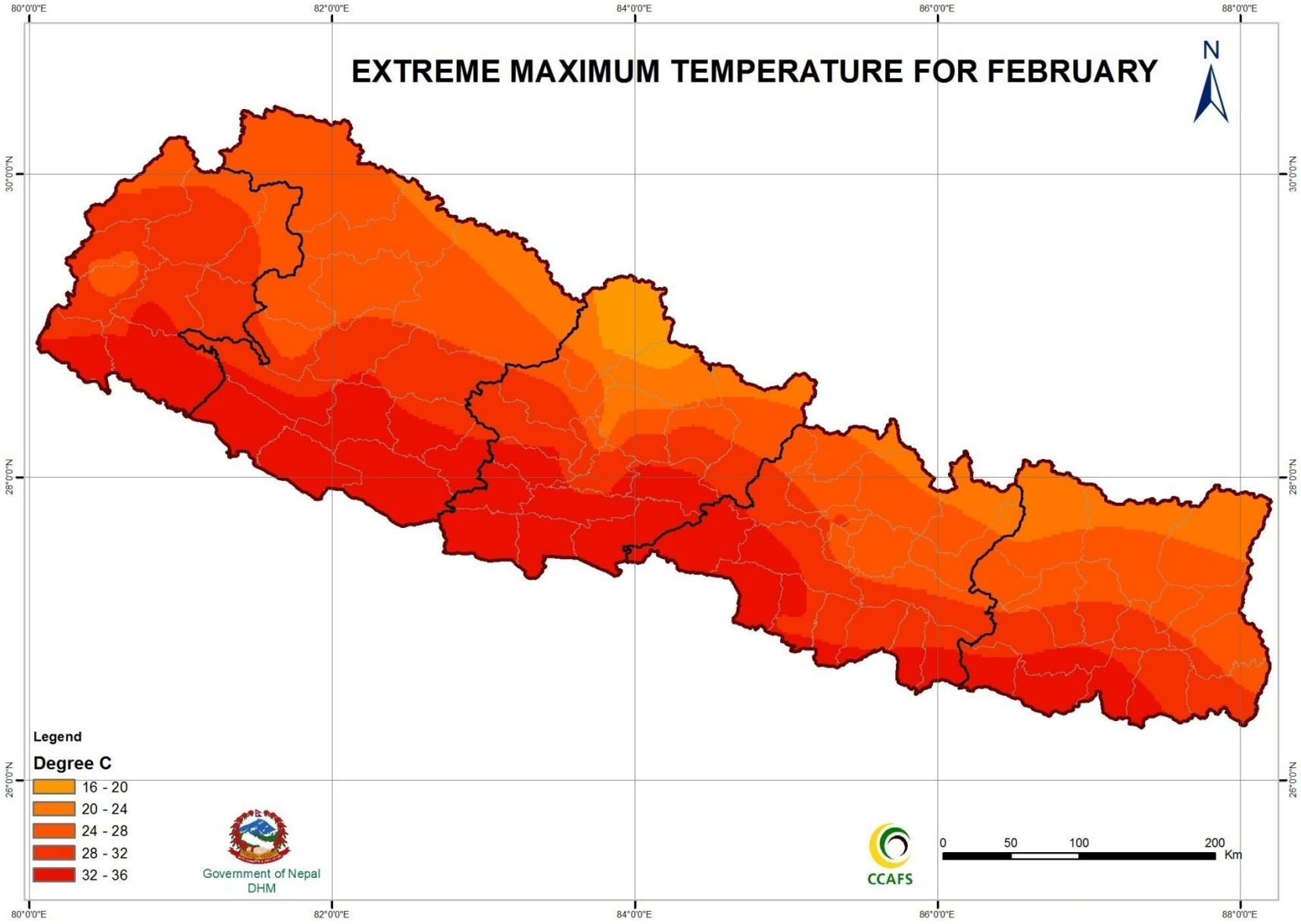
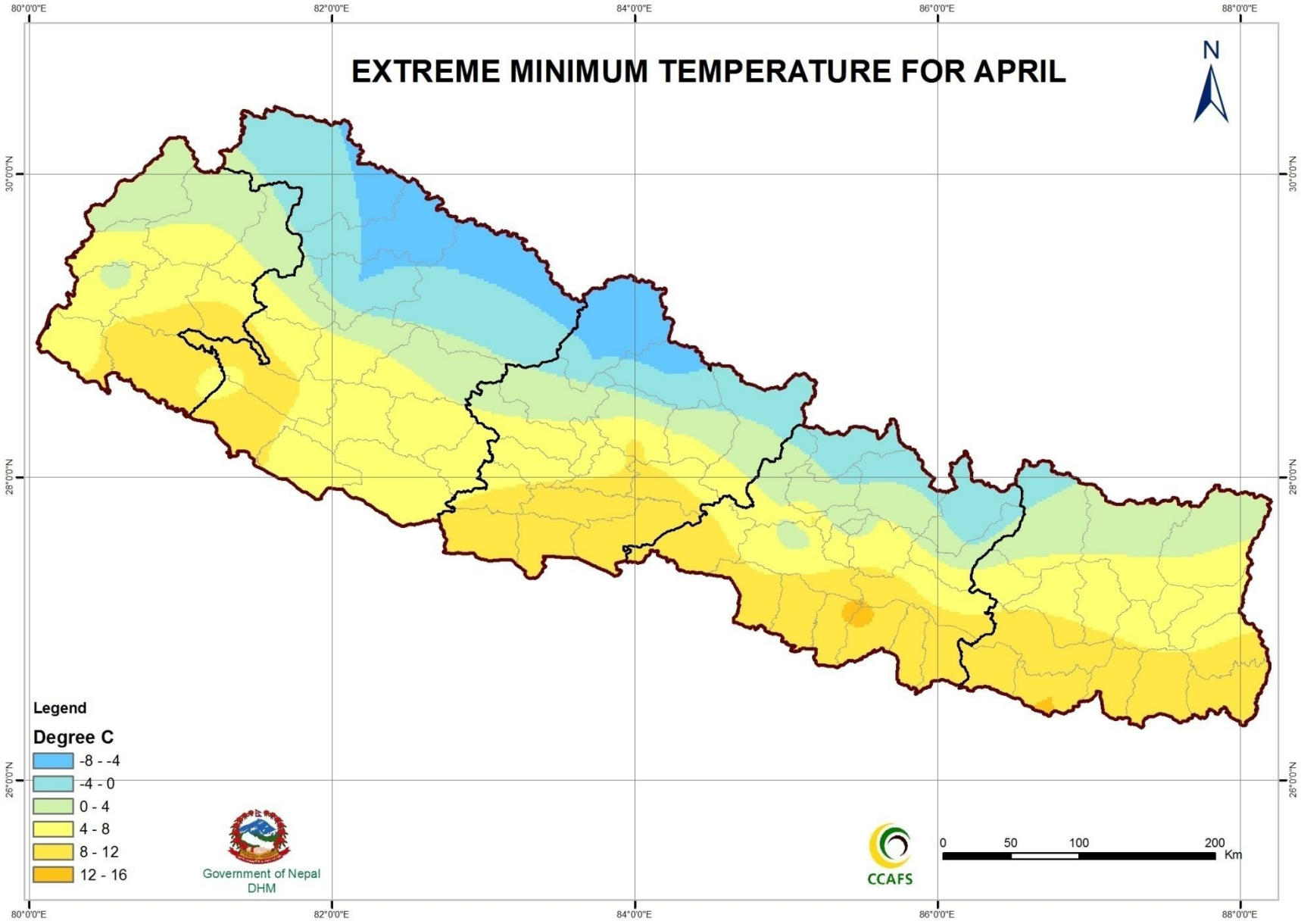
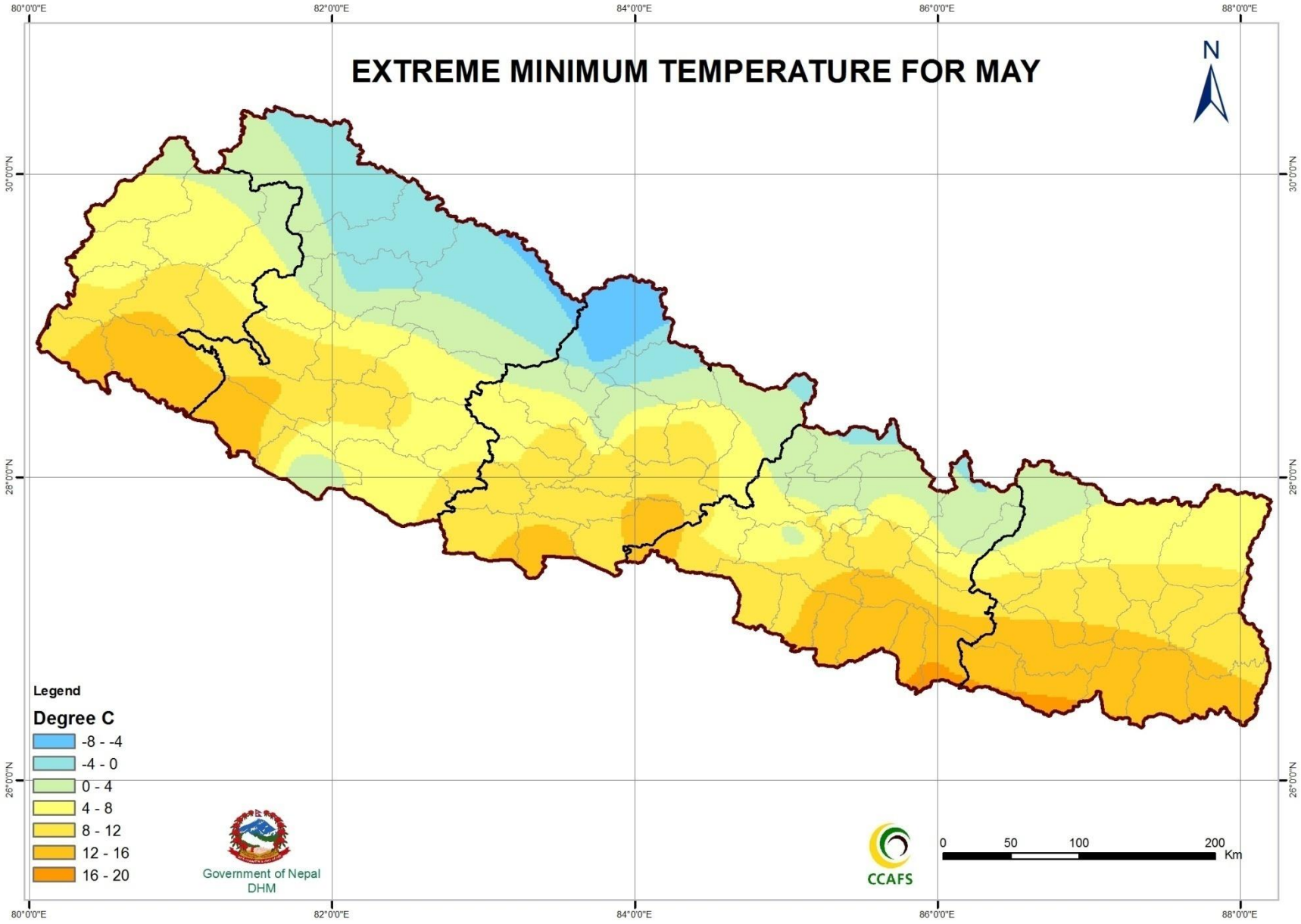
50
100
200
Km


EXTREME MAXIMUM TEMPERATURE FOR DECEMBER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
16 - 20
20 - 24
24 - 28
28 - 32
32 - 36
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


EXTREME MAXIMUM TEMPERATURE FOR JANUARY
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
16 - 20
20 - 24
24 - 28
28 - 32
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


EXTREME MAXIMUM TEMPERATURE FOR FEBRUARY
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
16 - 20
20 - 24
24 - 28
28 - 32
32 - 36
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


EXTREME MINIMUM TEMPERATURE FOR APRIL
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
-8 - -4
-4 - 0
0 - 4
4 - 8
8 - 12
12 - 16
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


EXTREME MINIMUM TEMPERATURE FOR MAY
N
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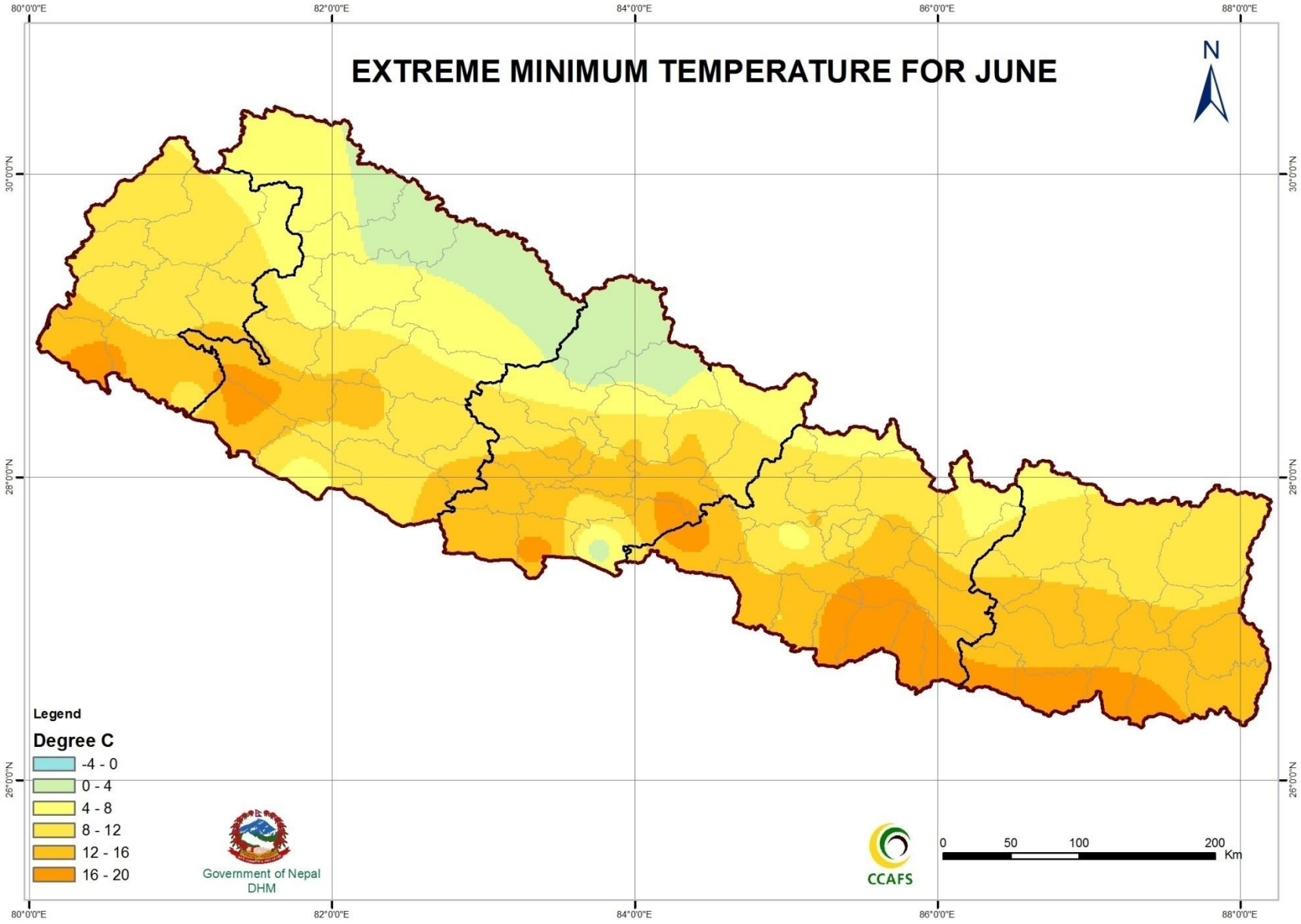
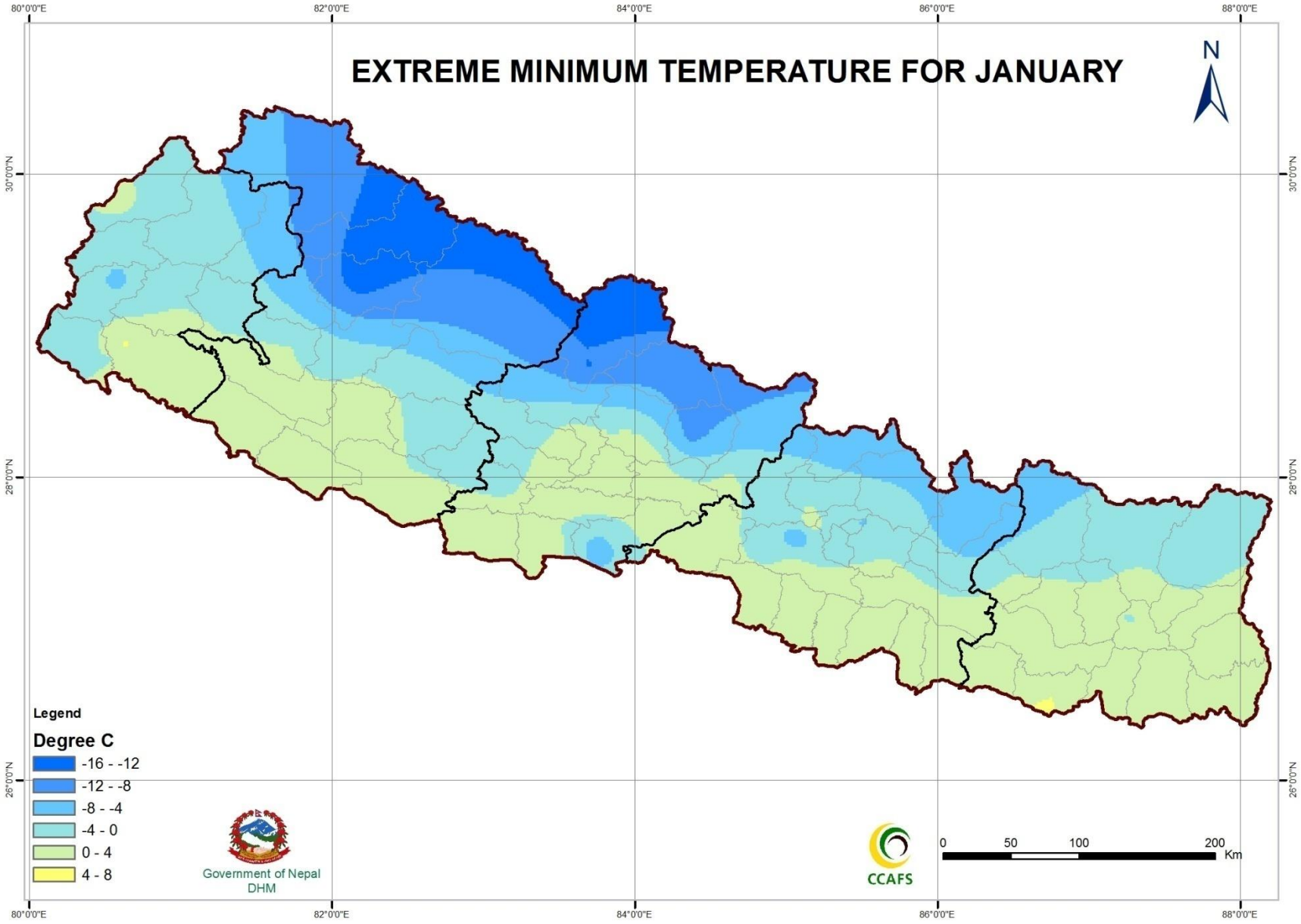
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
-8 - -4
-4 - 0
0 - 4
4 - 8
8 - 12
12 - 16
16 - 20
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


EXTREME MINIMUM TEMPERATURE FOR JUNE
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
-4 - 0
0 - 4
4 - 8
8 - 12
12 - 16
16 - 20
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


EXTREME MINIMUM TEMPERATURE FOR JANUARY
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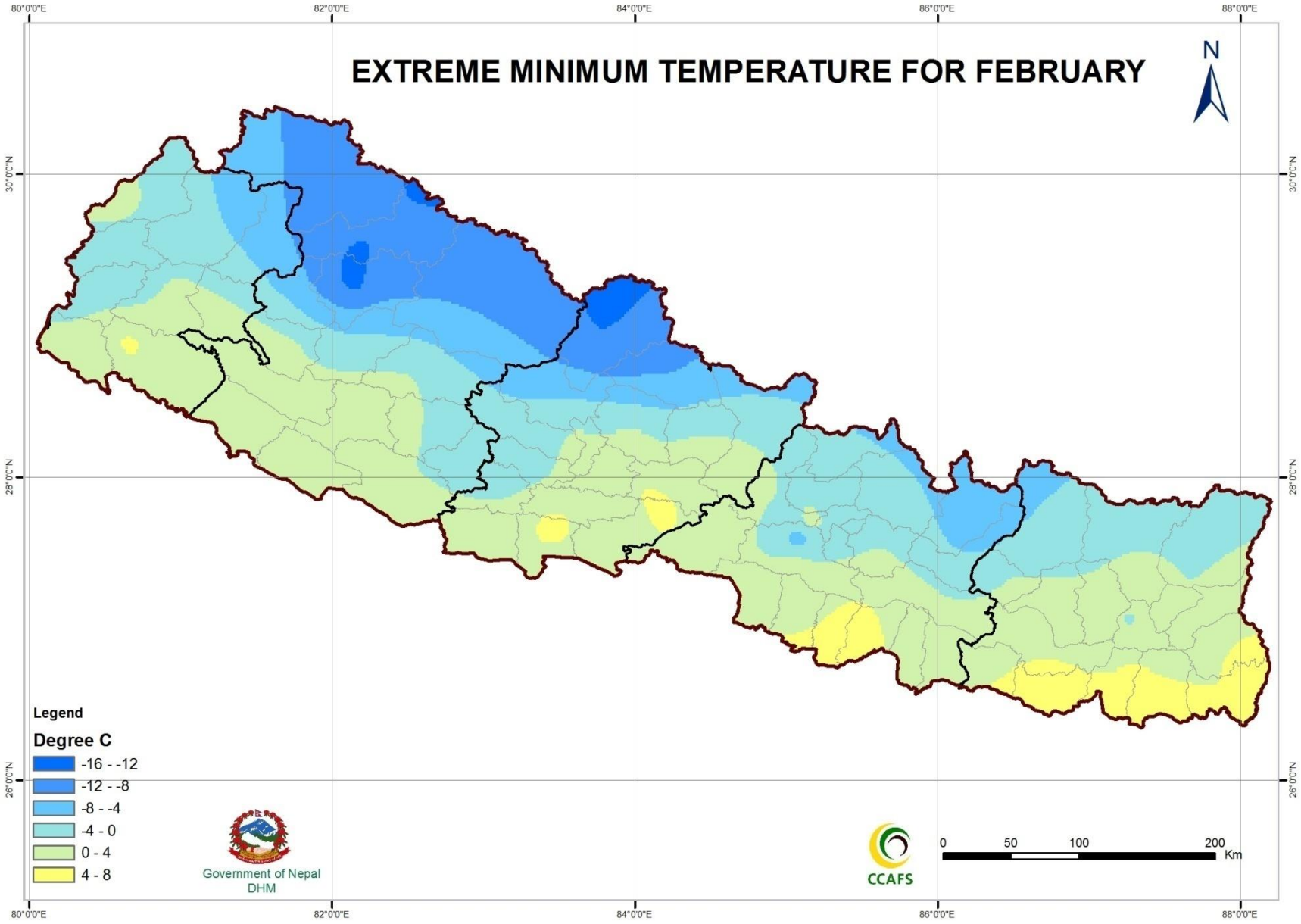
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
-16 - -12
-12 - -8
-8 - -4
-4 - 0
0 - 4
4 - 8
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


EXTREME MINIMUM TEMPERATURE FOR FEBRUARY
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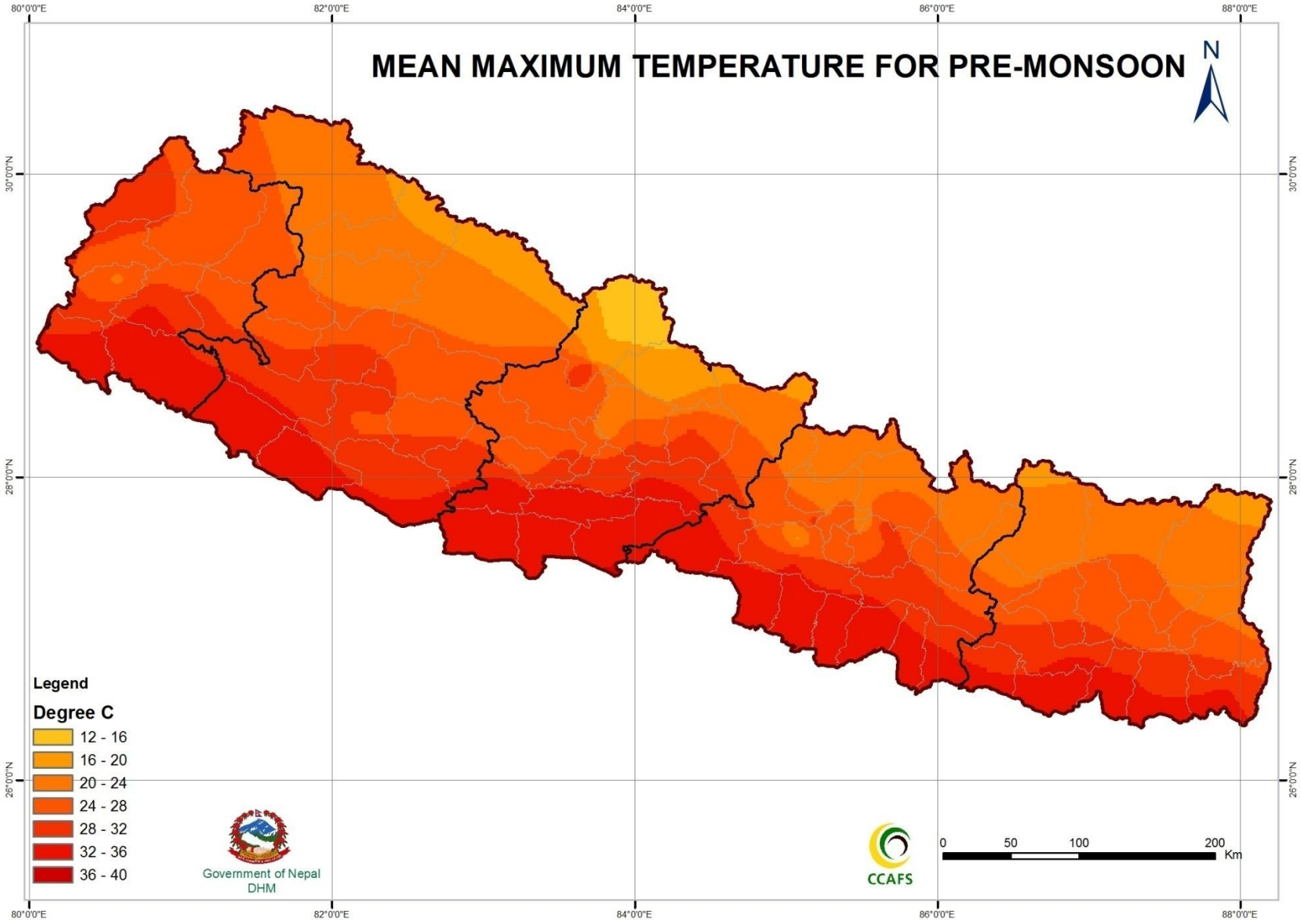
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
-16 - -12
-12 - -8
-8 - -4
-4 - 0
0 - 4
4 - 8
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN MAXIMUM TEMPERATURE FOR PRE-MONSOON
N
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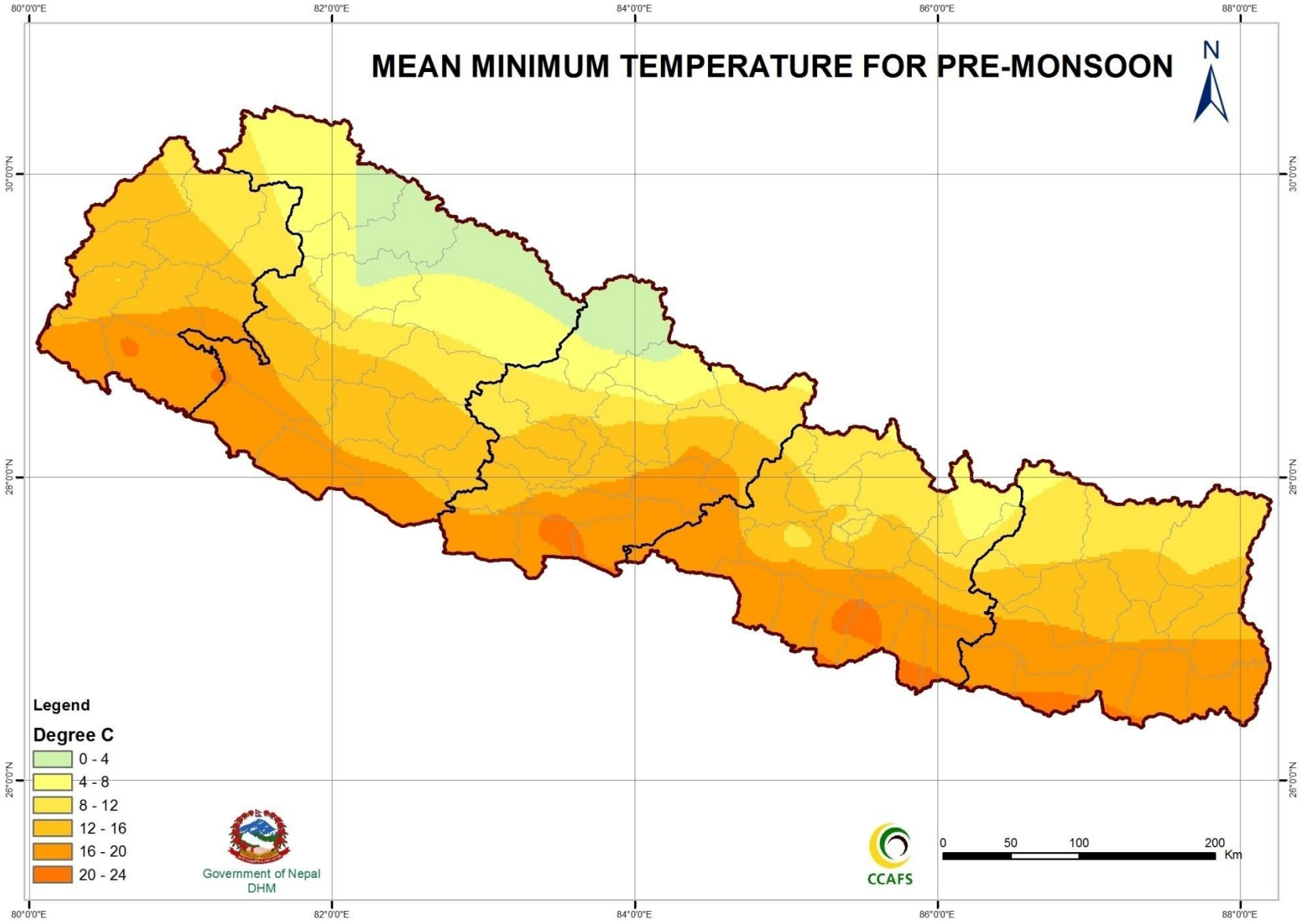
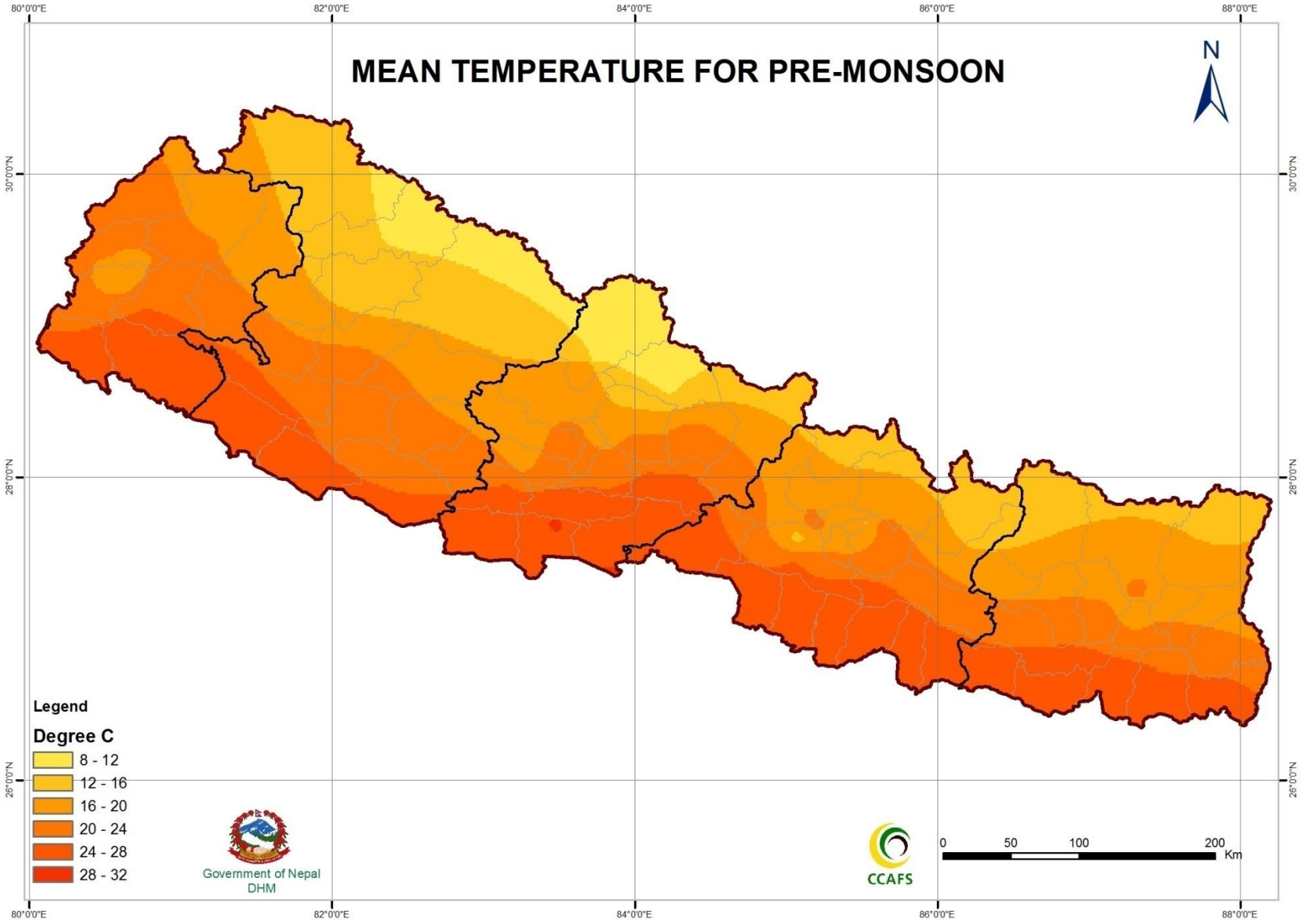
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
12 - 16
16 - 20
20 - 24
24 - 28
28 - 32
32 - 36
36 - 40
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN MINIMUM TEMPERATURE FOR PRE-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
0 - 4
4 - 8
8 - 12
12 - 16
16 - 20
20 - 24
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN TEMPERATURE FOR PRE-MONSOON
N
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82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
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12 - 16
16 - 20
20 - 24
24 - 28
28 - 32
Government of Nepal
DHM
CCAFS
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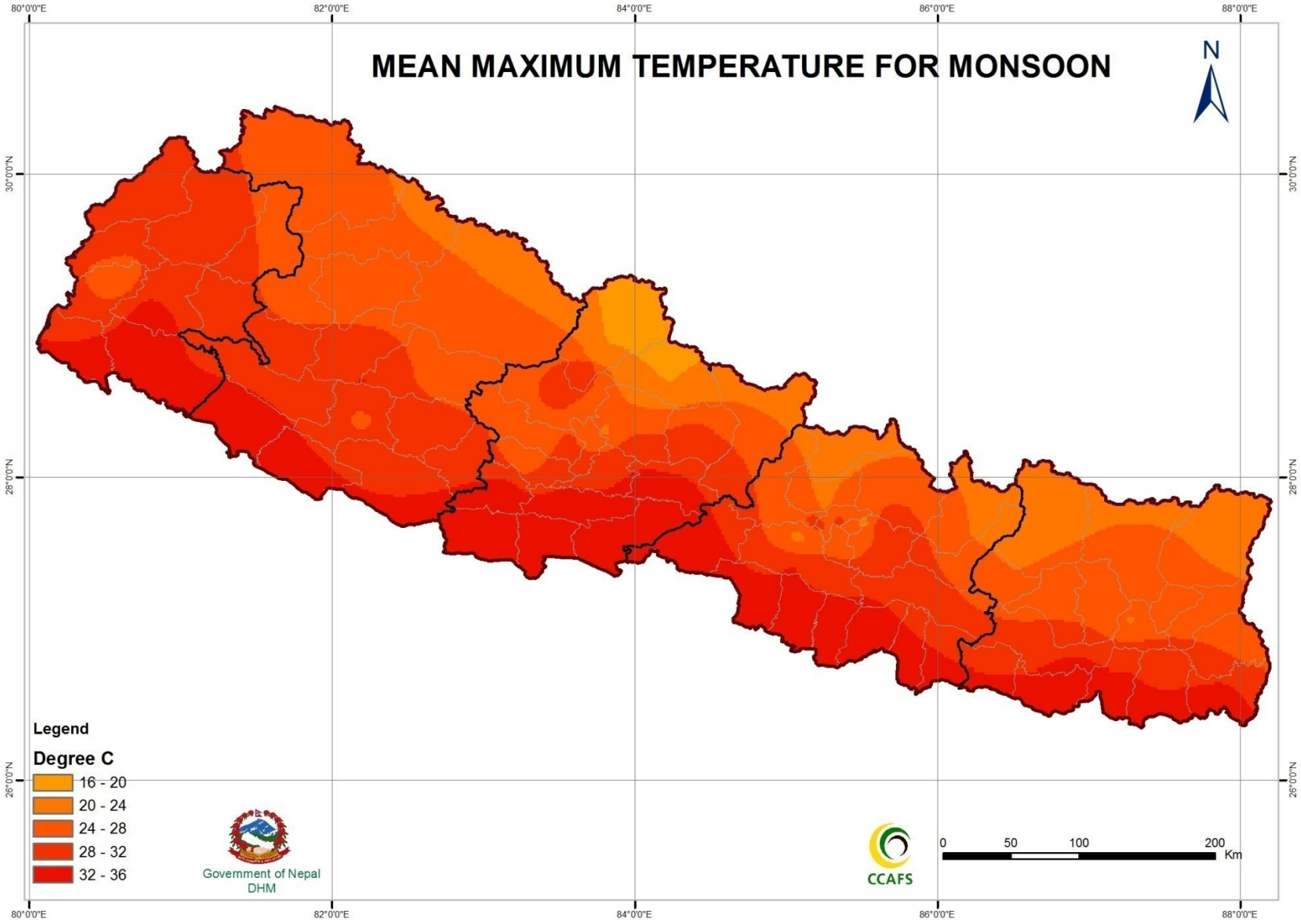
50
100
200
Km


MEAN MAXIMUM TEMPERATURE FOR MONSOON
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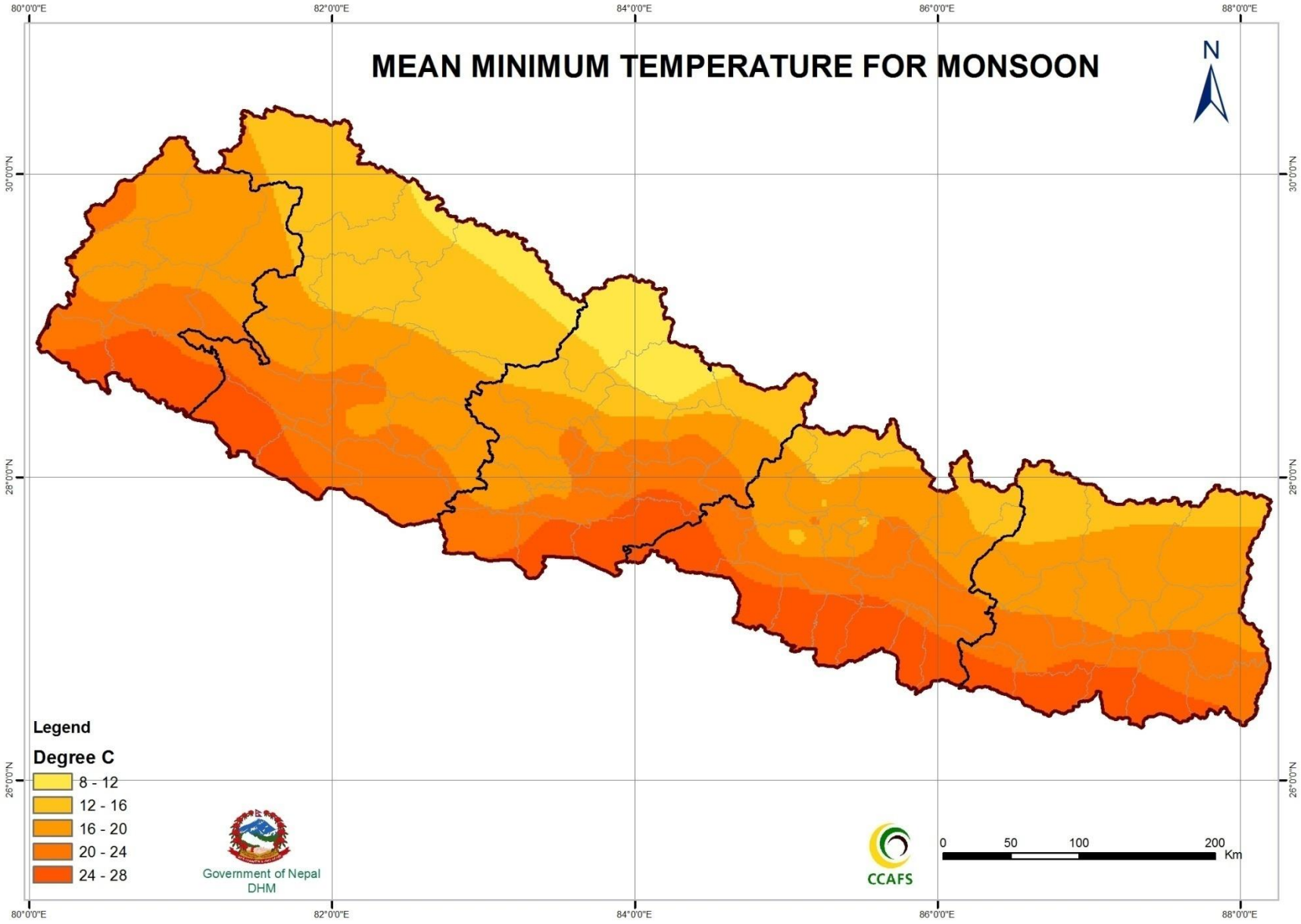
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
16 - 20
20 - 24
24 - 28
28 - 32
32 - 36
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN MINIMUM TEMPERATURE FOR MONSOON
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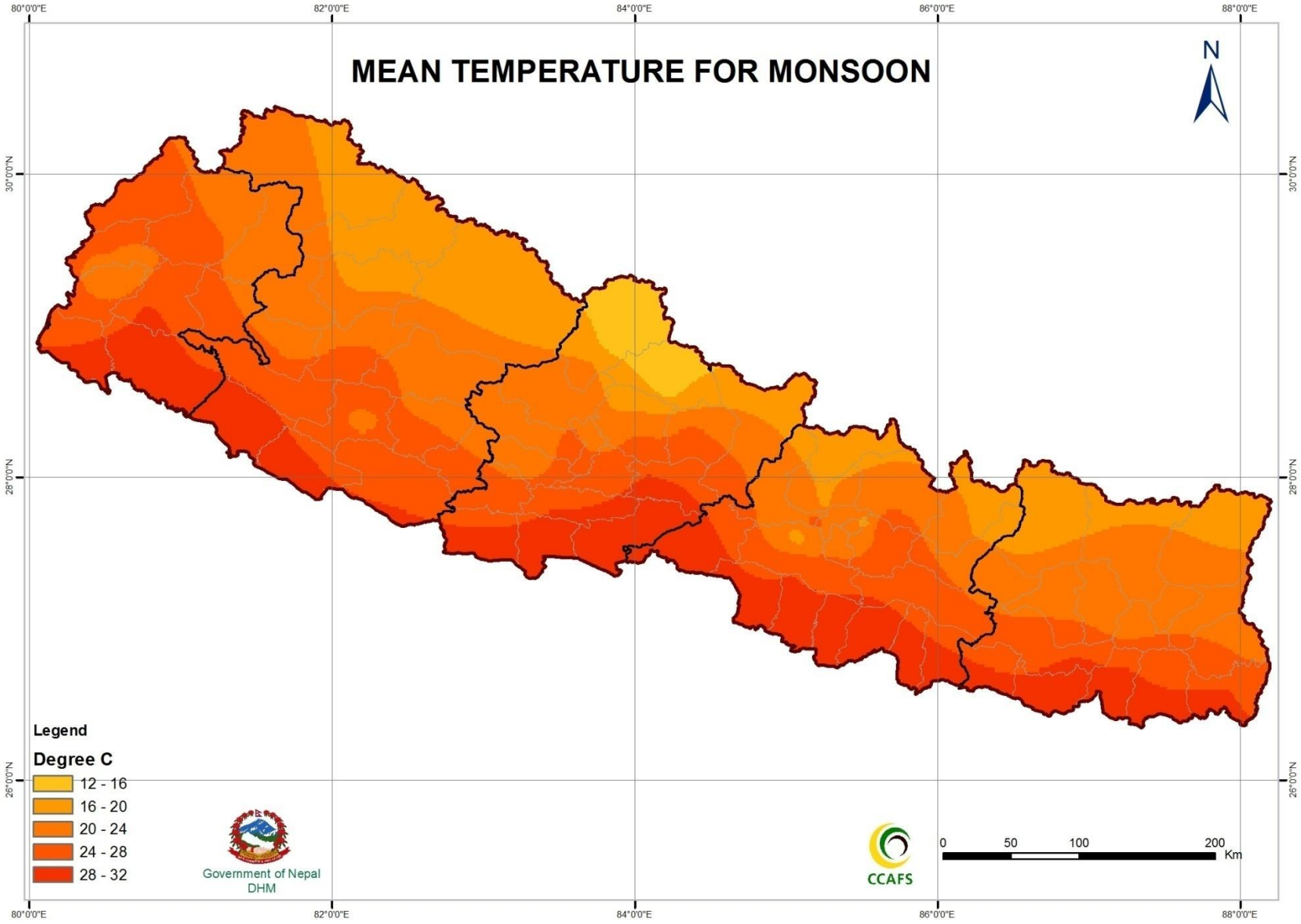
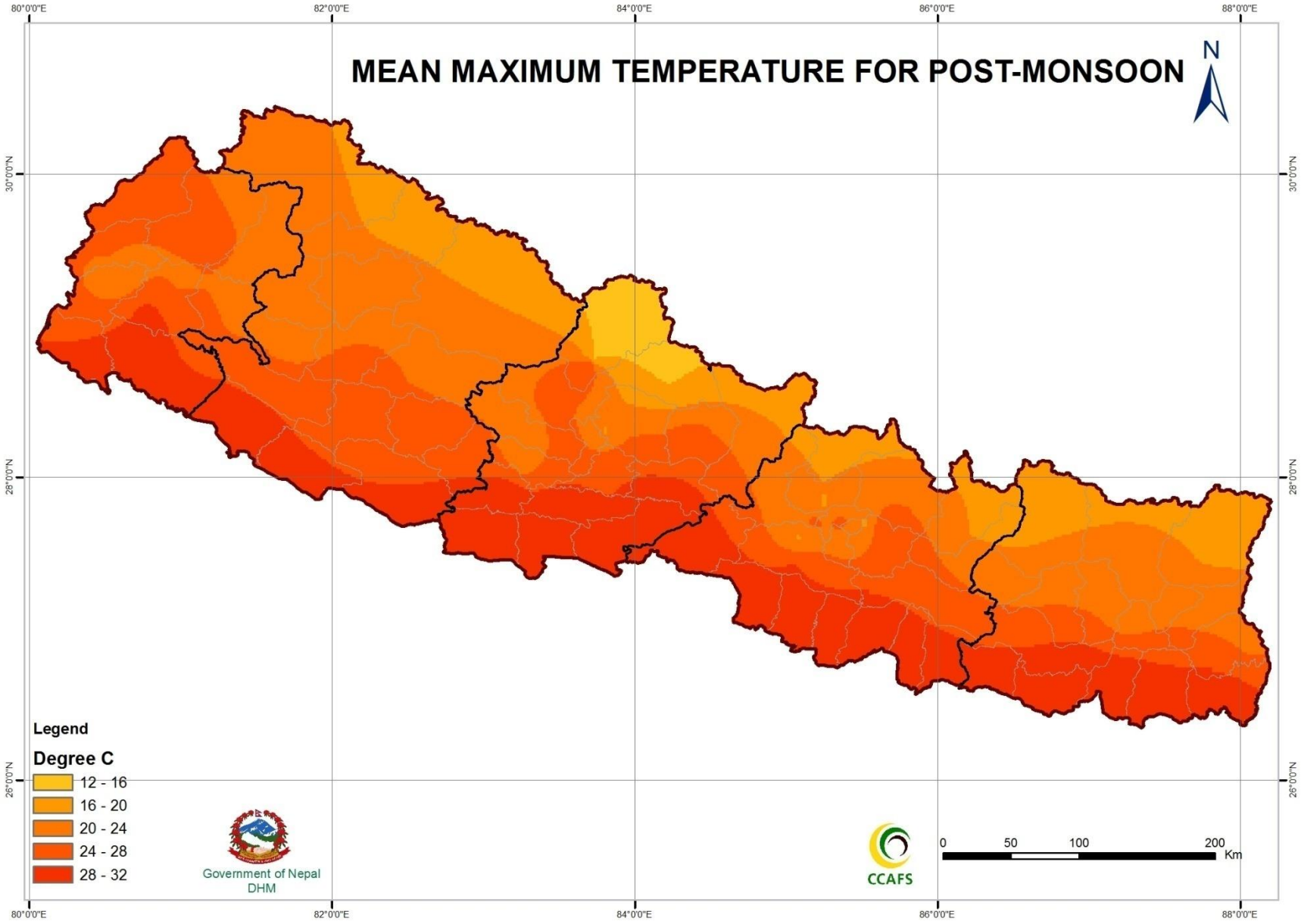
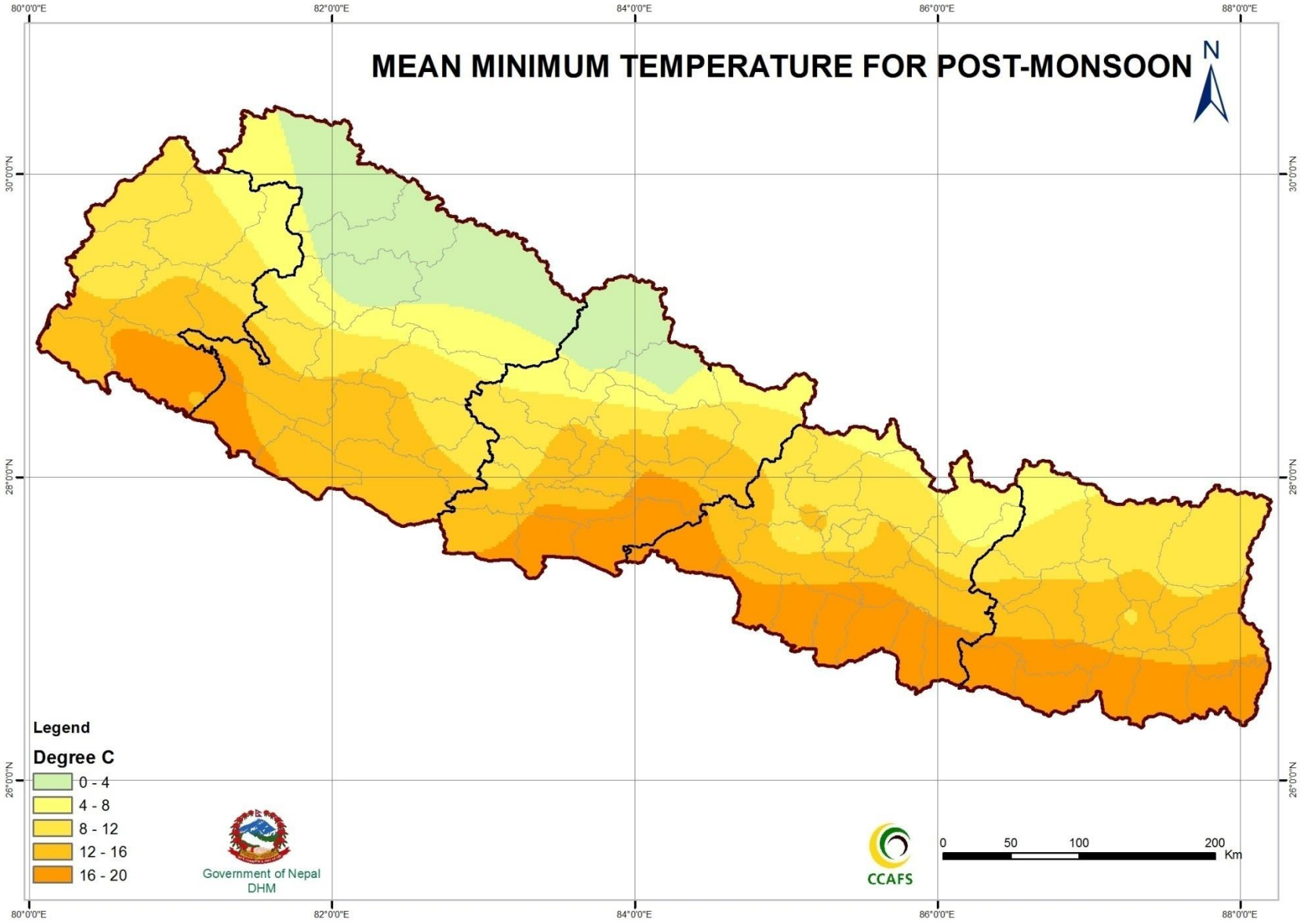
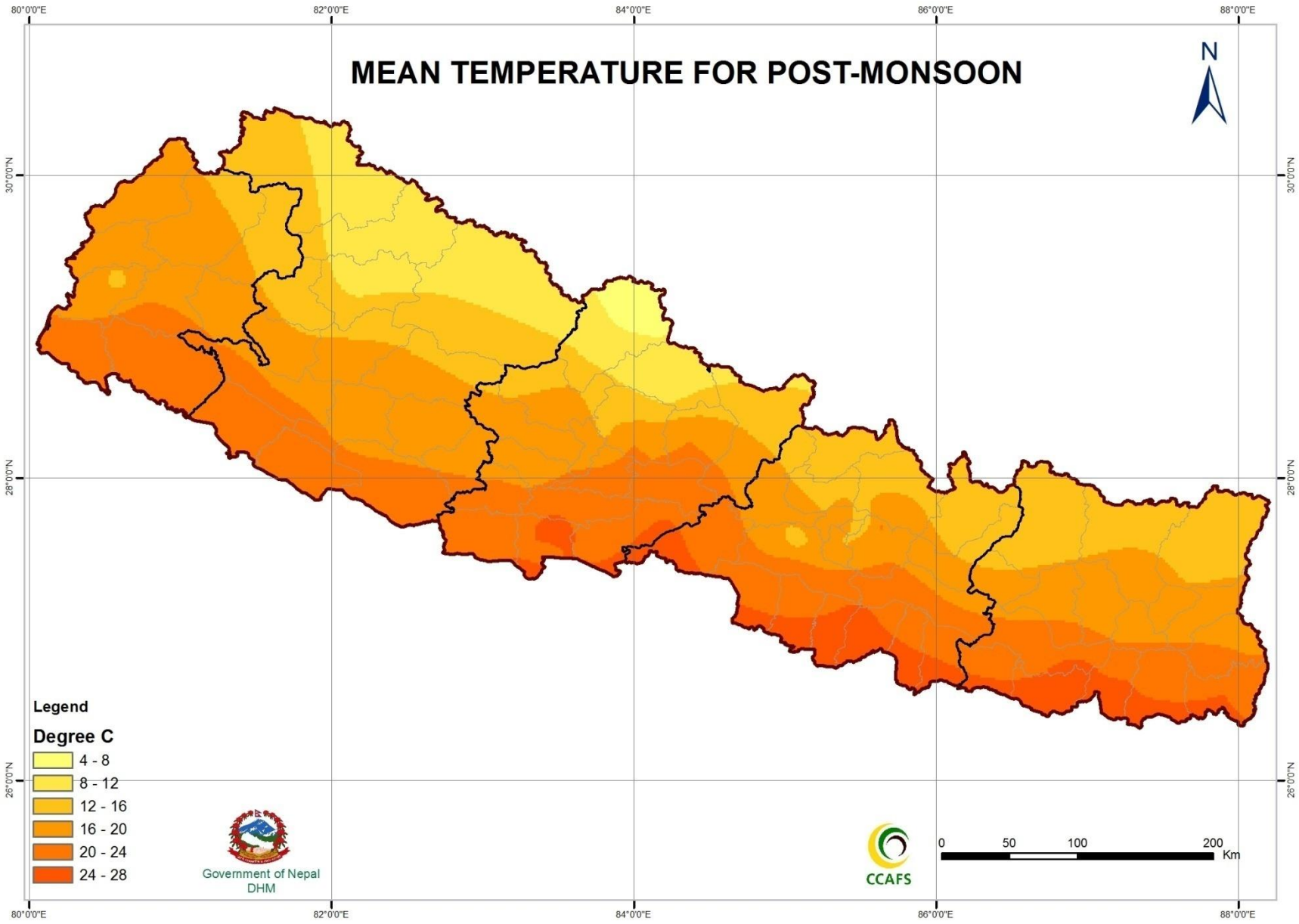
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
8 - 12
12 - 16
16 - 20
20 - 24
24 - 28
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN TEMPERATURE FOR MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
12 - 16
16 - 20
20 - 24
24 - 28
28 - 32
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN MAXIMUM TEMPERATURE FOR POST-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
12 - 16
16 - 20
20 - 24
24 - 28
28 - 32
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN MINIMUM TEMPERATURE FOR POST-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
0 - 4
4 - 8
8 - 12
12 - 16
16 - 20
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


MEAN TEMPERATURE FOR POST-MONSOON
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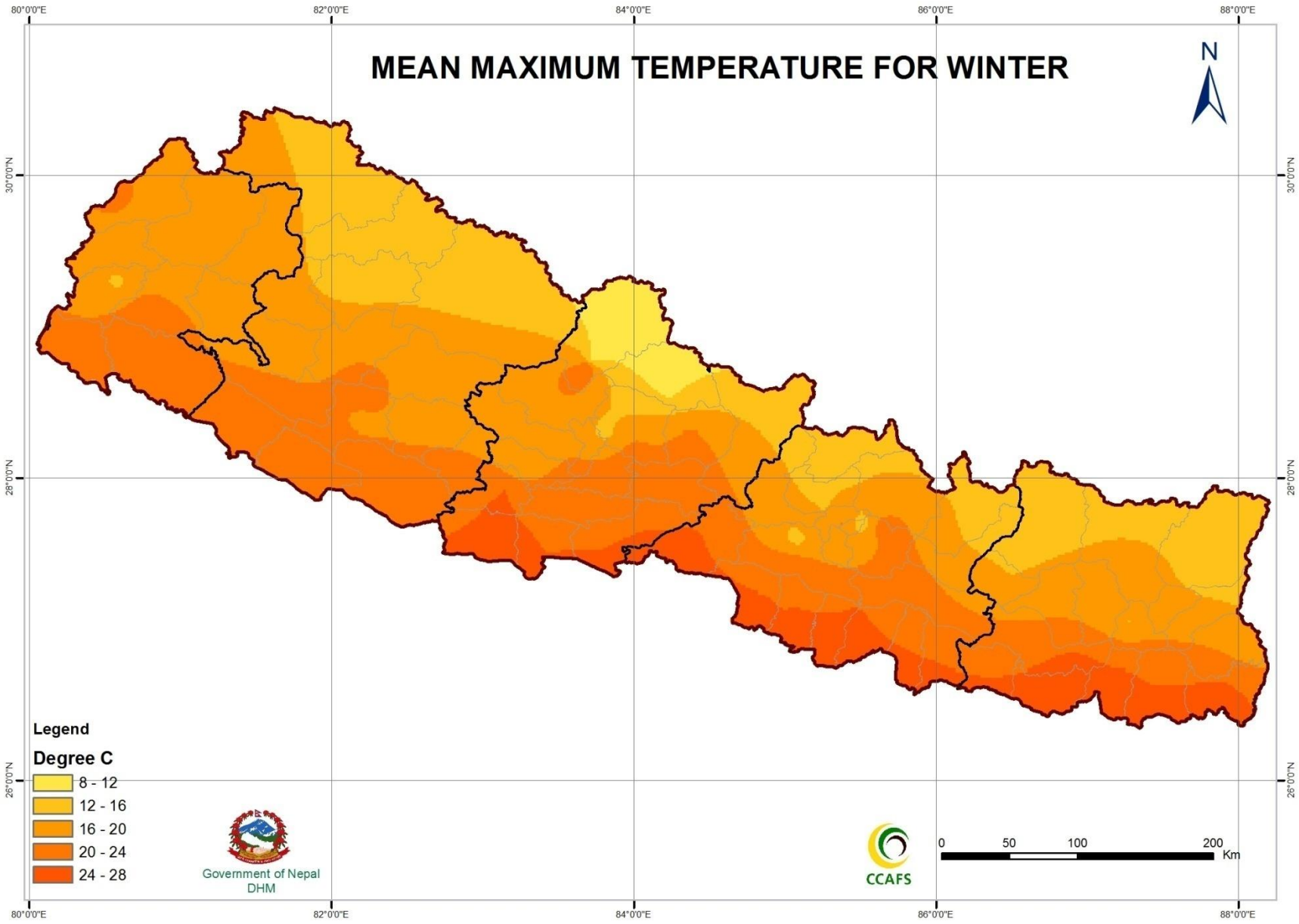
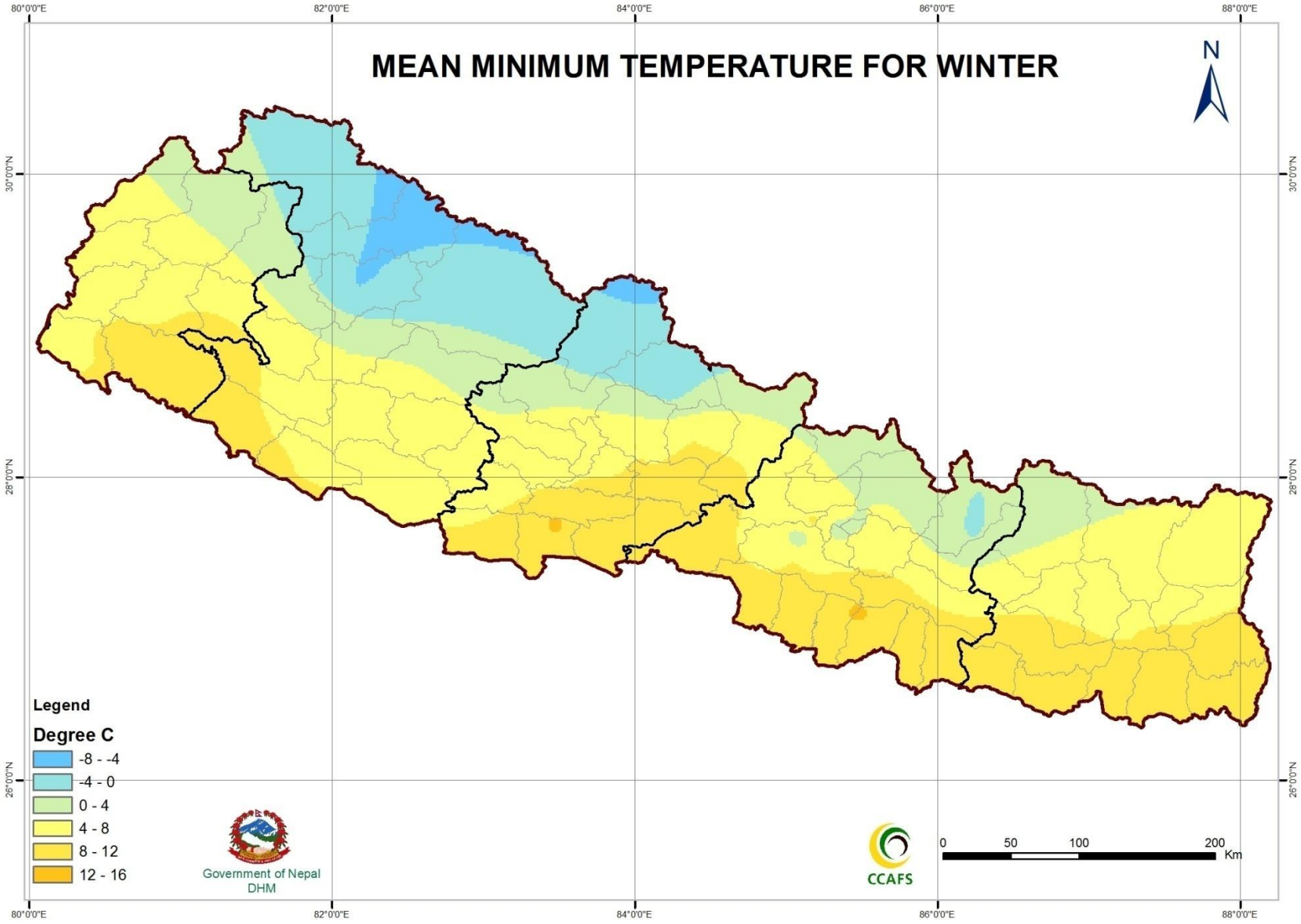
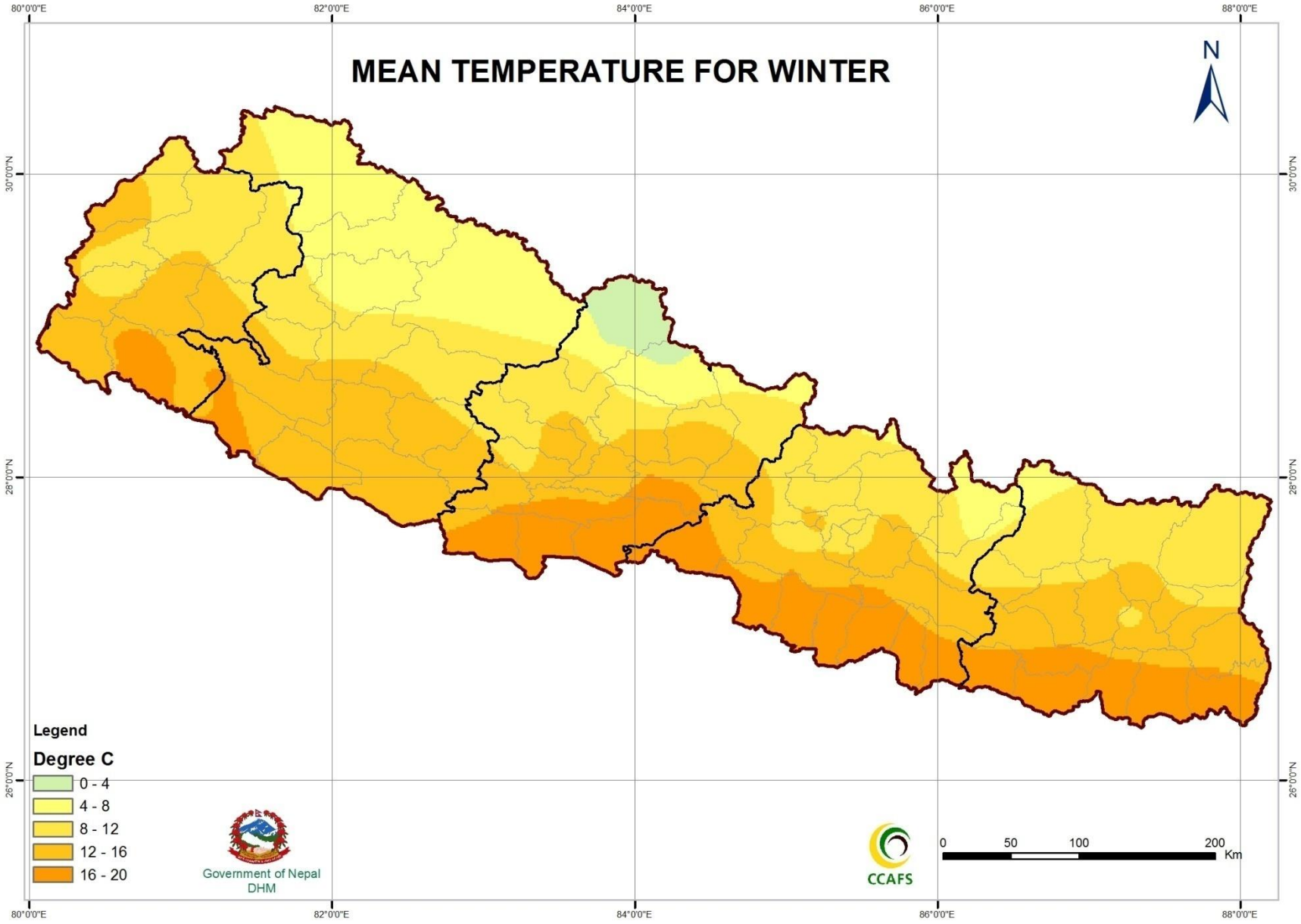
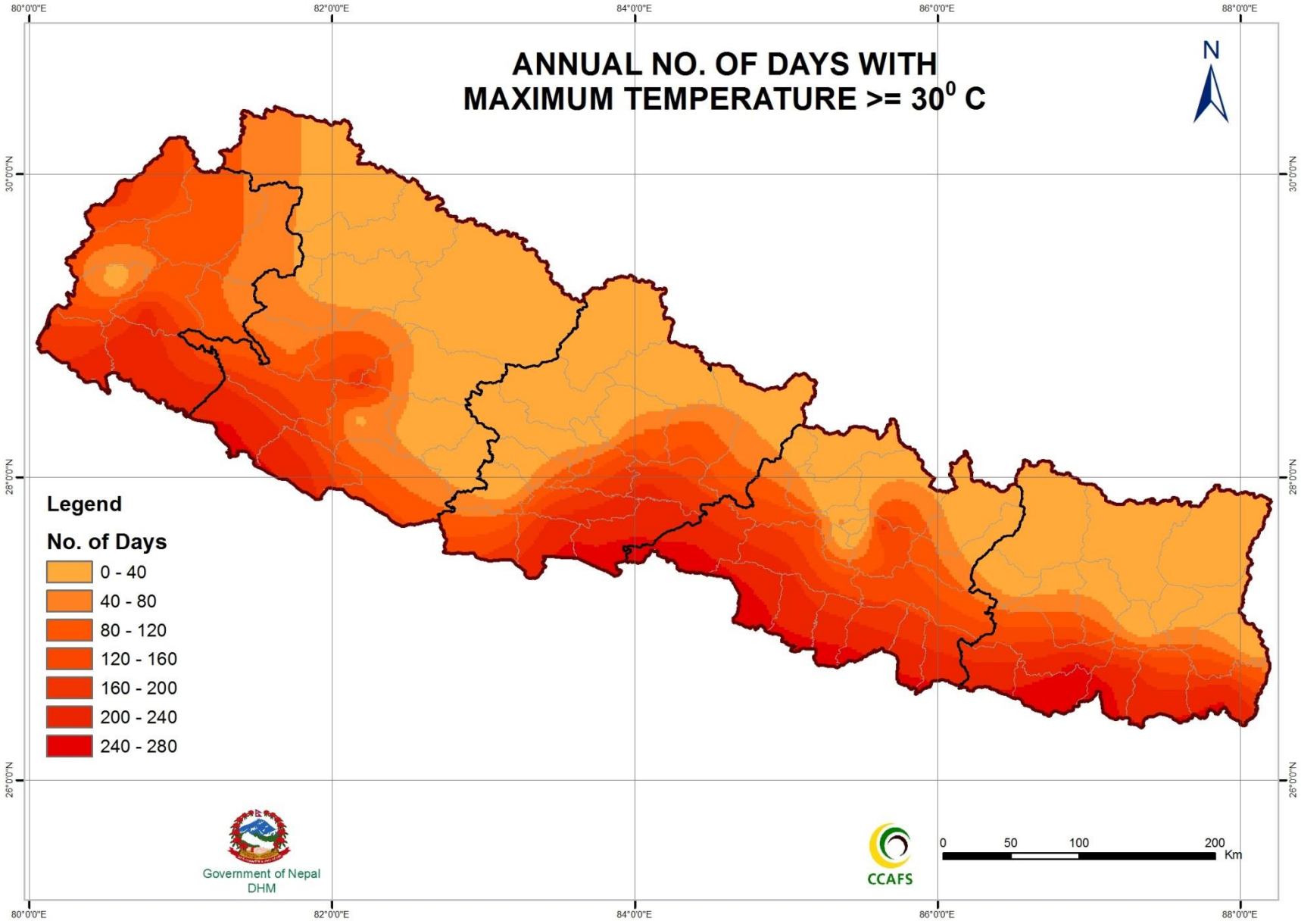
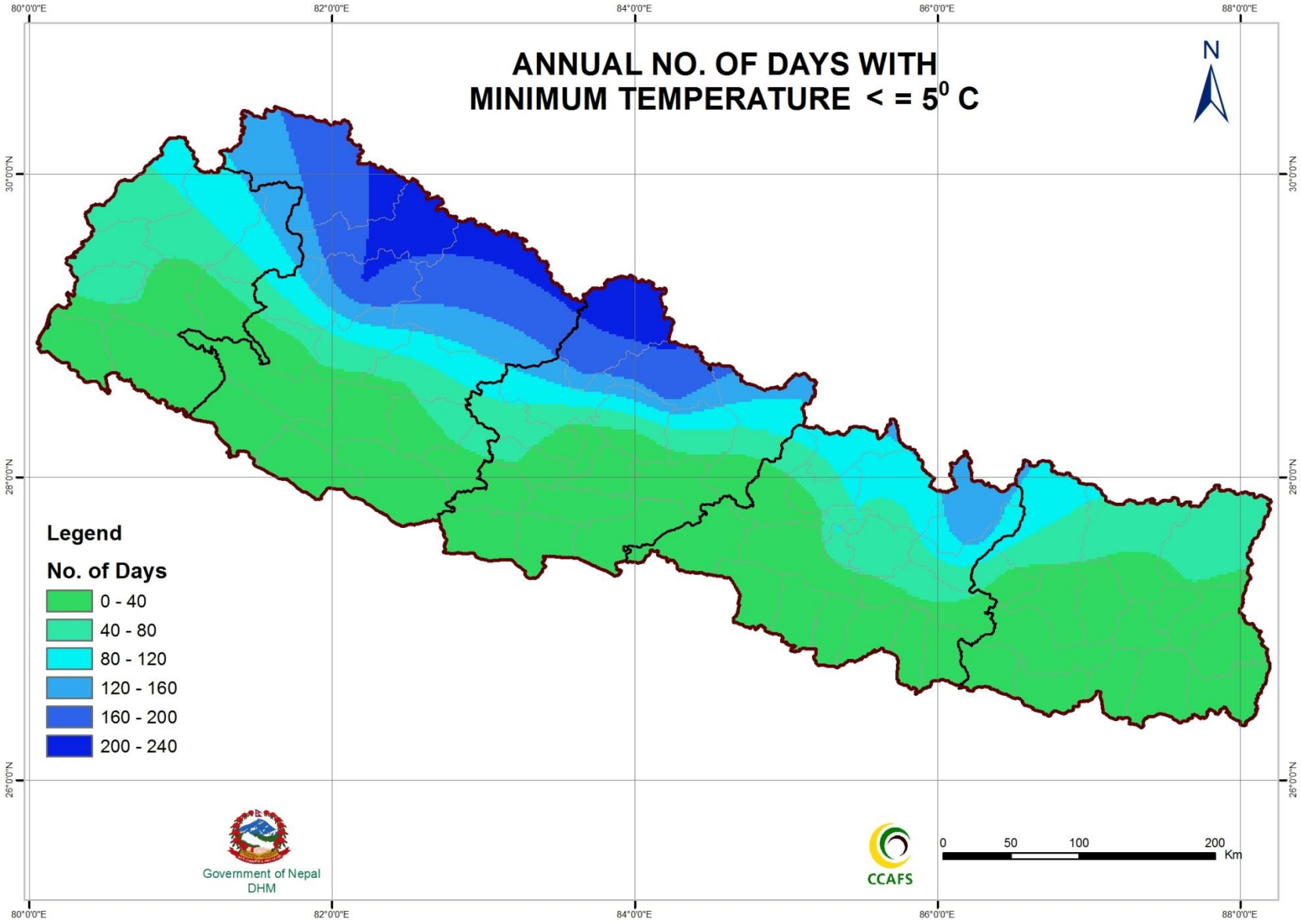
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
4 - 8
8 - 12
12 - 16
16 - 20
20 - 24
24 - 28
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

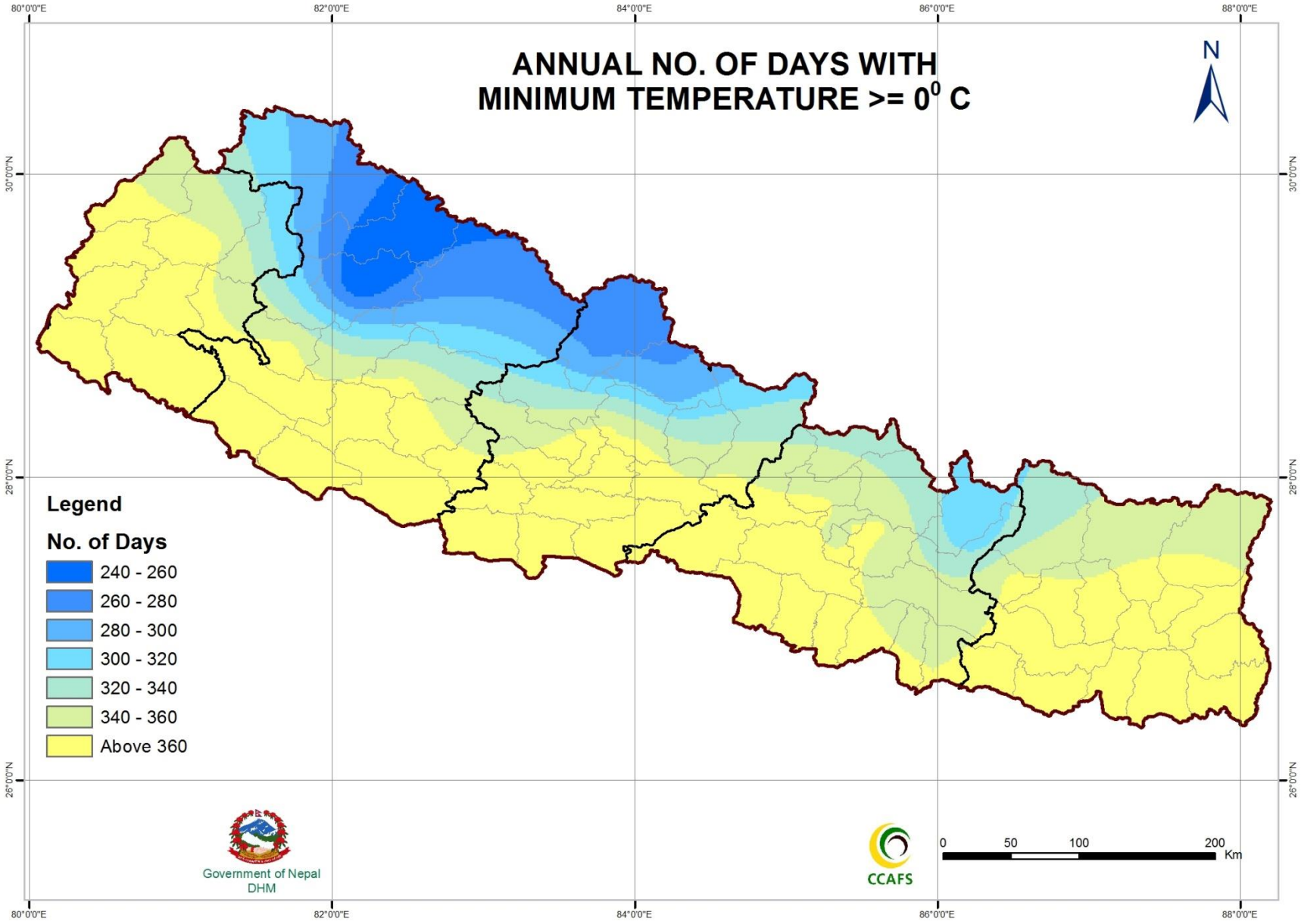

MEAN MAXIMUM TEMPERATURE FOR WINTER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
8 - 12
12 - 16
16 - 20
20 - 24
24 - 28
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

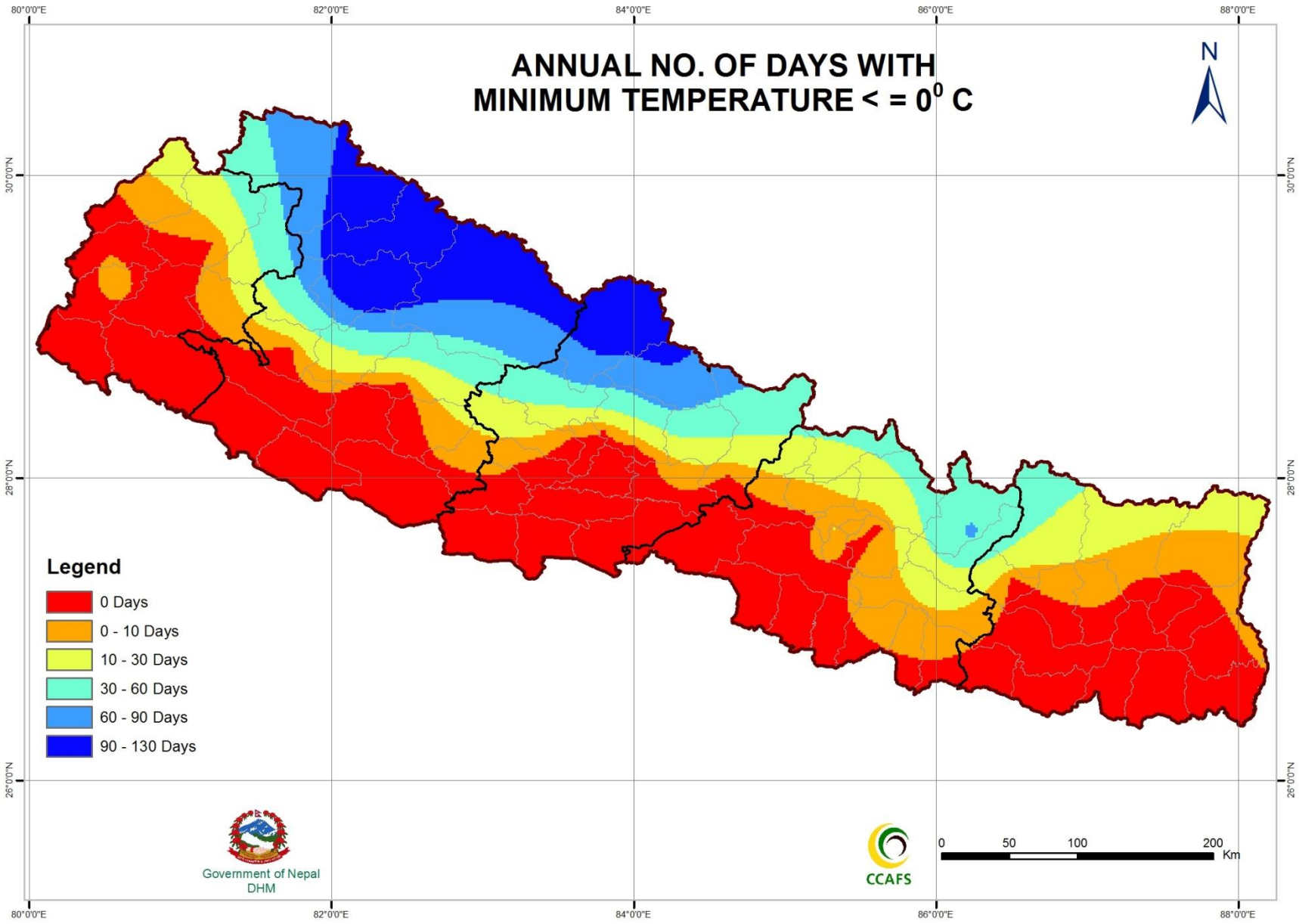

MEAN MINIMUM TEMPERATURE FOR WINTER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
-8 - -4
-4 - 0
0 - 4
4 - 8
8 - 12
12 - 16
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

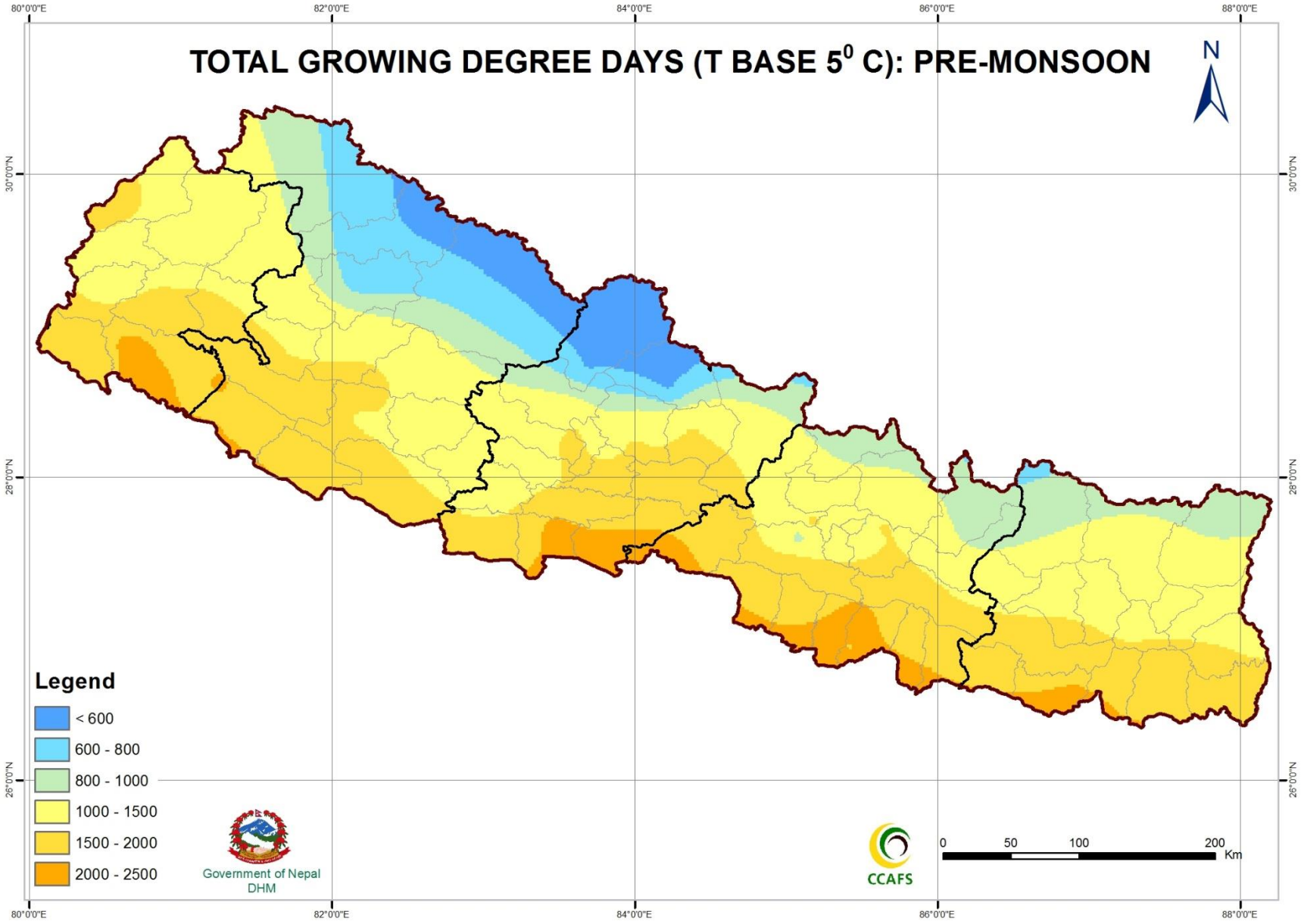

MEAN TEMPERATURE FOR WINTER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
Degree C
0 - 4
4 - 8
8 - 12
12 - 16
16 - 20
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

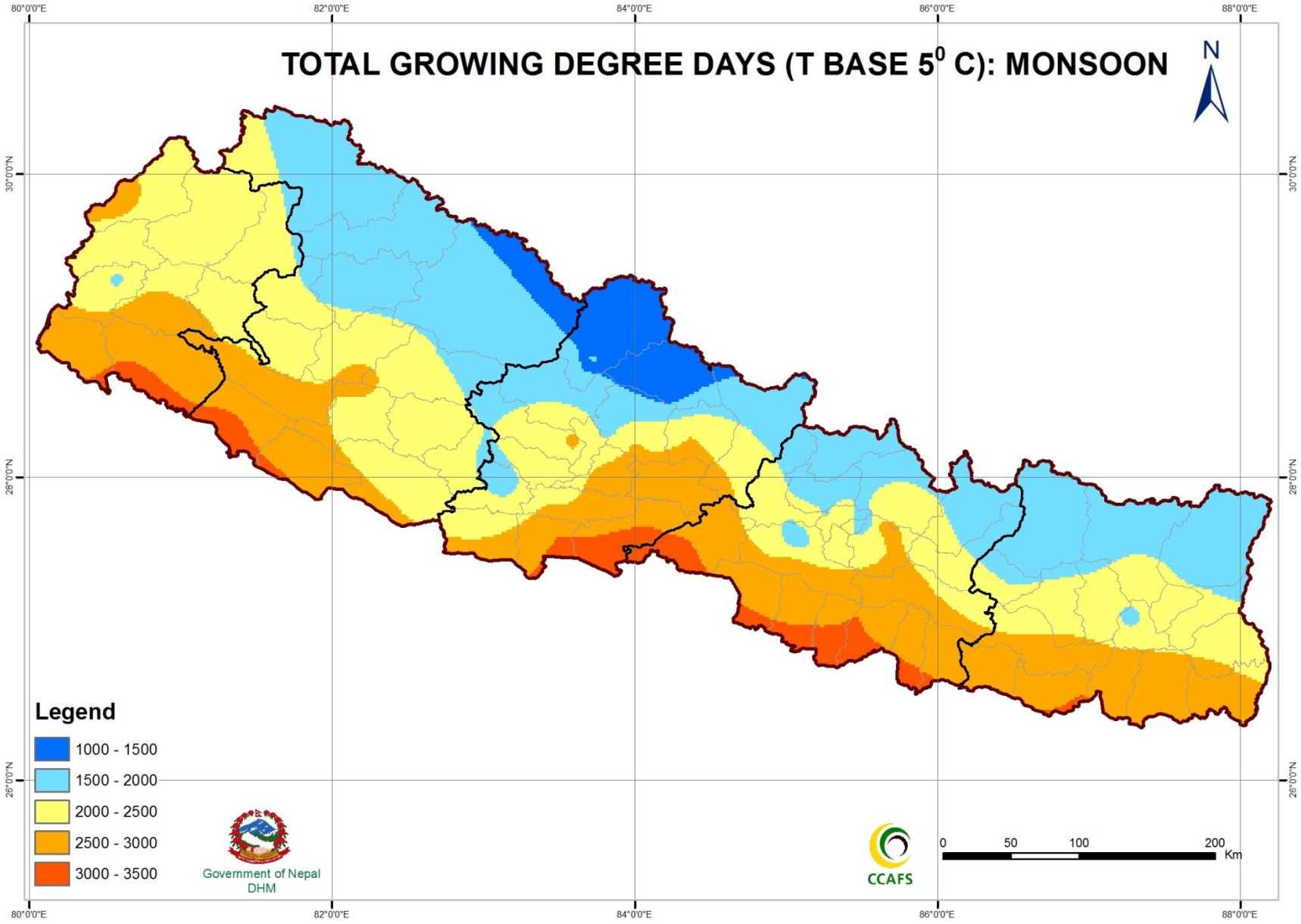

ANNUAL NO. OF DAYS WITH
MAXIMUM TEMPERATURE >= 30⁰ C
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
No. of Days
0 - 40
40 - 80
80 - 120
120 - 160
160 - 200
200 - 240
240 - 280
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

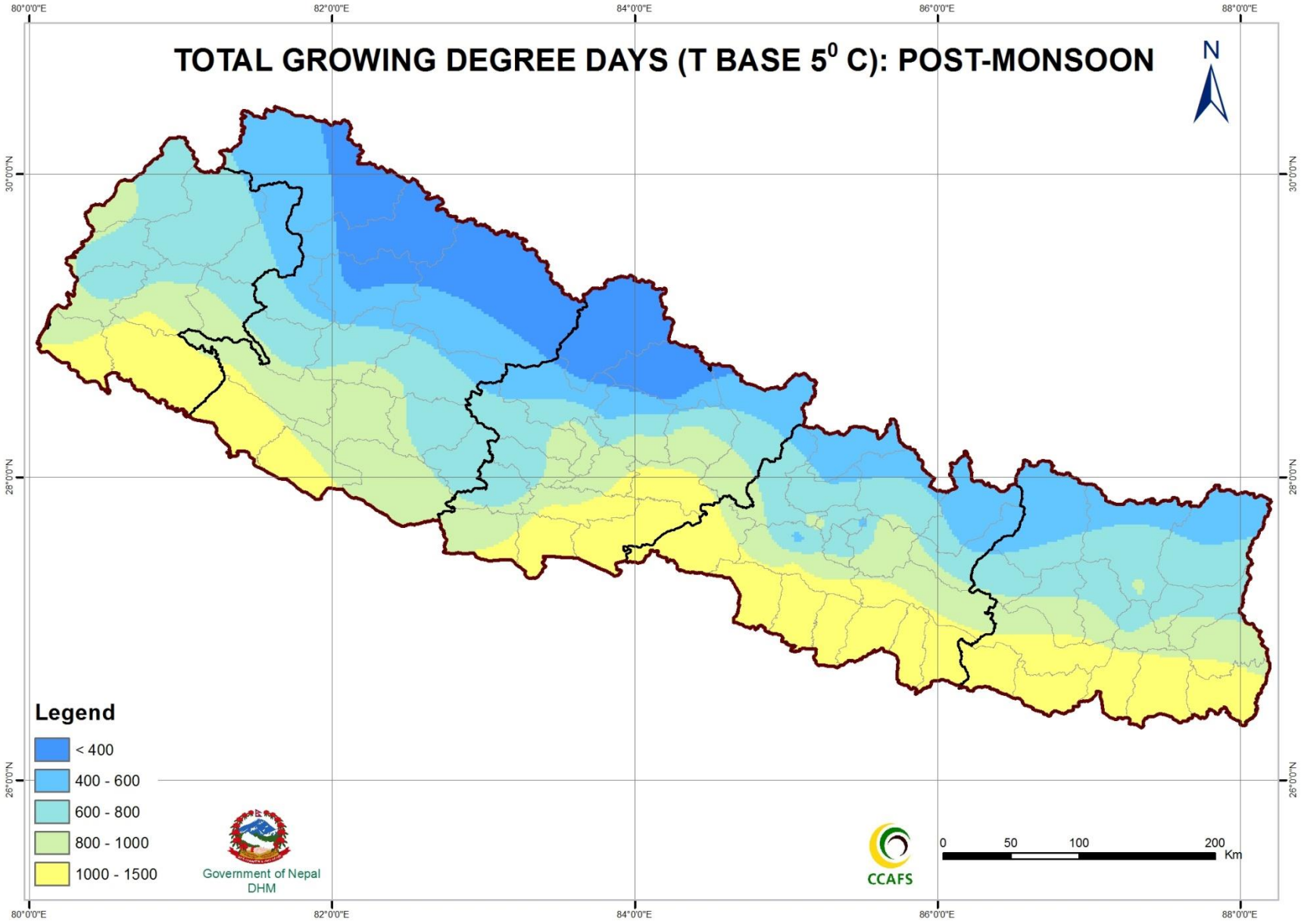

ANNUAL NO. OF DAYS WITH
MINIMUM TEMPERATURE < = 5⁰ C
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
No. of Days
0 - 40
40 - 80
80 - 120
120 - 160
160 - 200
200 - 240
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

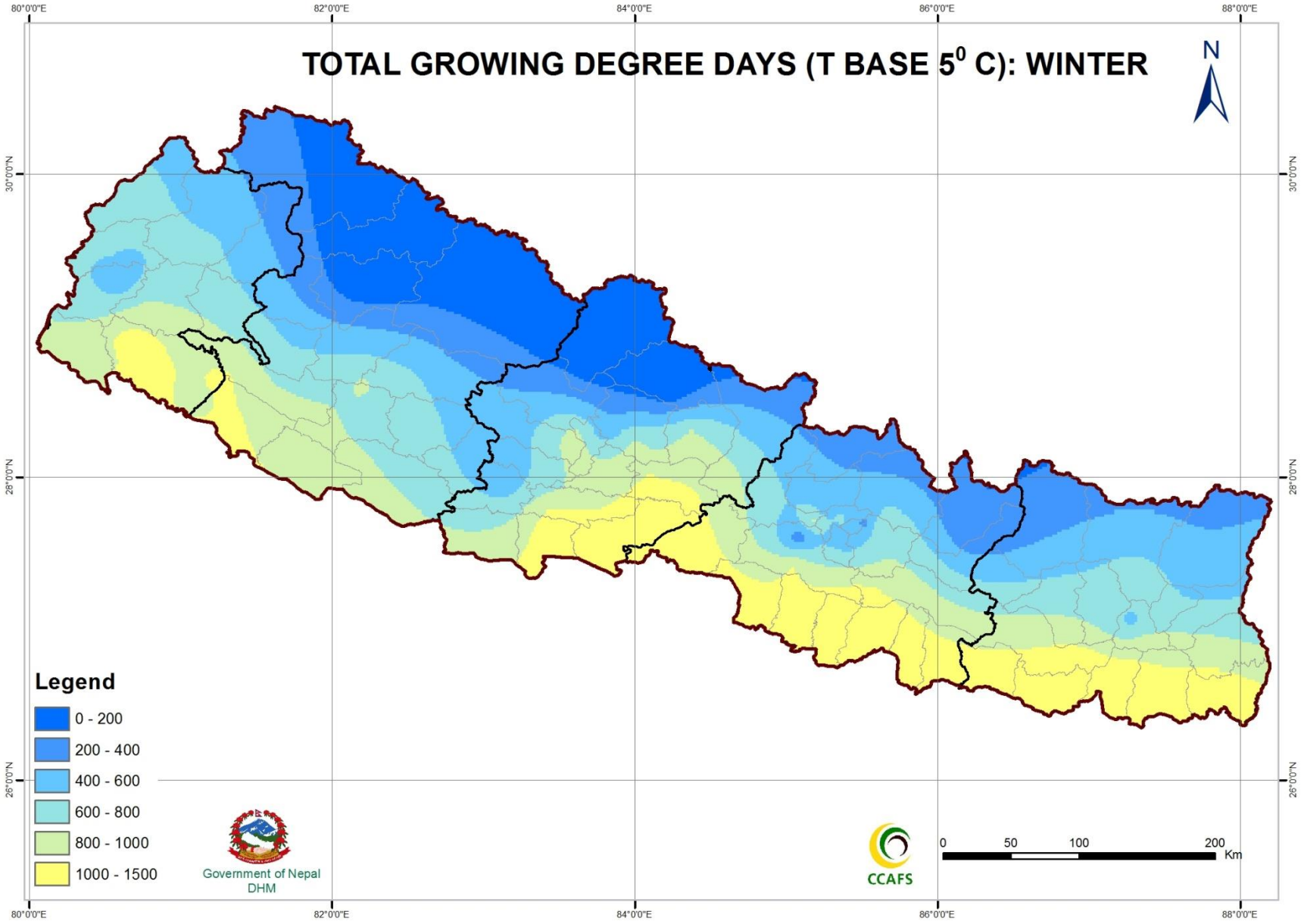

ANNUAL NO. OF DAYS WITH
MINIMUM TEMPERATURE >= 0^0 C
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
No. of Days
240 - 260
260 - 280
280 - 300
300 - 320
320 - 340
340 - 360
Above 360
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

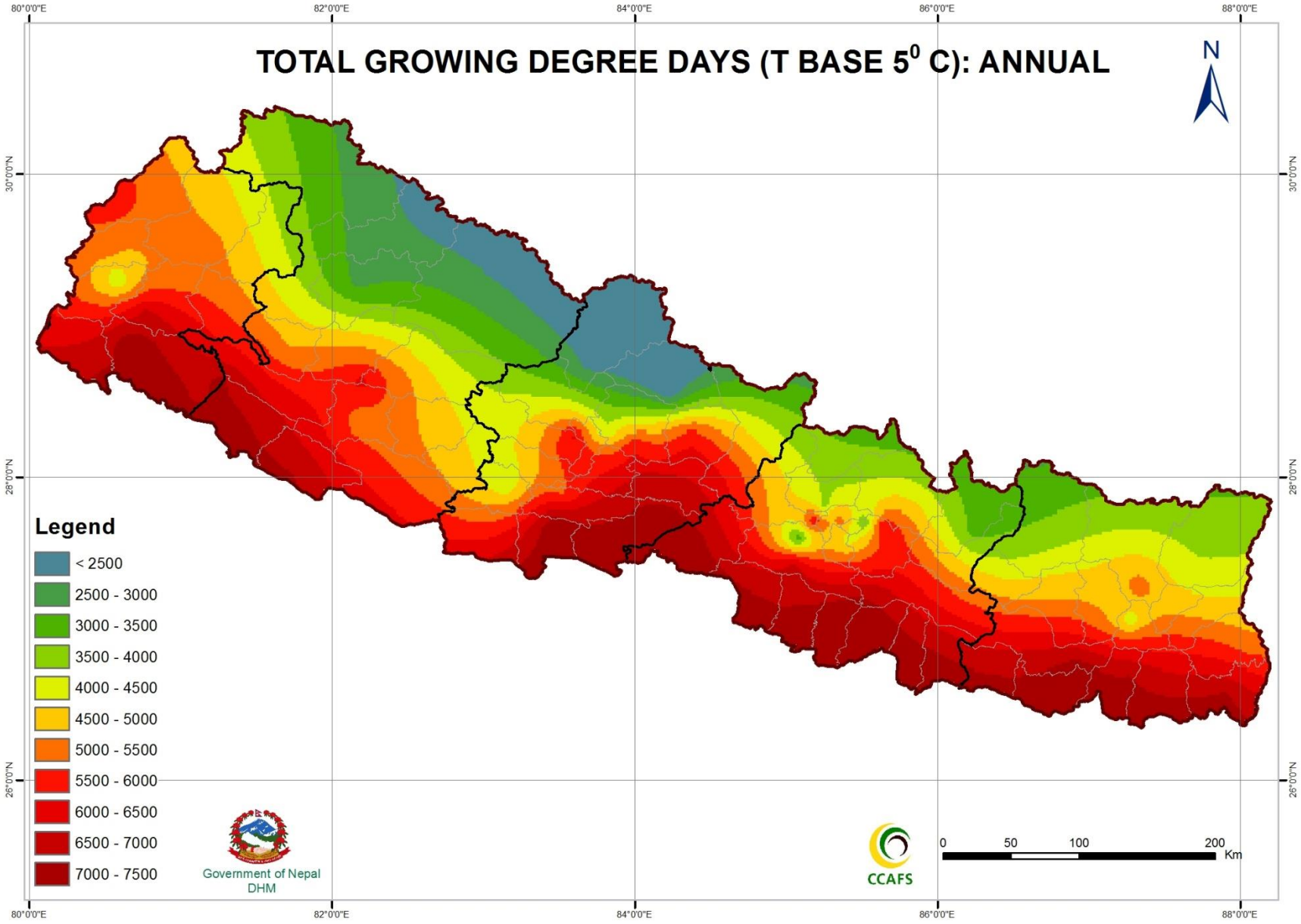

ANNUAL NO. OF DAYS WITH
MINIMUM TEMPERATURE < = 0⁰ C
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
0 Days
0 - 10 Days
10 - 30 Days
30 - 60 Days
60 - 90 Days
90 - 130 Days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

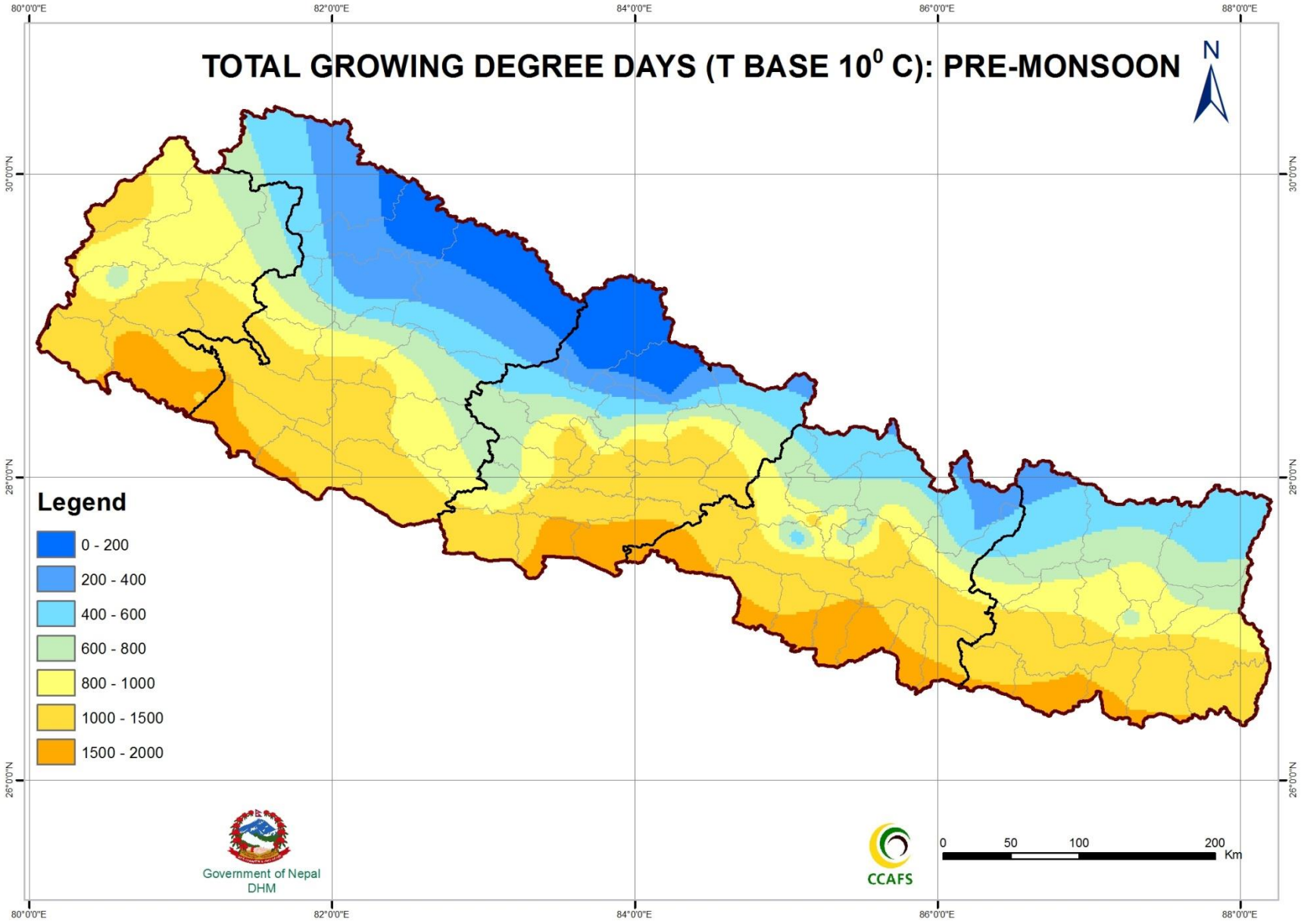

TOTAL GROWING DEGREE DAYS (T BASE 5^0 C): PRE-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 600
600 - 800
800 - 1000
1000 - 1500
1500 - 2000
2000 - 2500
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

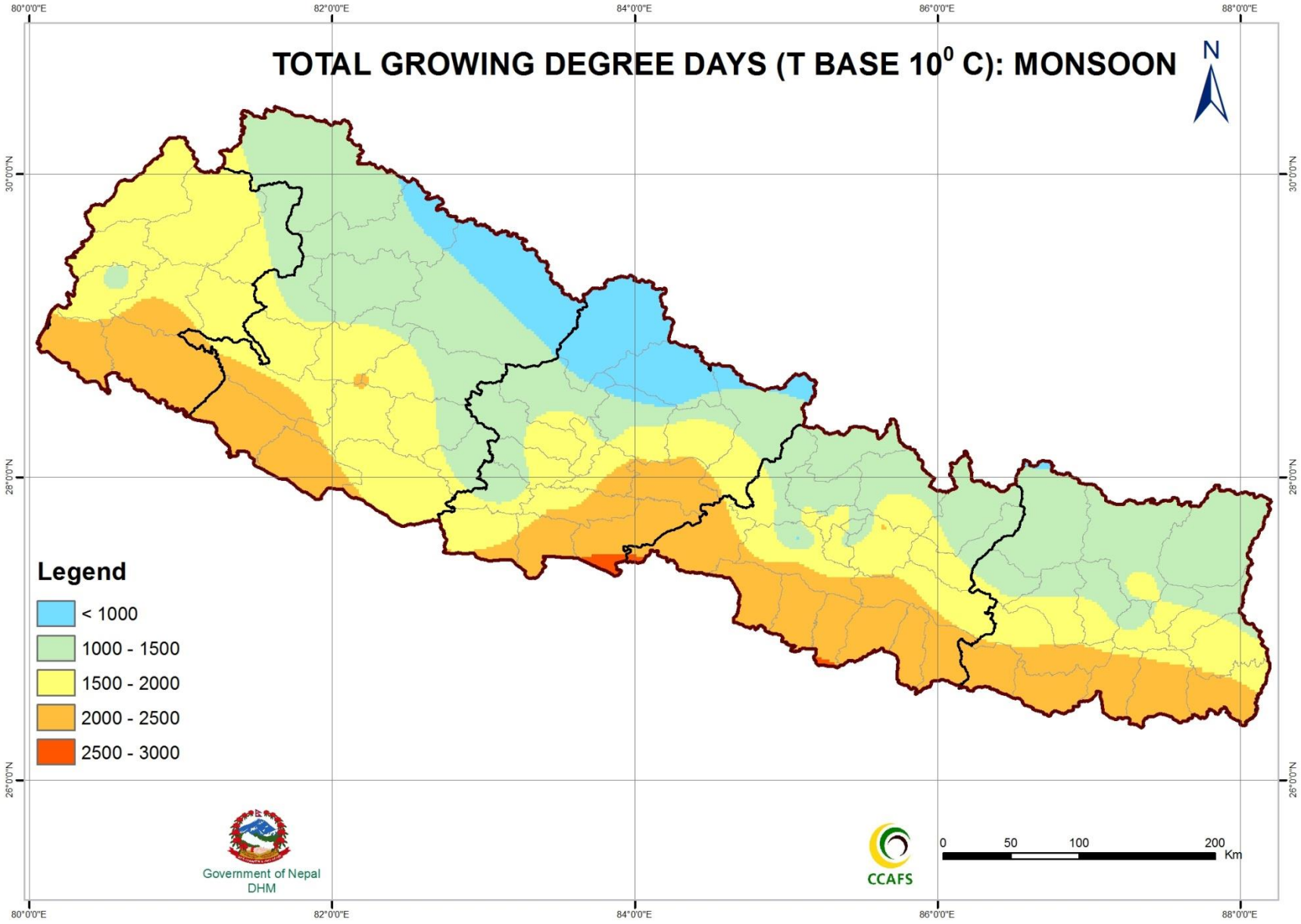

TOTAL GROWING DEGREE DAYS (T BASE 5^0 C): MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
1000 - 1500
1500 - 2000
2000 - 2500
2500 - 3000
3000 - 3500
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

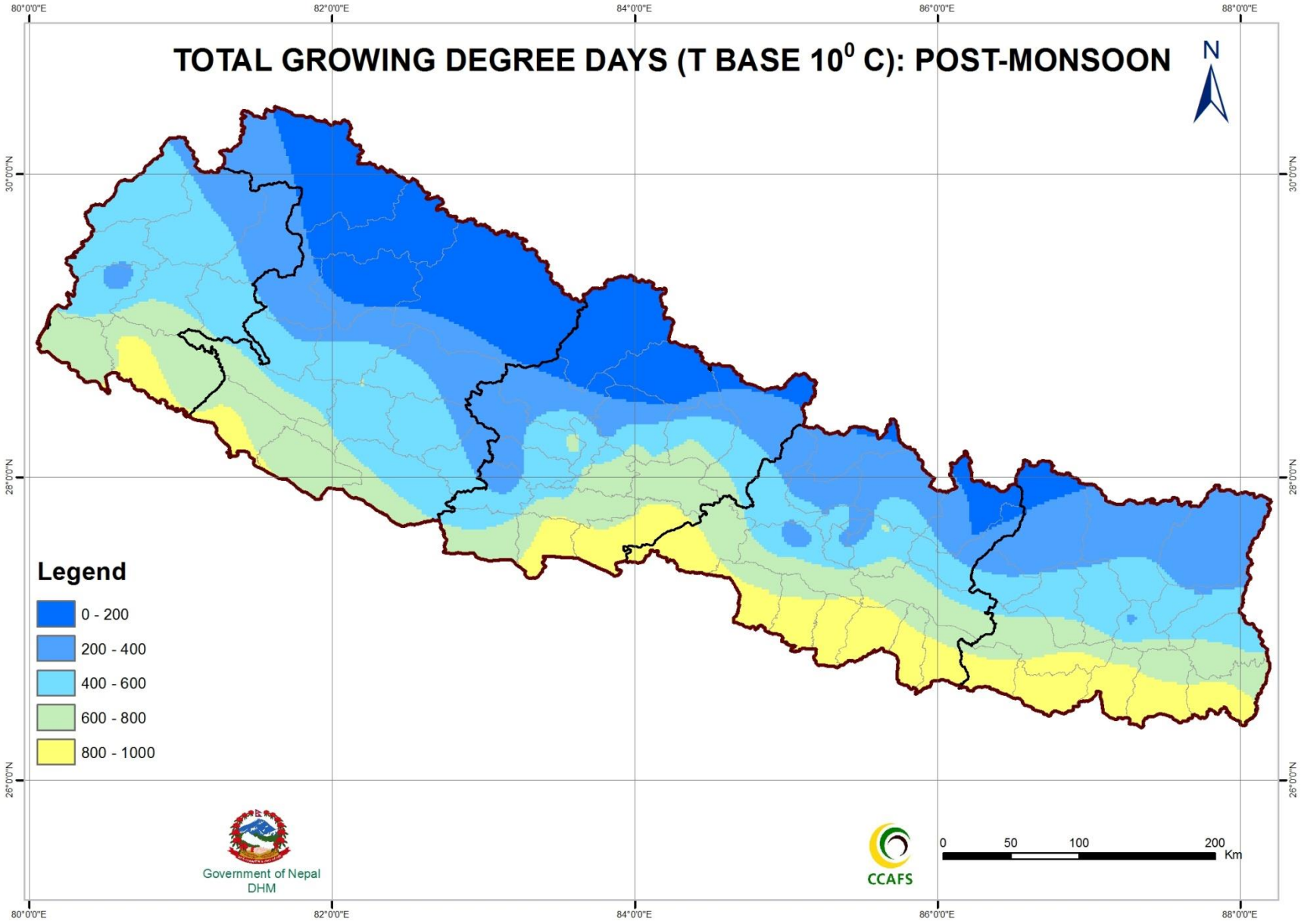

TOTAL GROWING DEGREE DAYS (T BASE 5^0 C): POST-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 400
400 - 600
600 - 800
800 - 1000
1000 - 1500
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

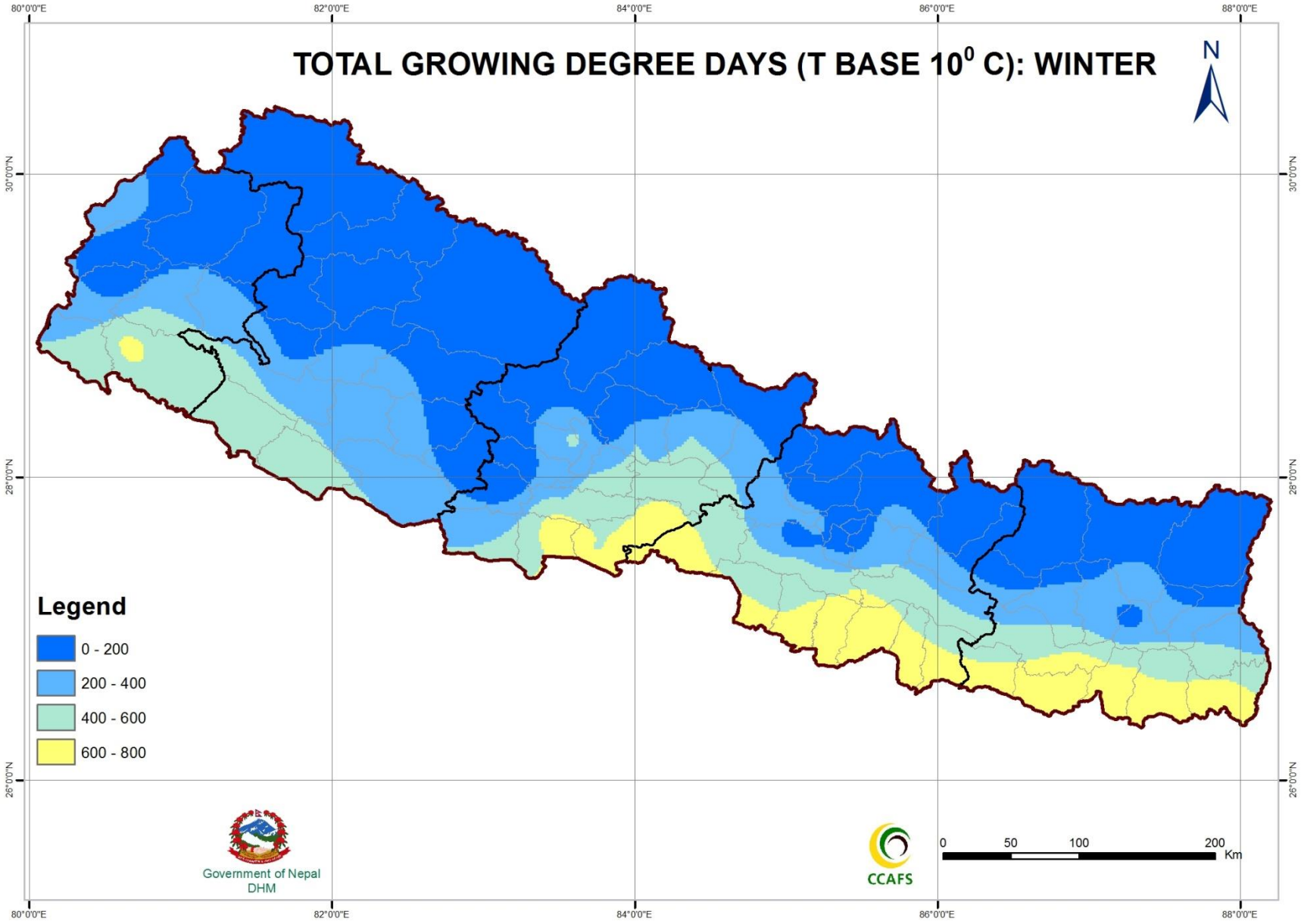

TOTAL GROWING DEGREE DAYS (T BASE 5^0 C): WINTER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
0 - 200
200 - 400
400 - 600
600 - 800
800 - 1000
1000 - 1500
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

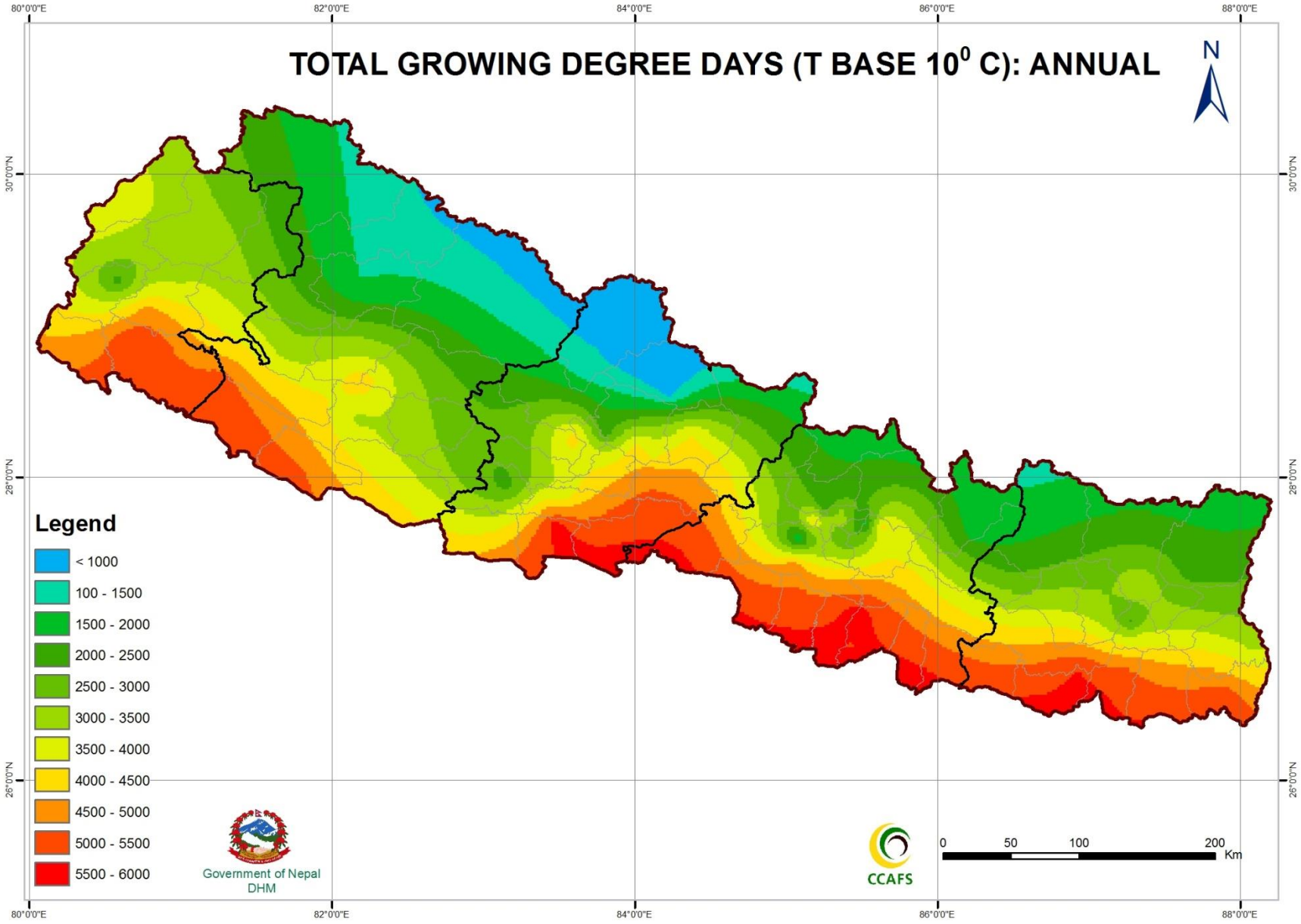

TOTAL GROWING DEGREE DAYS (T BASE 5^0 C): ANNUAL
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 2500
2500 - 3000
3000 - 3500
3500 - 4000
4000 - 4500
4500 - 5000
5000 - 5500
5500 - 6000
6000 - 6500
6500 - 7000
7000 - 7500
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

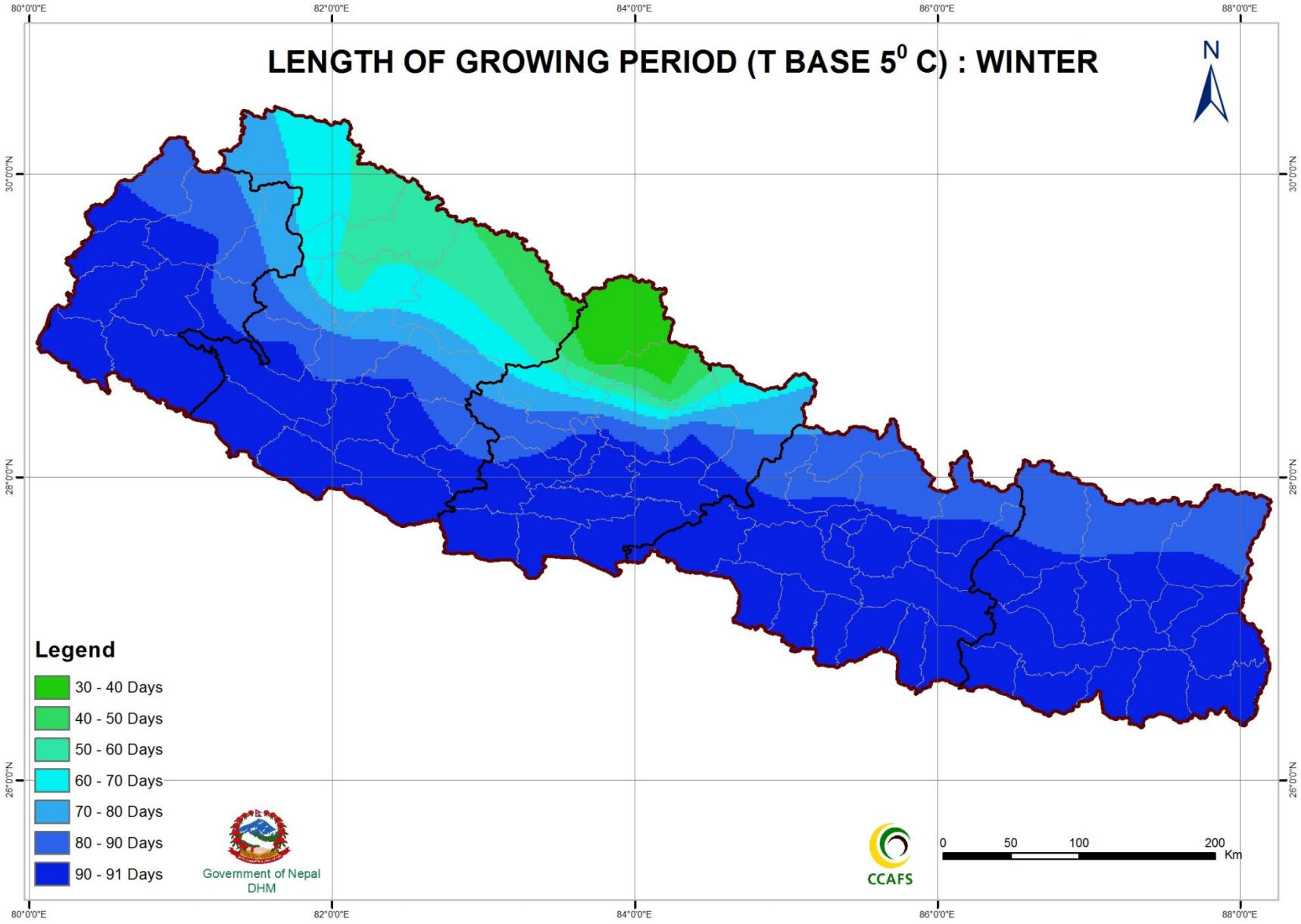

TOTAL GROWING DEGREE DAYS (T BASE 10⁰ C): PRE-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
0 - 200
200 - 400
400 - 600
600 - 800
800 - 1000
1000 - 1500
1500 - 2000
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

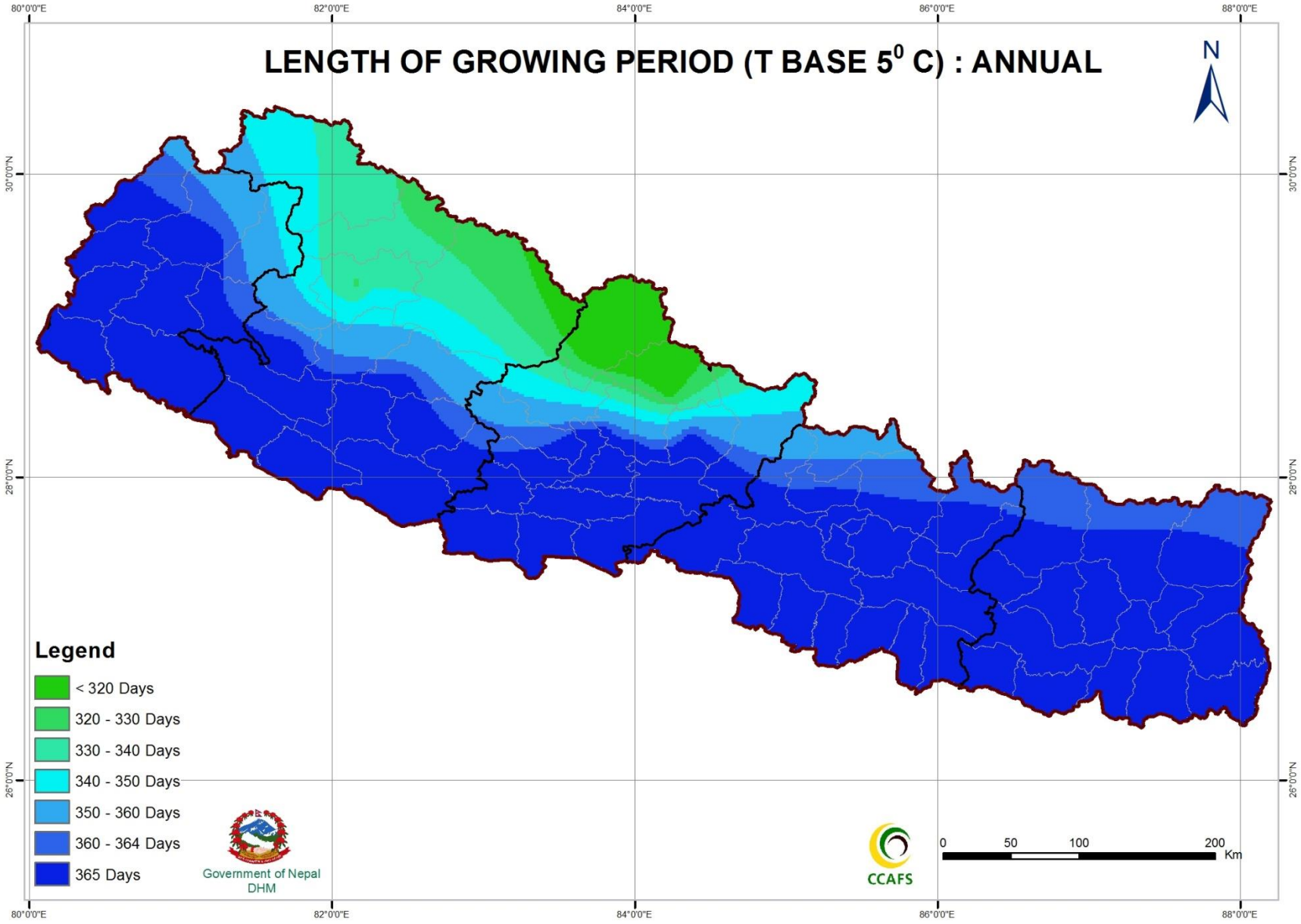

TOTAL GROWING DEGREE DAYS (T BASE 10^0 C): MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 1000
1000 - 1500
1500 - 2000
2000 - 2500
2500 - 3000
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

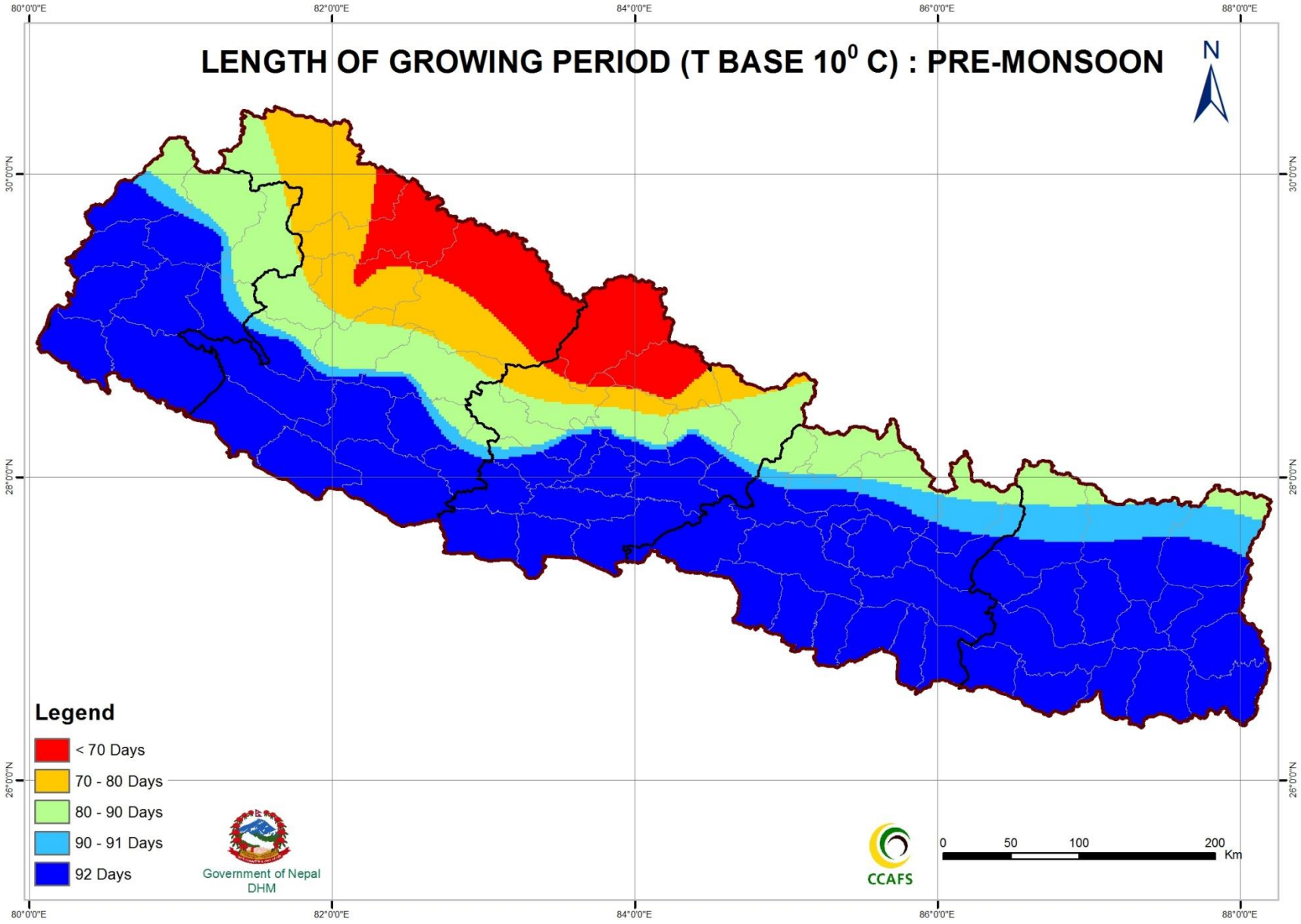

TOTAL GROWING DEGREE DAYS (T BASE 10^0 C): POST-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
0 - 200
200 - 400
400 - 600
600 - 800
800 - 1000
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

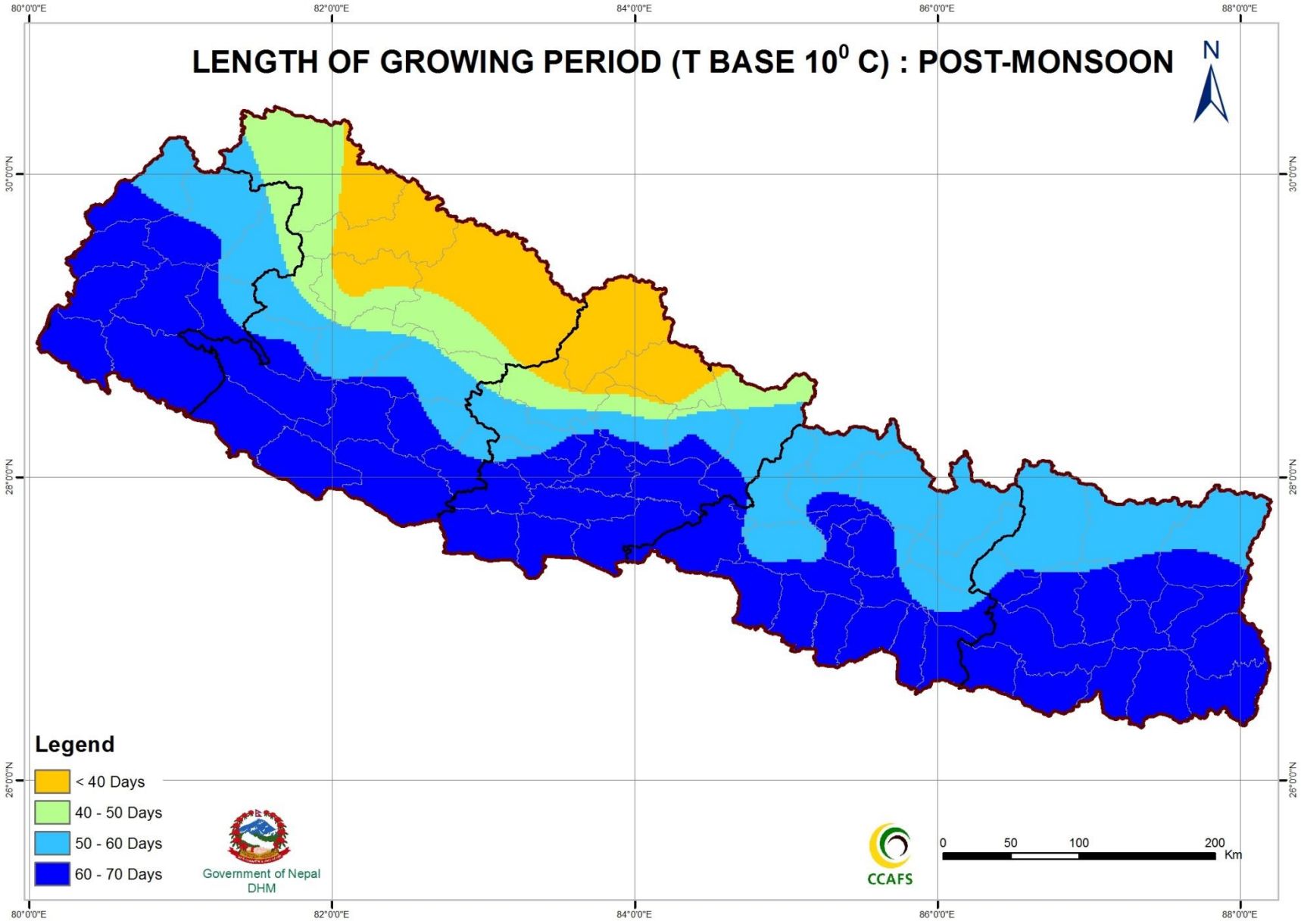

TOTAL GROWING DEGREE DAYS (T BASE 10⁰ C): WINTER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
0 - 200
200 - 400
400 - 600
600 - 800
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

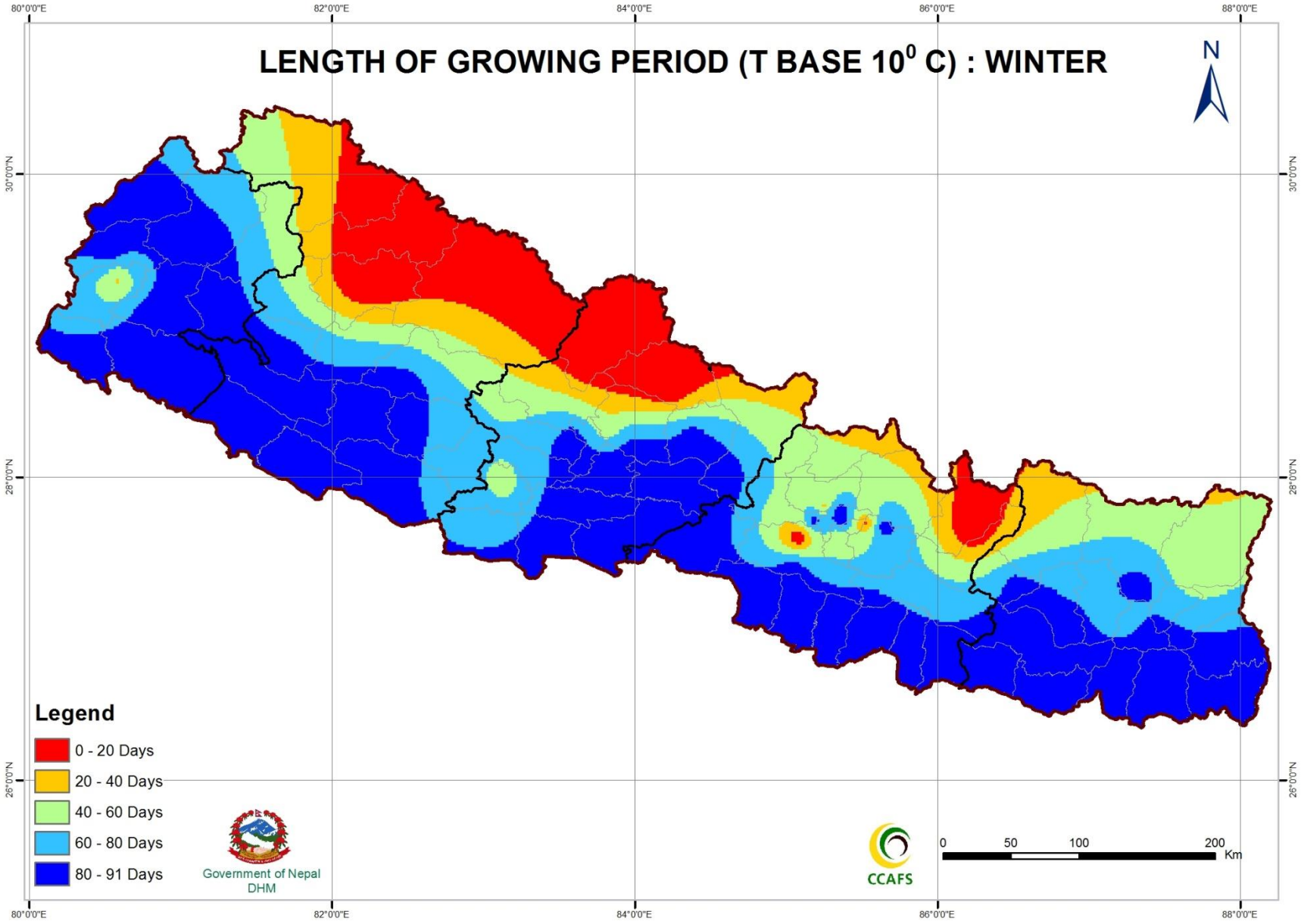

TOTAL GROWING DEGREE DAYS (T BASE 10⁰ C): ANNUAL
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 1000
100 - 1500
1500 - 2000
2000 - 2500
2500 - 3000
3000 - 3500
3500 - 4000
4000 - 4500
4500 - 5000
5000 - 5500
5500 - 6000
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

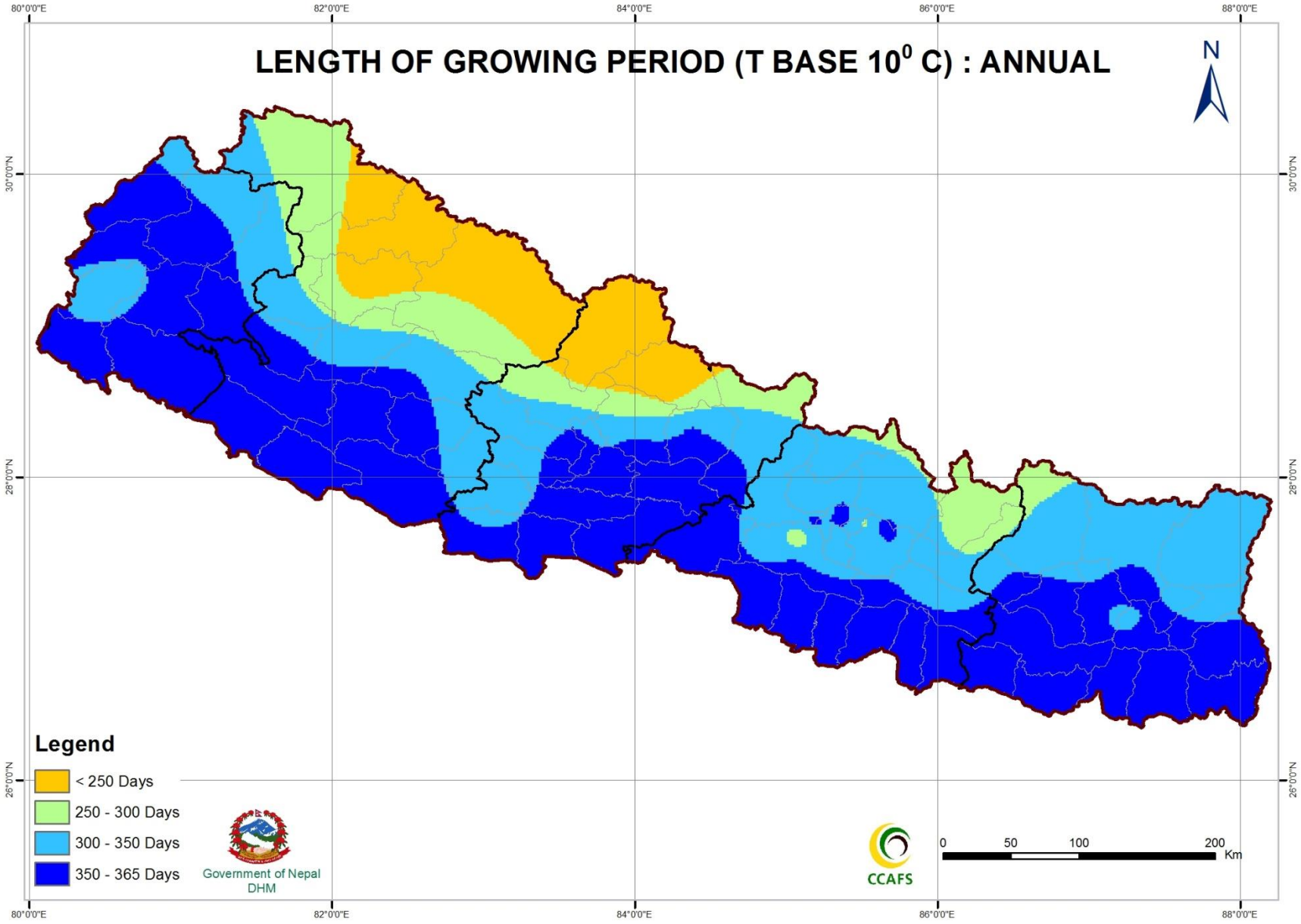

LENGTH OF GROWING PERIOD (T BASE 5^0 C) : WINTER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
30 - 40 Days
40 - 50 Days
50 - 60 Days
60 - 70 Days
70 - 80 Days
80 - 90 Days
90 - 91 Days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

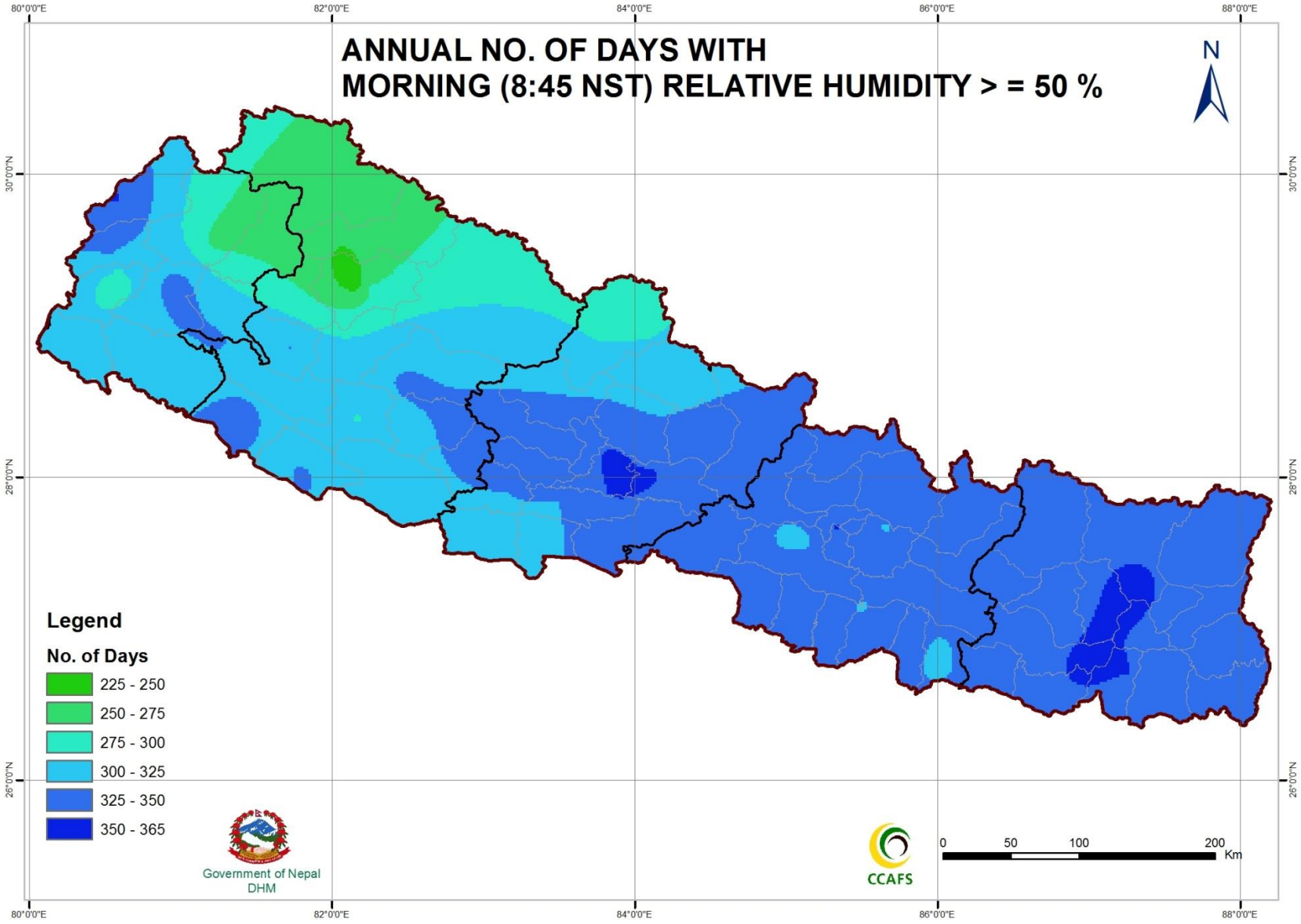

LENGTH OF GROWING PERIOD (T BASE 5^0 C) : ANNUAL
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 320 Days
320 - 330 Days
330 - 340 Days
340 - 350 Days
350 - 360 Days
360 - 364 Days
365 Days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

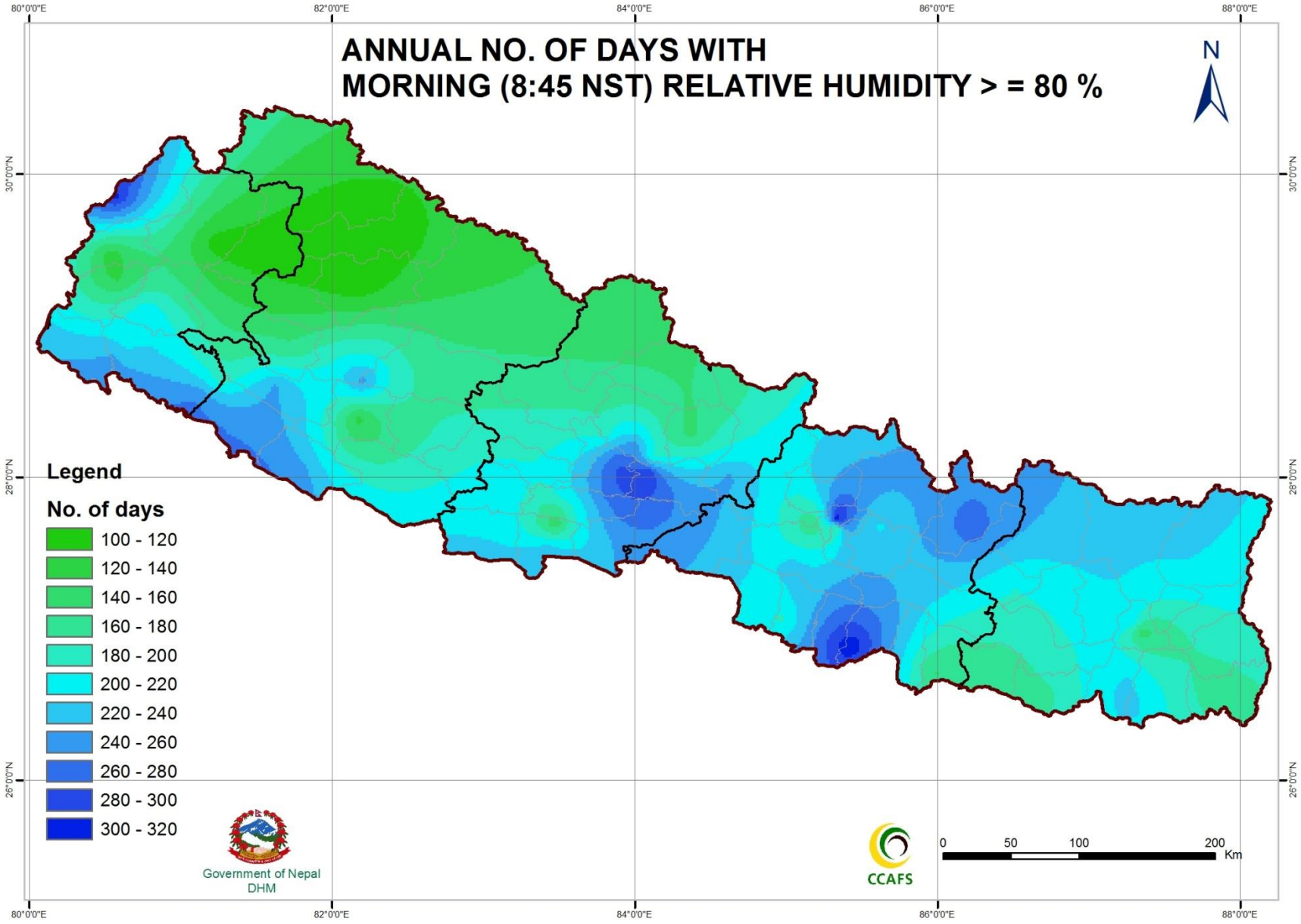

LENGTH OF GROWING PERIOD (T BASE 10^0 C) : PRE-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 70 Days
70 - 80 Days
80 - 90 Days
90 - 91 Days
92 Days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


LENGTH OF GROWING PERIOD (T BASE 10^0 C) : POST-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 40 Days
40 - 50 Days
50 - 60 Days
60 - 70 Days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


LENGTH OF GROWING PERIOD (T BASE 10^0 C) : WINTER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
0 - 20 Days
20 - 40 Days
40 - 60 Days
60 - 80 Days
80 - 91 Days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


LENGTH OF GROWING PERIOD (T BASE 10⁰ C) : ANNUAL
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 250 Days
250 - 300 Days
300 - 350 Days
350 - 365 Days
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


ANNUAL NO. OF DAYS WITH
MORNING (8:45 NST) RELATIVE HUMIDITY > = 50 %
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
No. of Days
225 - 250
250 - 275
275 - 300
300 - 325
325 - 350
350 - 365
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


ANNUAL NO. OF DAYS WITH
MORNING (8:45 NST) RELATIVE HUMIDITY > = 80 %
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
No. of days
100 - 120
120 - 140
140 - 160
160 - 180
180 - 200
200 - 220
220 - 240
240 - 260
260 - 280
280 - 300
300 - 320
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

Section II

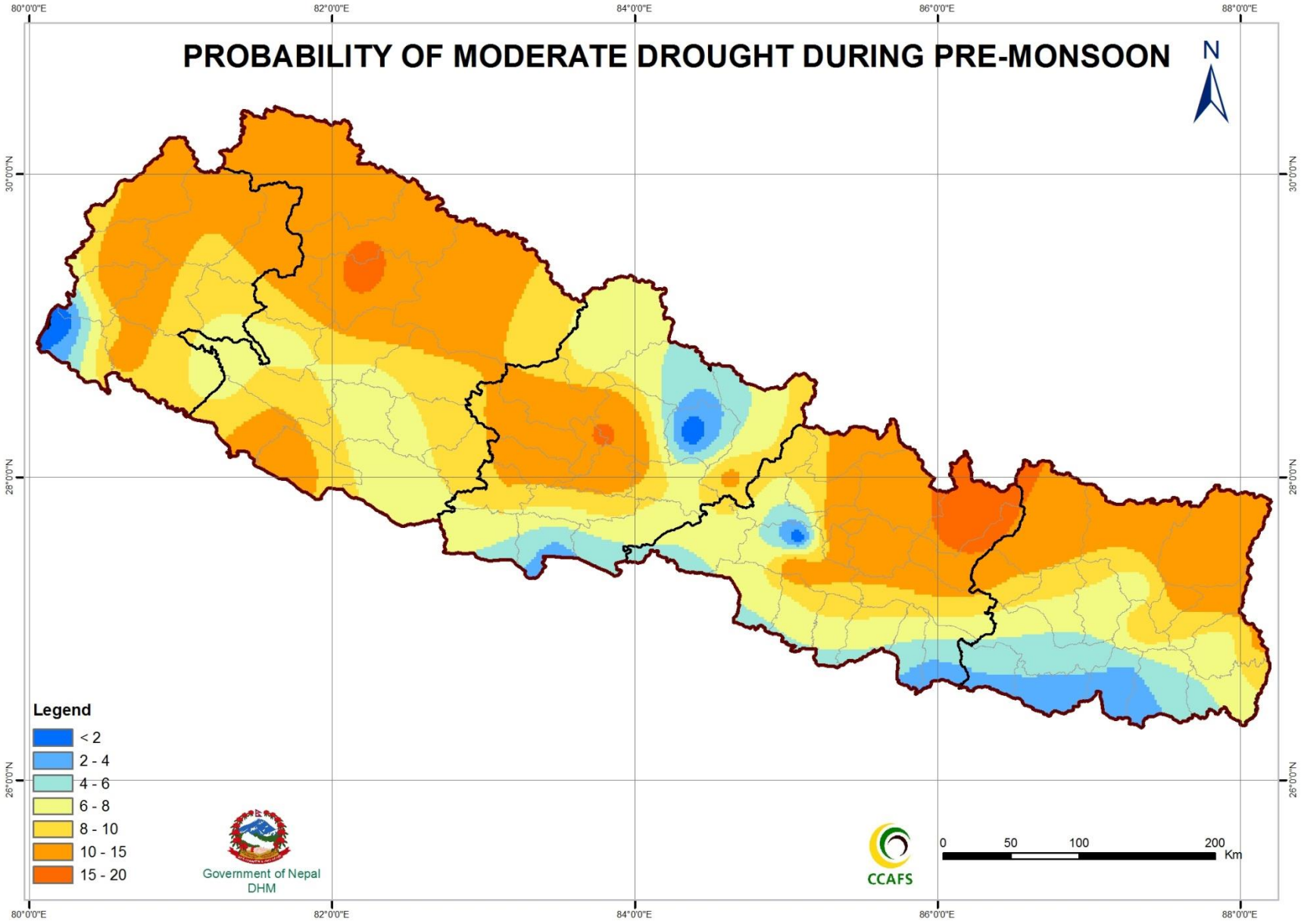
DROUGHT AND MOISTURE INDICES MAPS

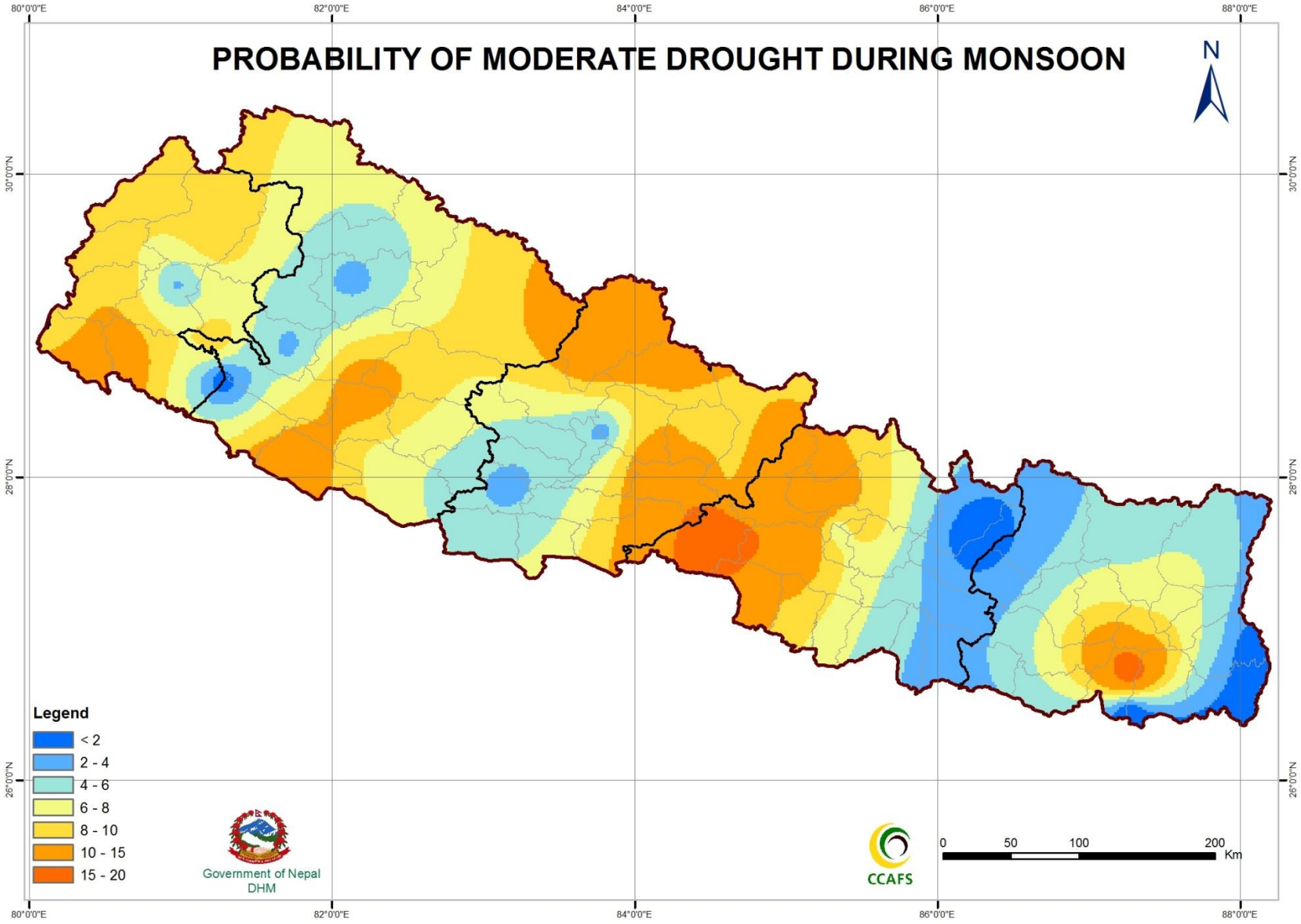
(SOURCES: ANALYSIS CARRIED OUT FOR CENTER FOR INTERNATIONAL STUDIES AND COOPERATION (CECI) BY BUDHATHOKI, K.P.

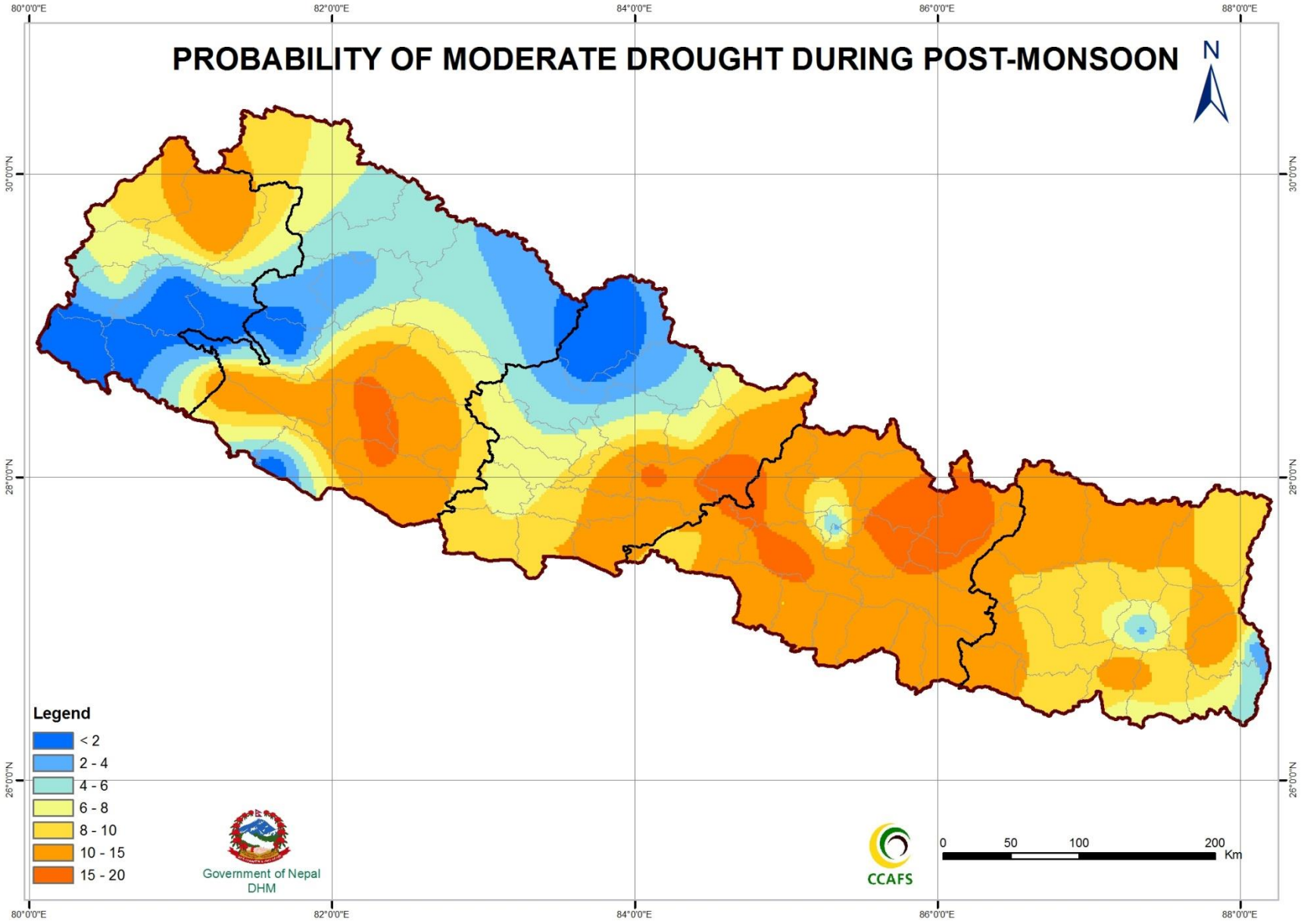
KARMACHARYA, J . , BAIDYA , S.K..) AND

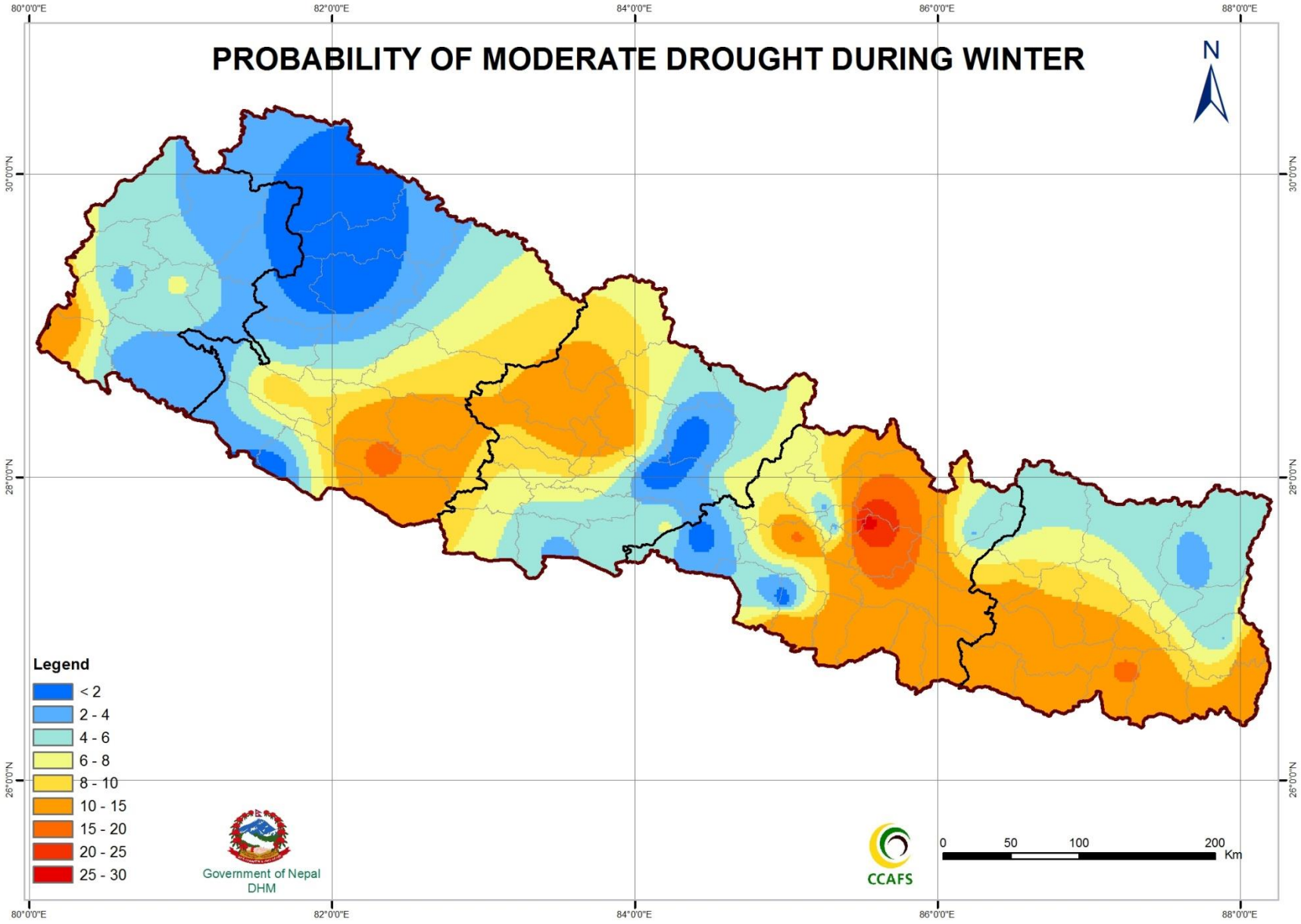
AGRO-CLIMATIC ZONING (RICE, WHEAT, MAIZE AND POTATO)MAPS

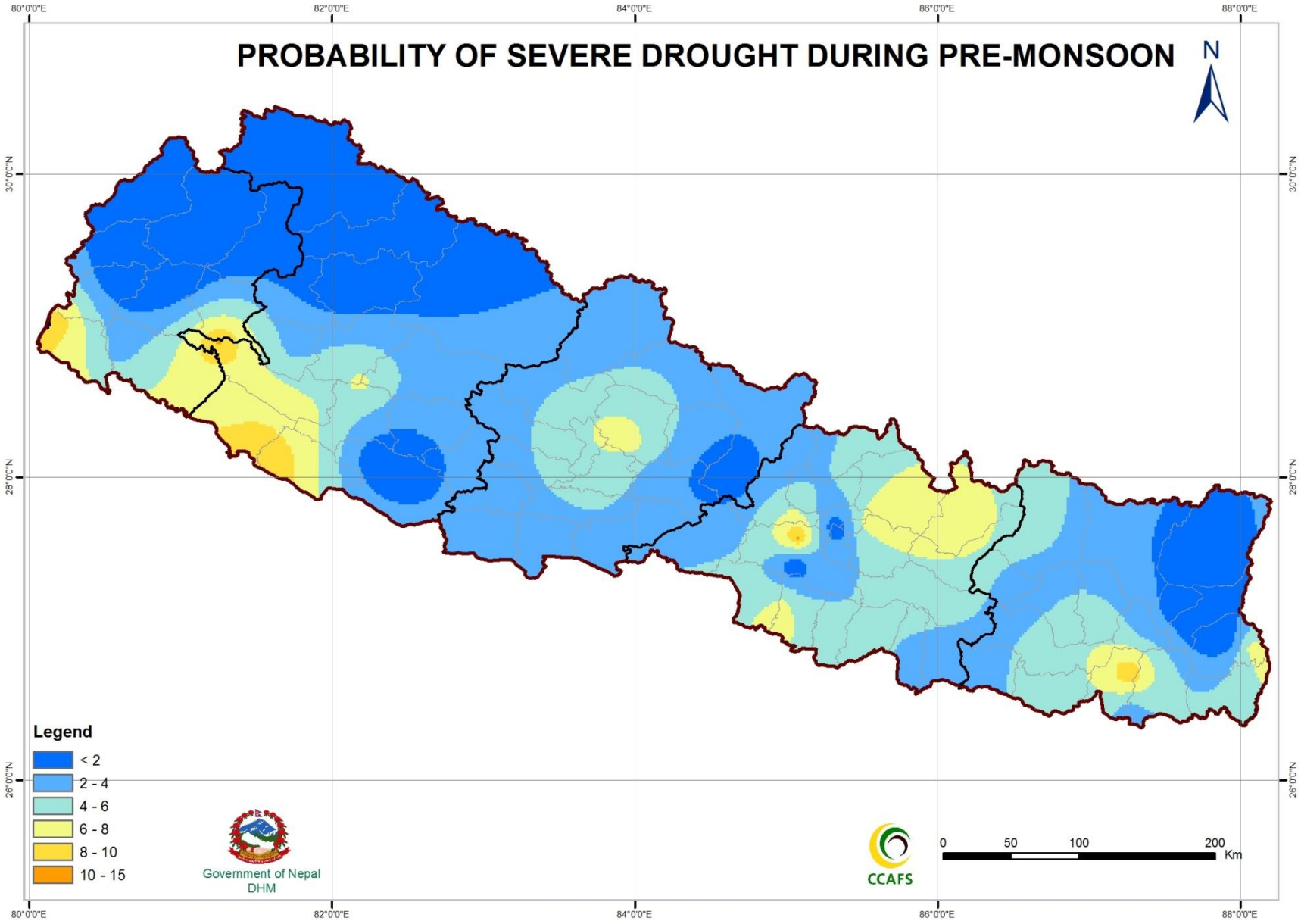
(SOURCES: DEPARTMENT OF HYDROLOGY AND METEOROLOGY)

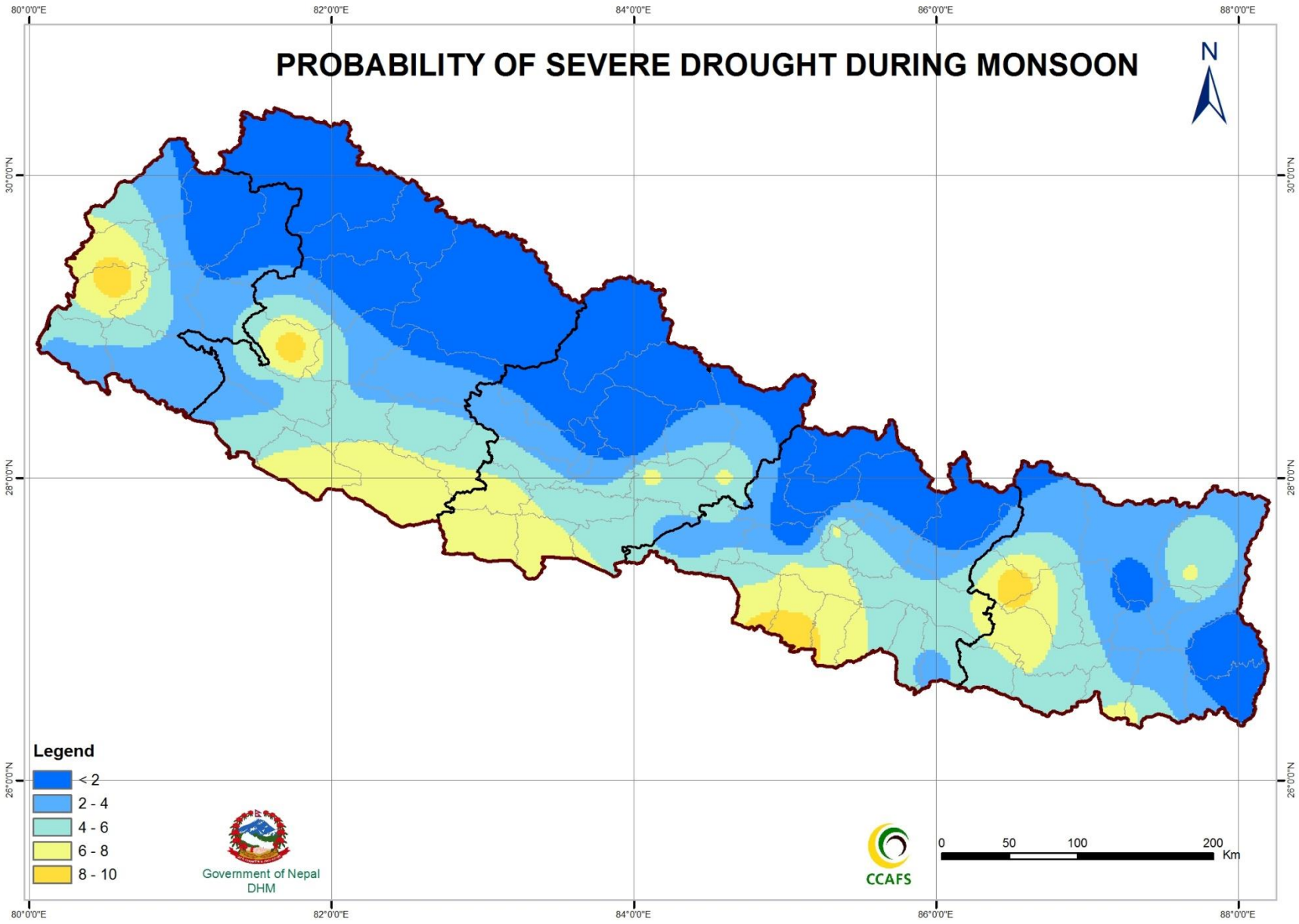

PROBABILITY OF MODERATE DROUGHT DURING PRE-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 2
2 - 4
4 - 6
6 - 8
8 - 10
10 - 15
15 - 20
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

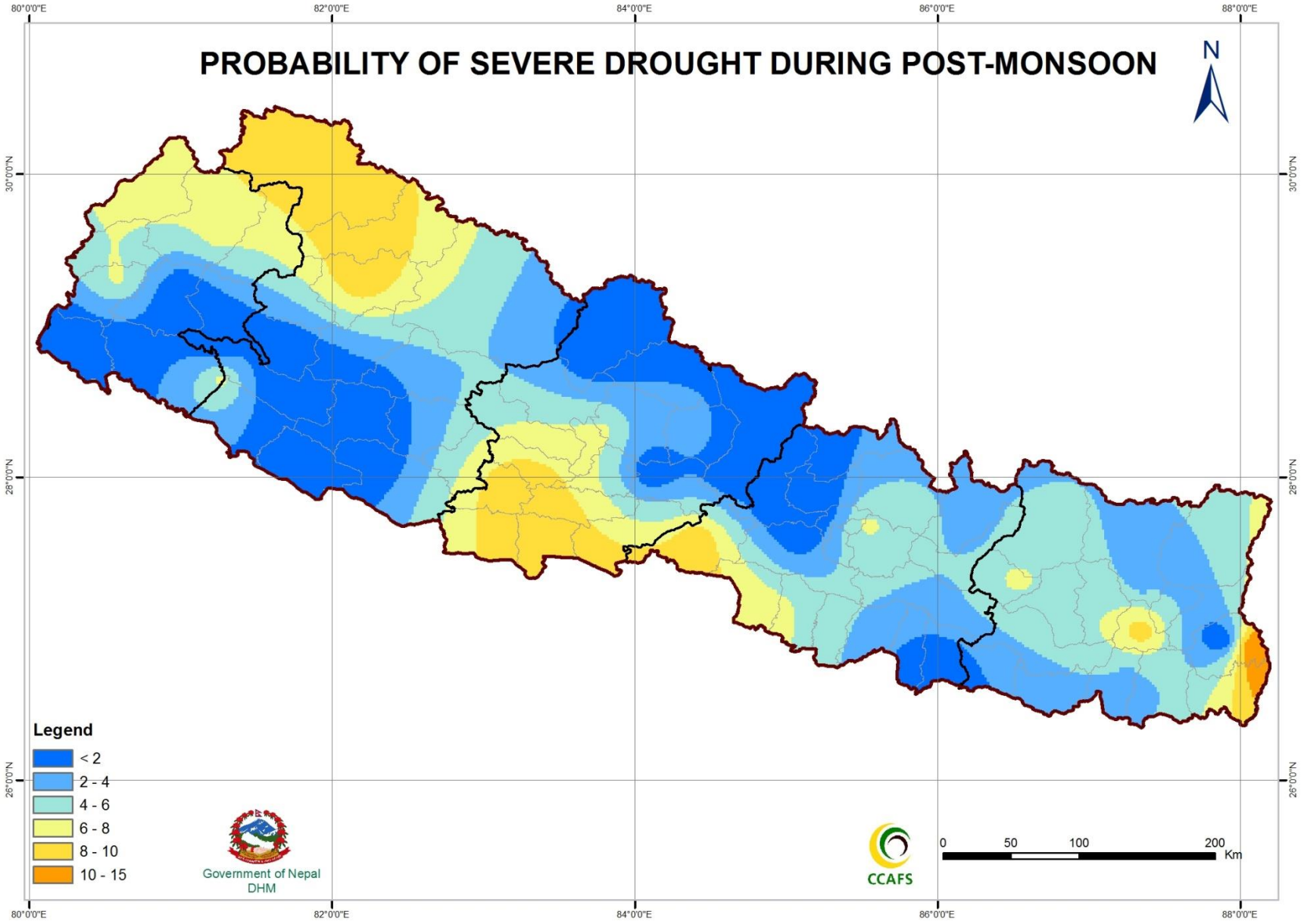

PROBABILITY OF MODERATE DROUGHT DURING MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 2
2 - 4
4 - 6
6 - 8
8 - 10
10 - 15
15 - 20
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


PROBABILITY OF MODERATE DROUGHT DURING POST-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 2
2 - 4
4 - 6
6 - 8
8 - 10
10 - 15
15 - 20
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


PROBABILITY OF MODERATE DROUGHT DURING WINTER
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 2
2 - 4
4 - 6
6 - 8
8 - 10
10 - 15
15 - 20
20 - 25
25 - 30
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


PROBABILITY OF SEVERE DROUGHT DURING PRE-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 2
2 - 4
4 - 6
6 - 8
8 - 10
10 - 15
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


PROBABILITY OF SEVERE DROUGHT DURING MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 2
2 - 4
4 - 6
6 - 8
8 - 10
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


PROBABILITY OF SEVERE DROUGHT DURING POST-MONSOON
N
80°0'0"E
82°0'0"E
84°0'0"E
86°0'0"E
88°0'0"E
30°0'0"N
28°0'0"N
26°0'0"N
Legend
< 2
2 - 4
4 - 6
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DHM
CCAFS
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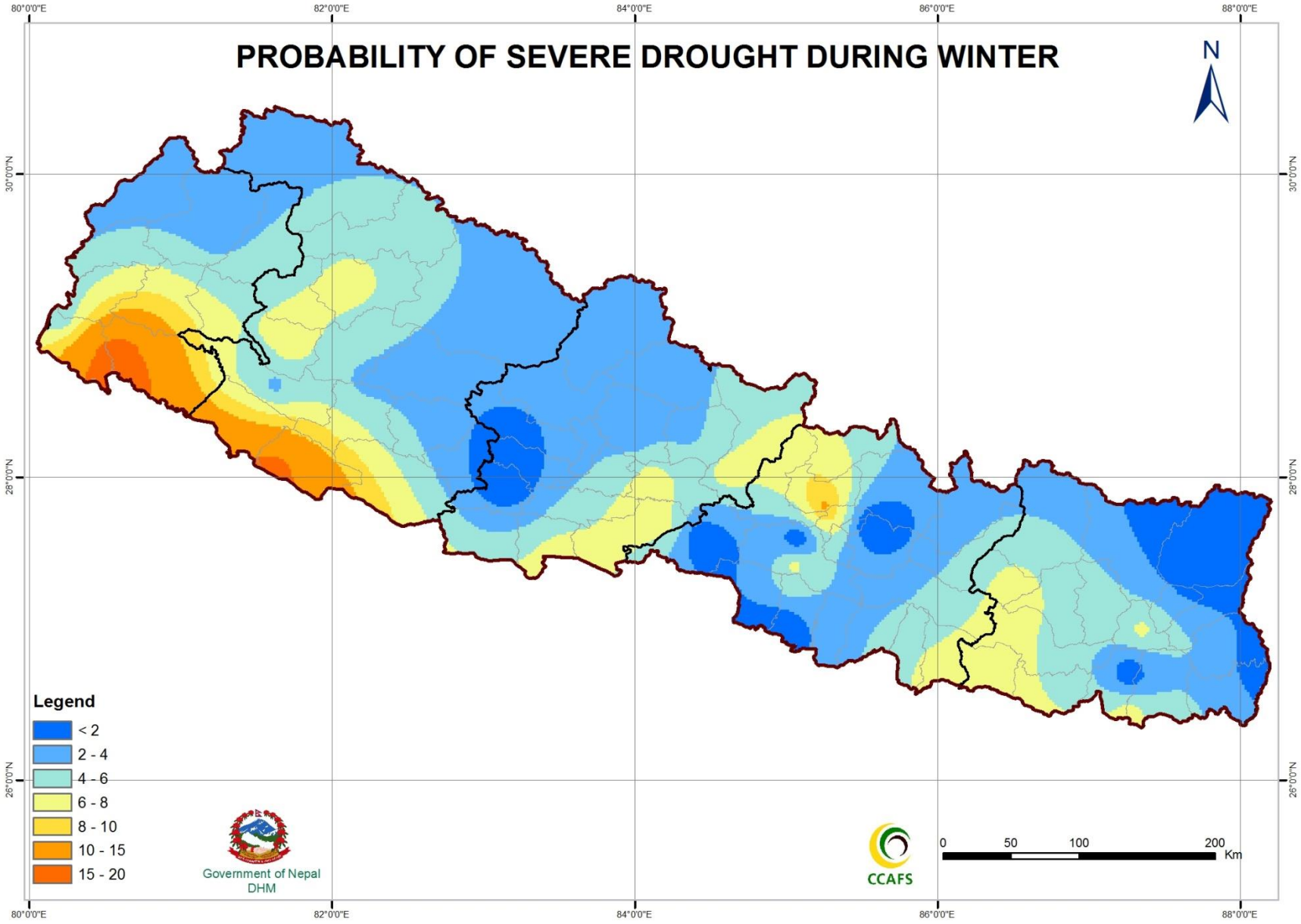
Km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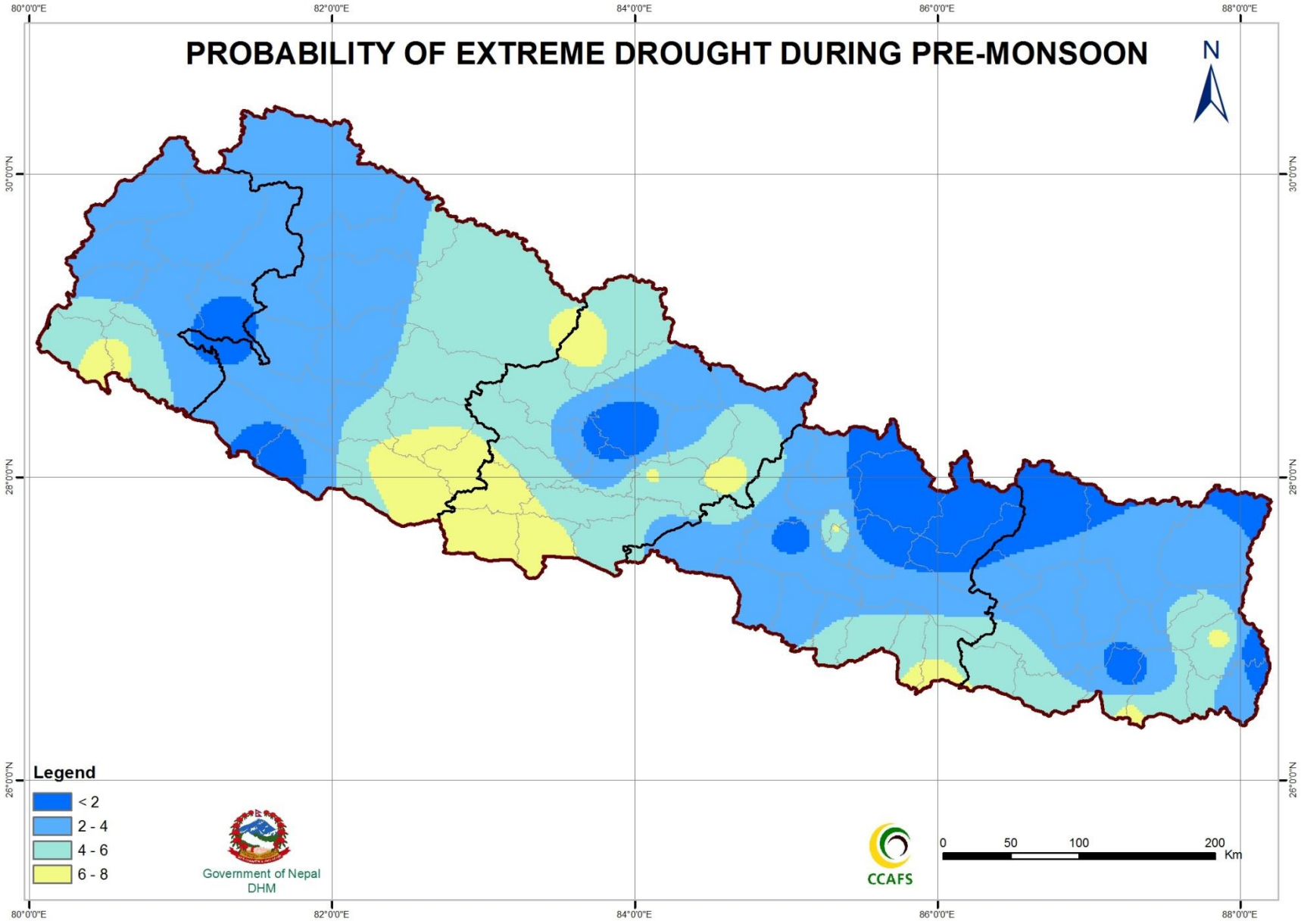
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Government of Nepal
DHM
CCAFS
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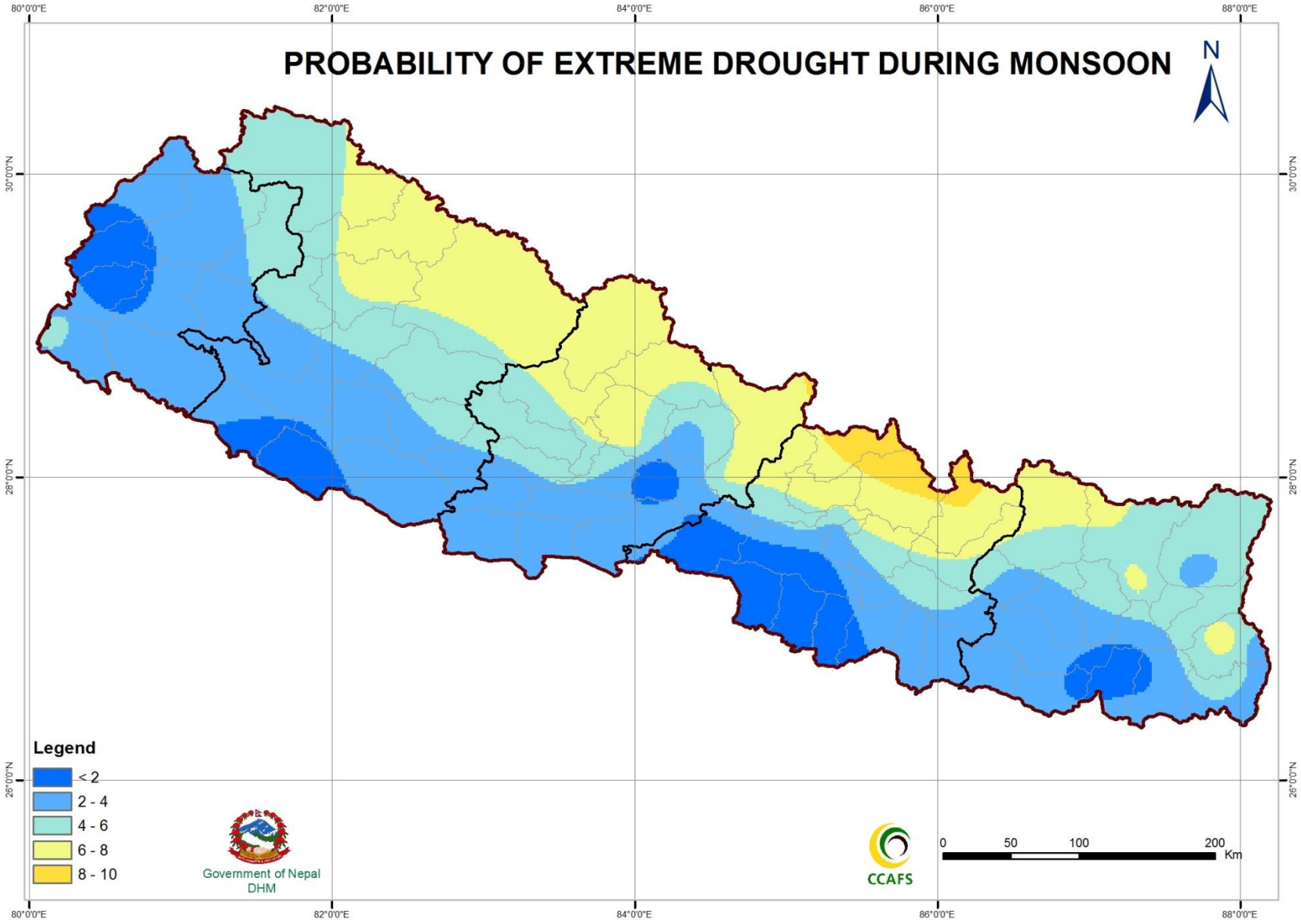
Km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Government of Nepal
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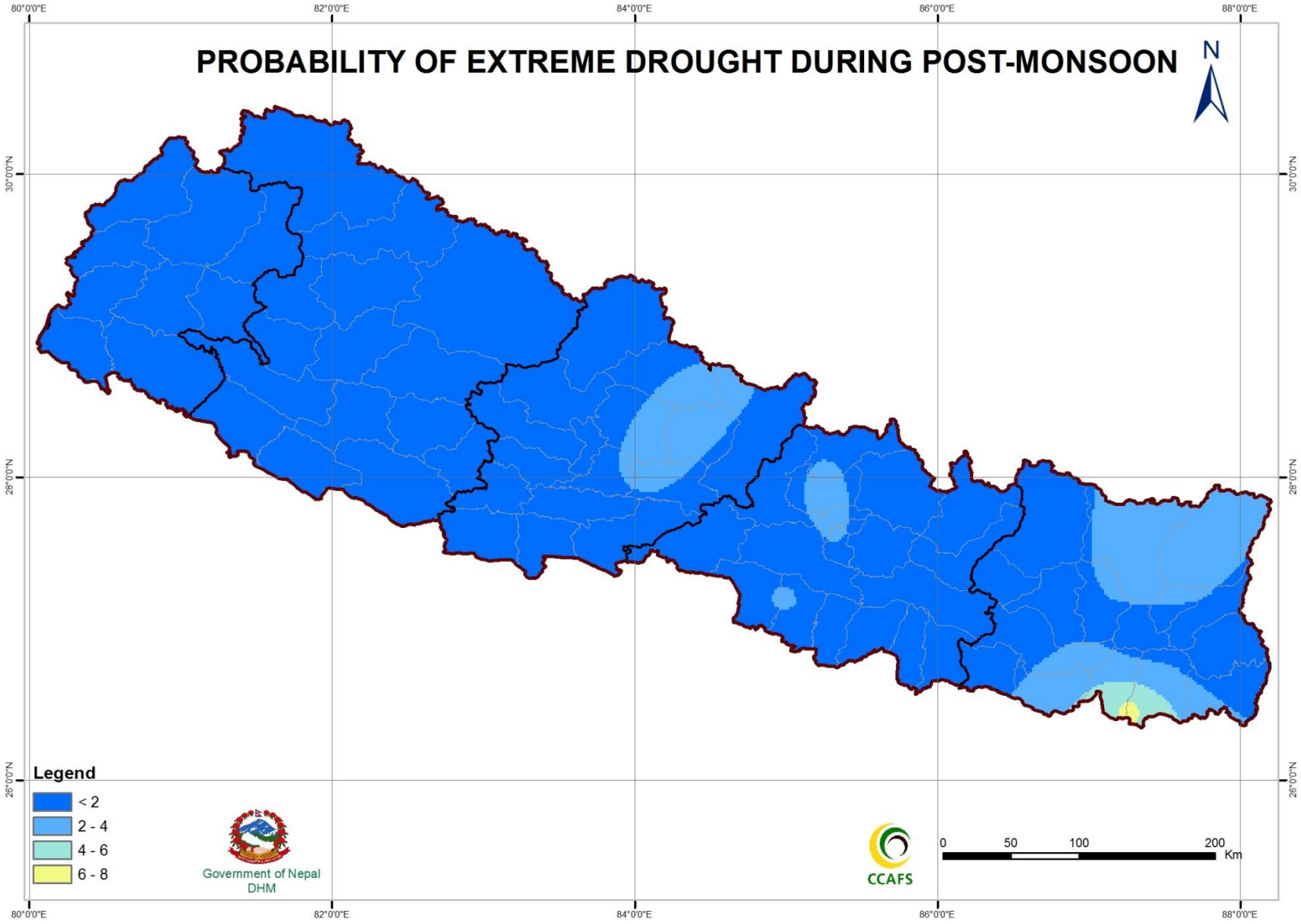
Km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Government of Nepal
DHM
CCAFS
0
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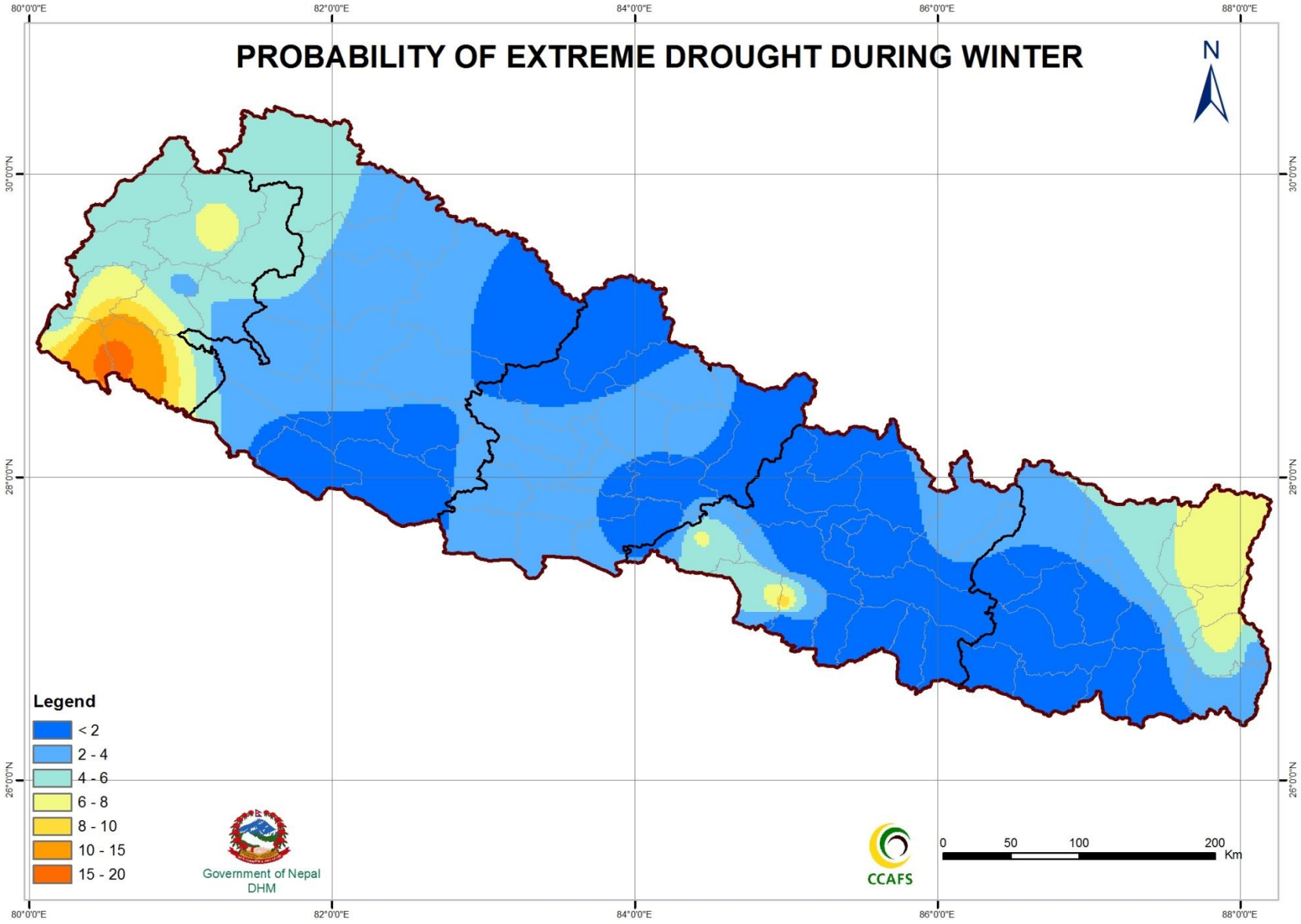
Km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10 - 15
15 - 20
Government of Nepal
DHM
CCAFS
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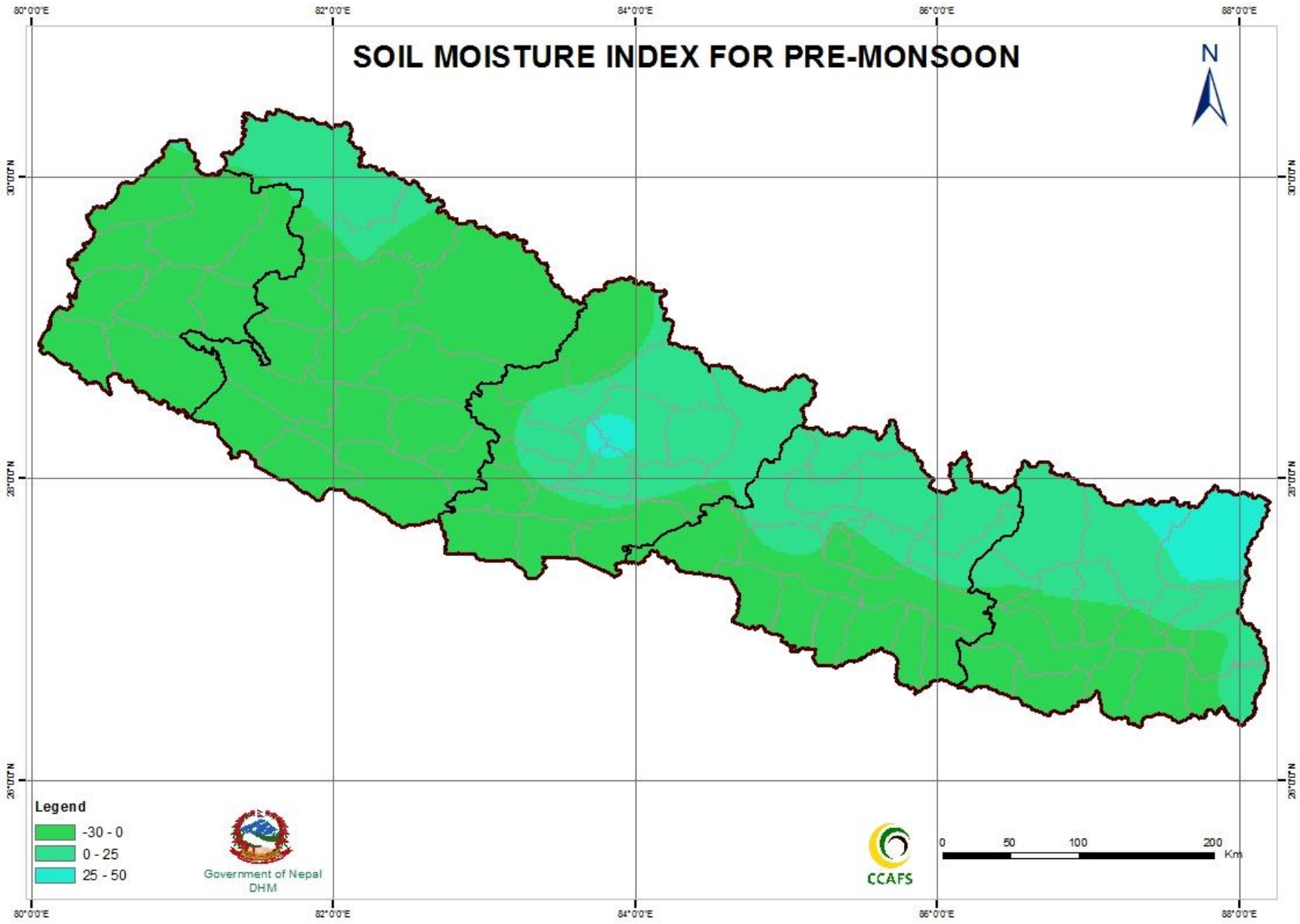
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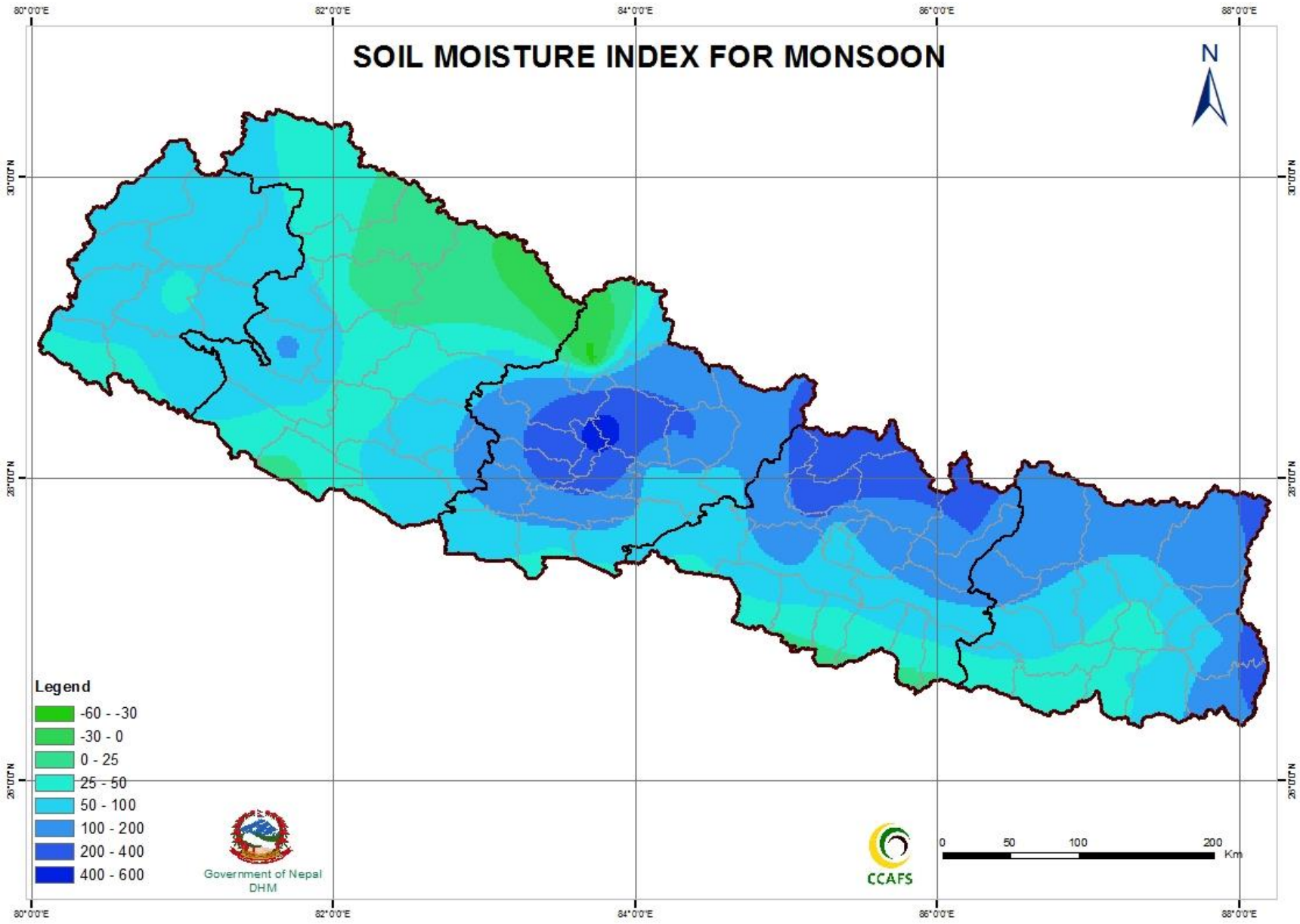
Legend
-30 - 0
0 - 25
25 - 50
Government of Nepal
DHM
CCAFS
0
50
100
200
Km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Legend
-60 - -30
-30 - 0
0 - 25
25 - 50
50 - 100
100 - 200
200 - 400
400 - 600
Government of Nepal
DHM
CCAFS
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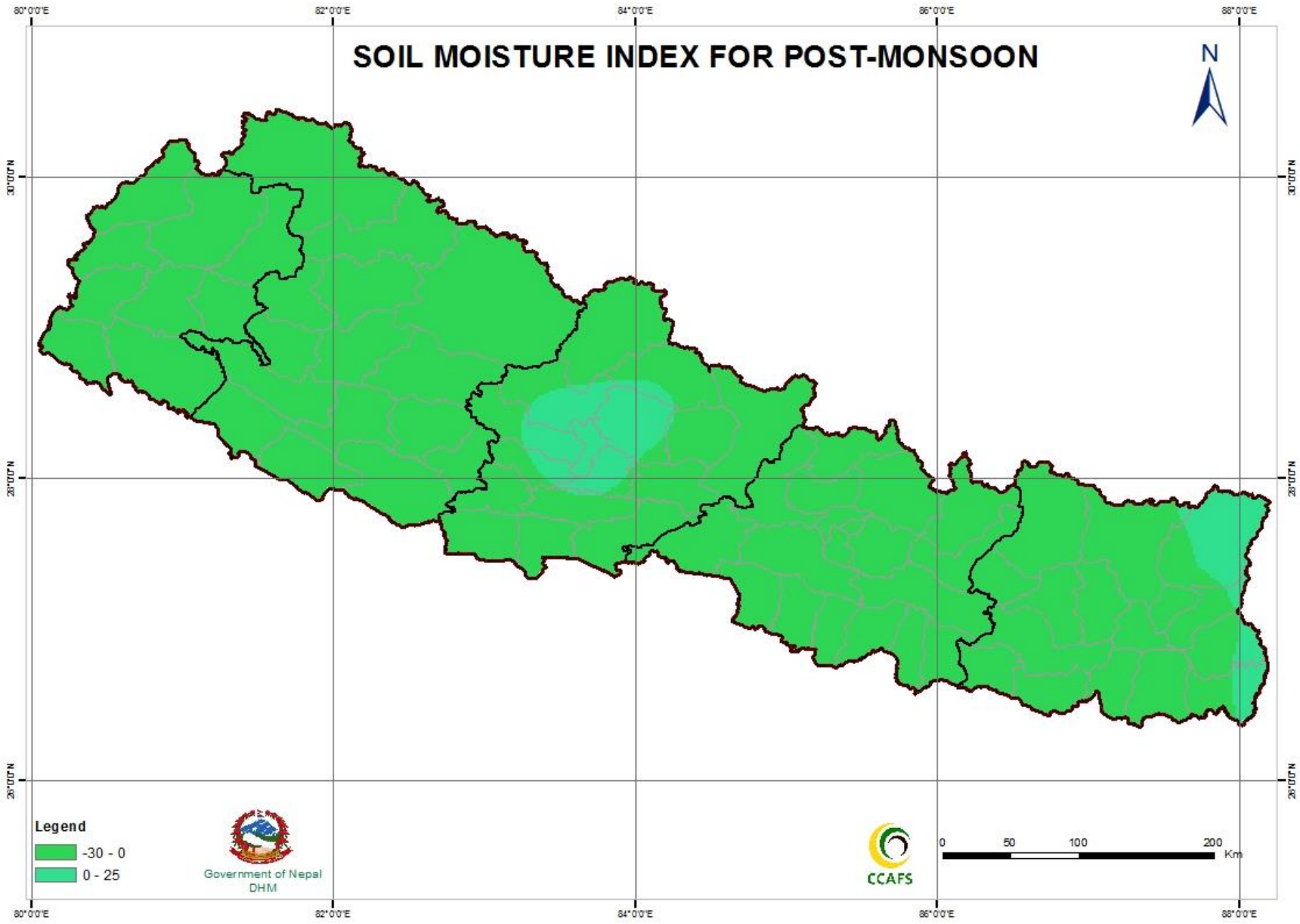
200
Km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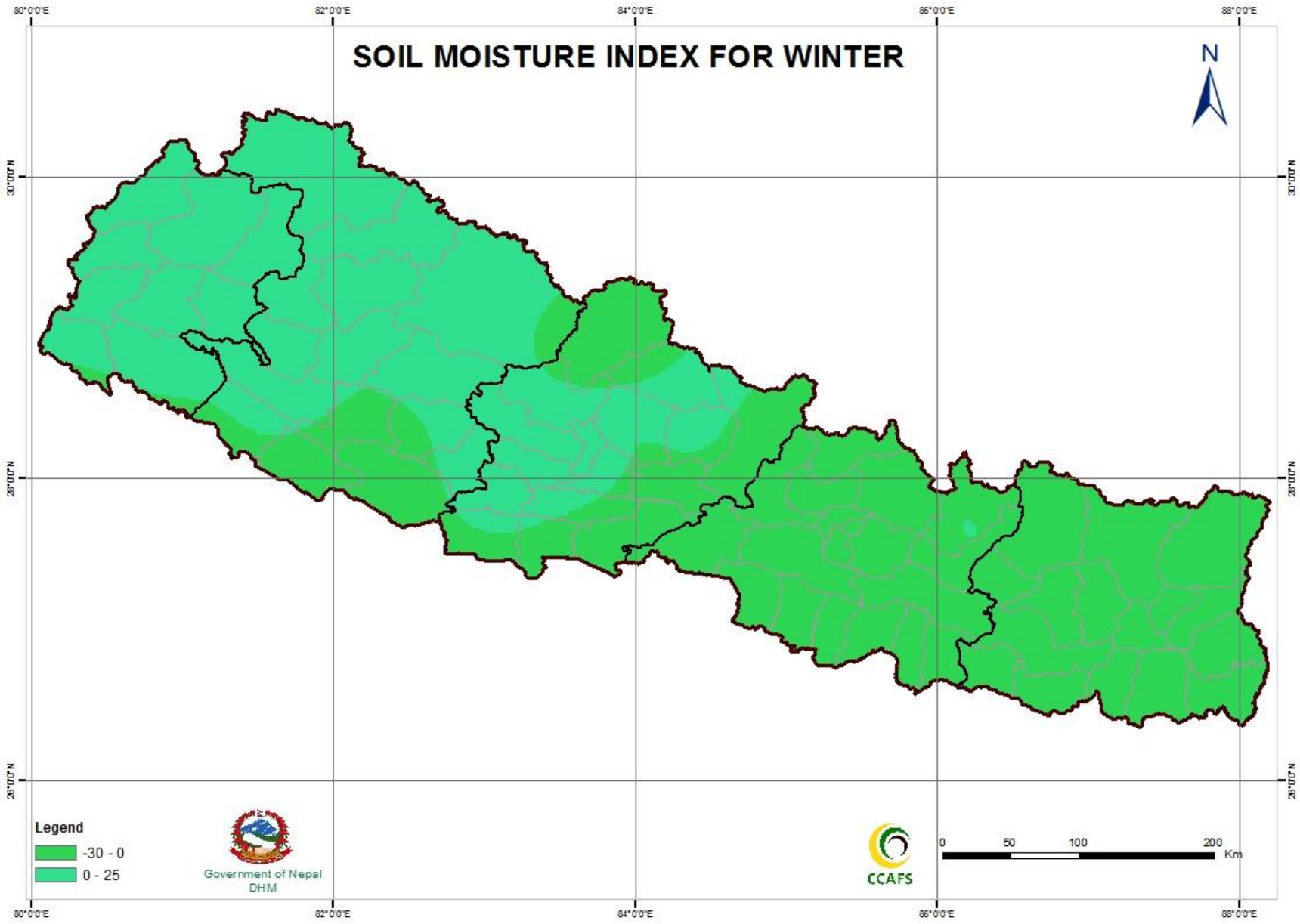
Legend
-30 - 0
0 - 25
Government of Nepal
DHM
CCAFS
0
50
100
200
Km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-30 - 0
0 - 25
Government of Nepal
DHM
CCAFS
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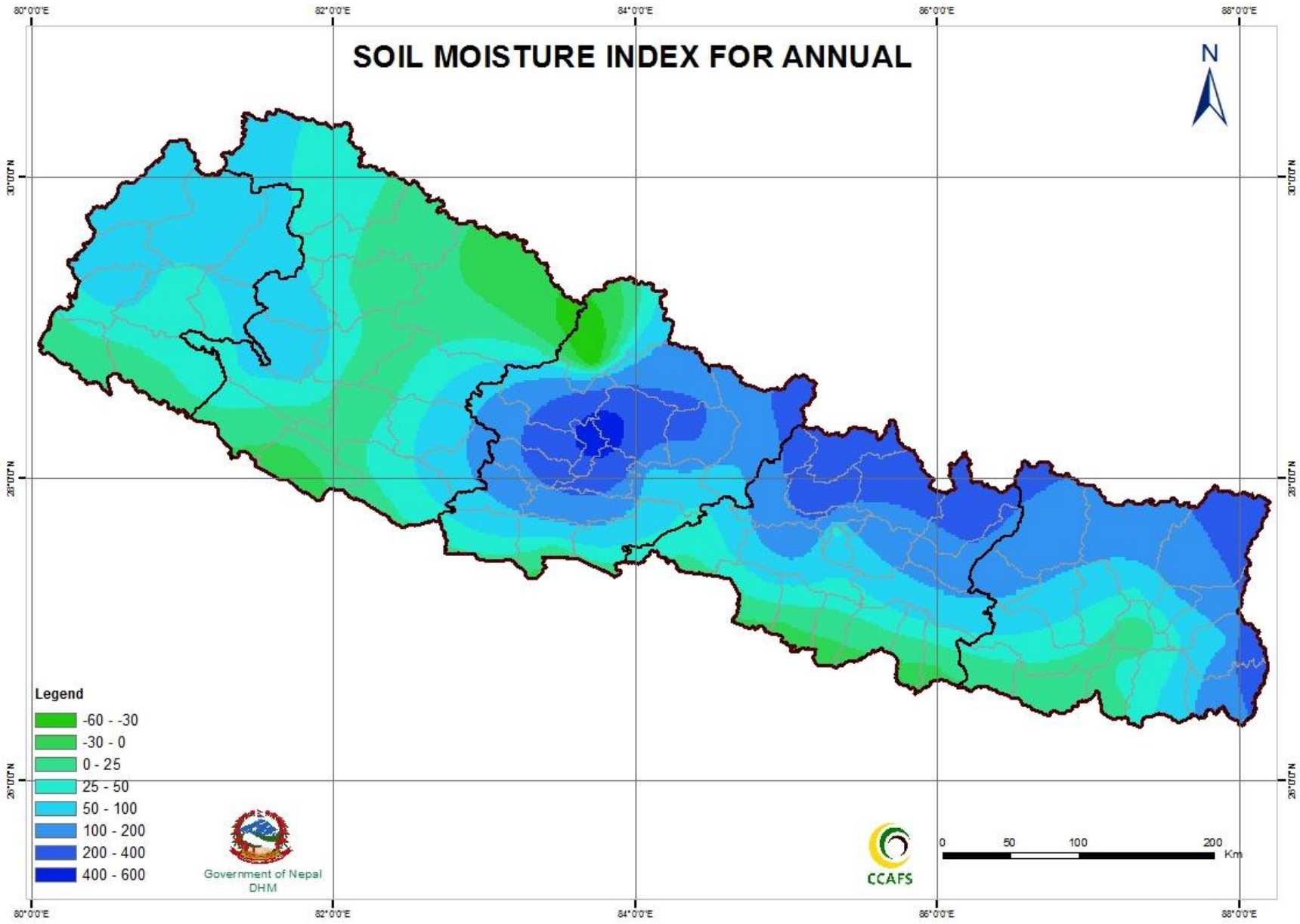
Km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Legend
-60 - -30
-30 - 0
0 - 25
25 - 50
50 - 100
100 - 200
200 - 400
400 - 600
Government of Nepal
DHM
CCAFS
0
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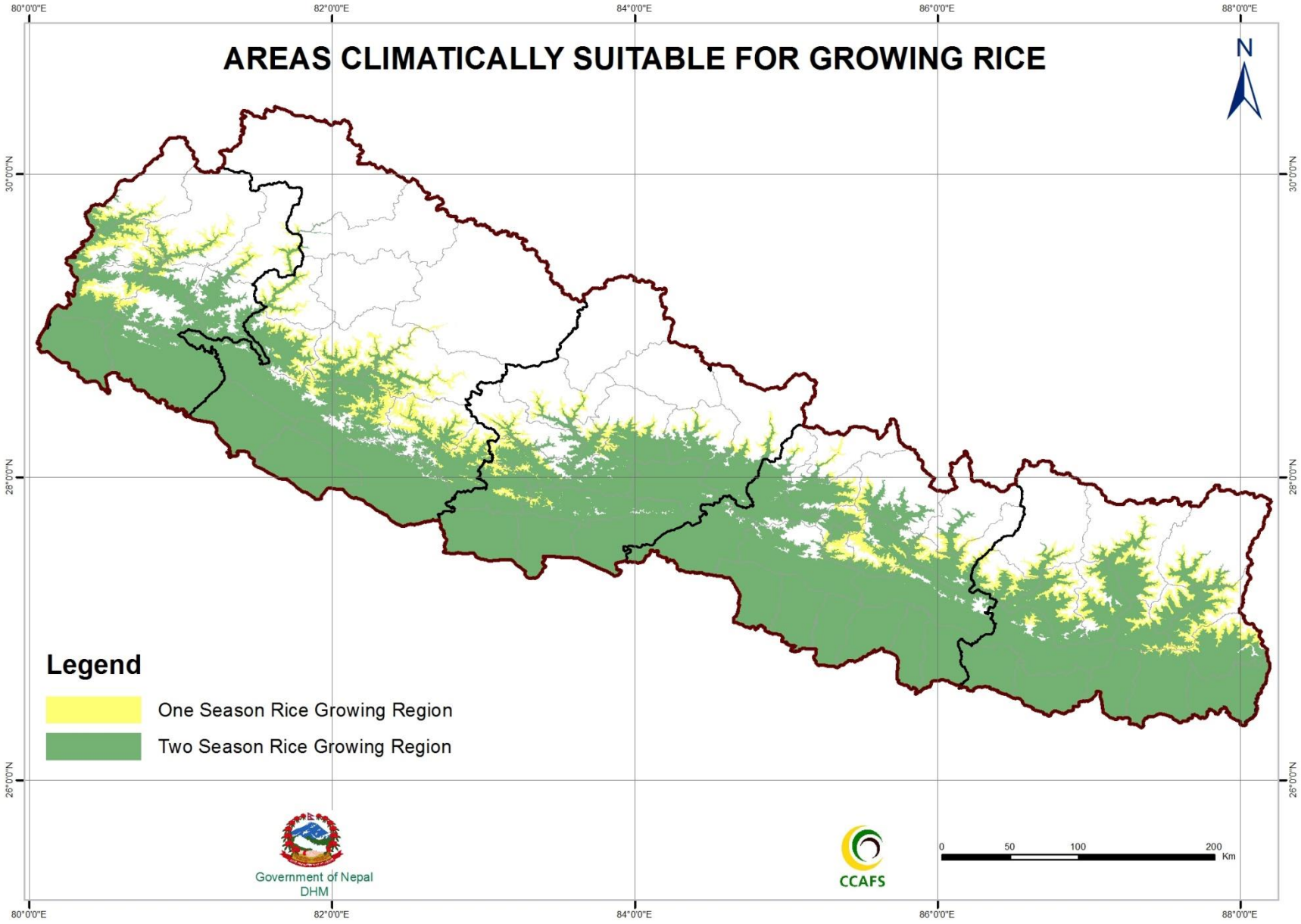
Km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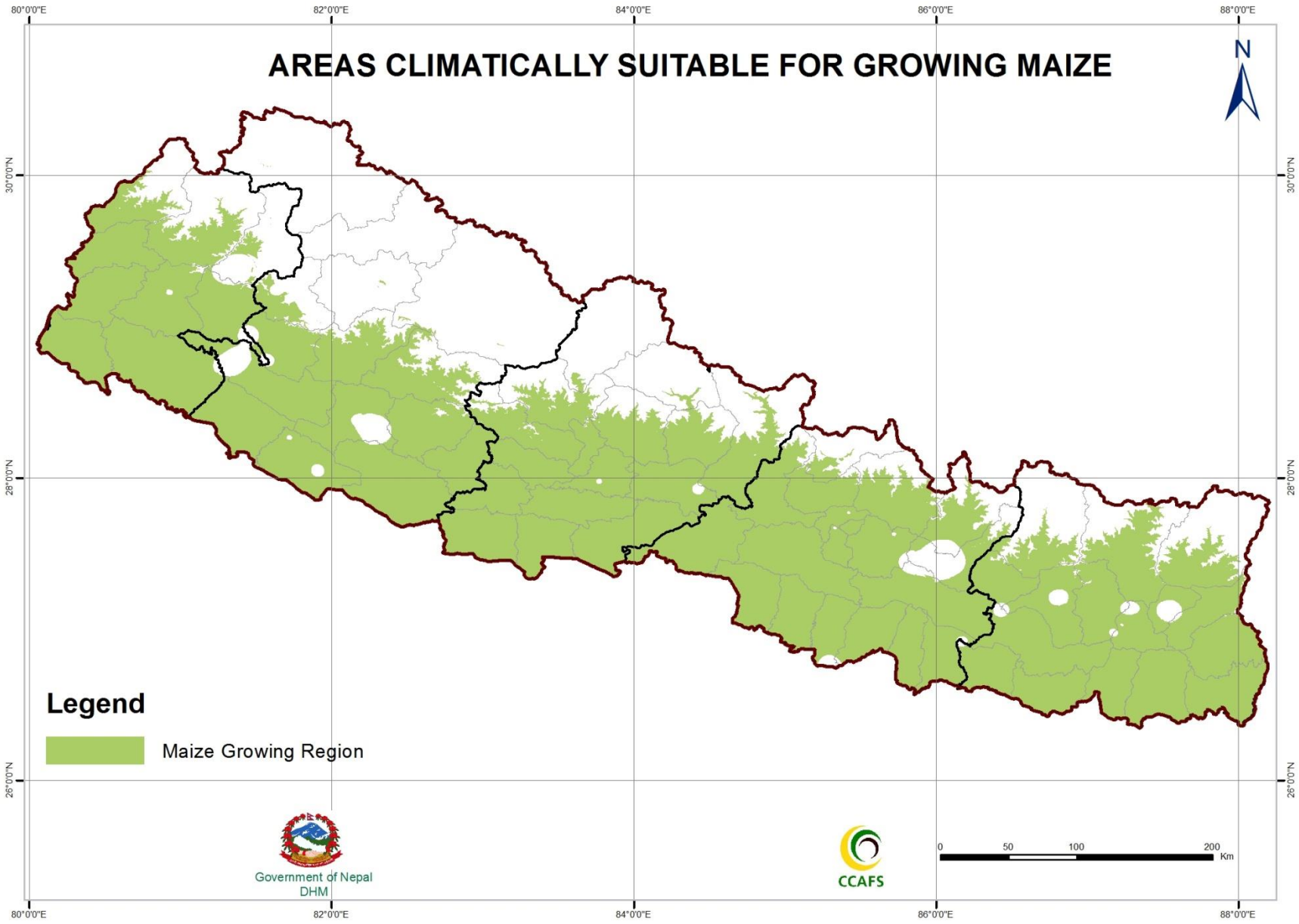
Legend
One Season Rice Growing Region
Two Season Rice Growing Region
Government of Nepal
DHM
CCAFS
0
50
100
200
Km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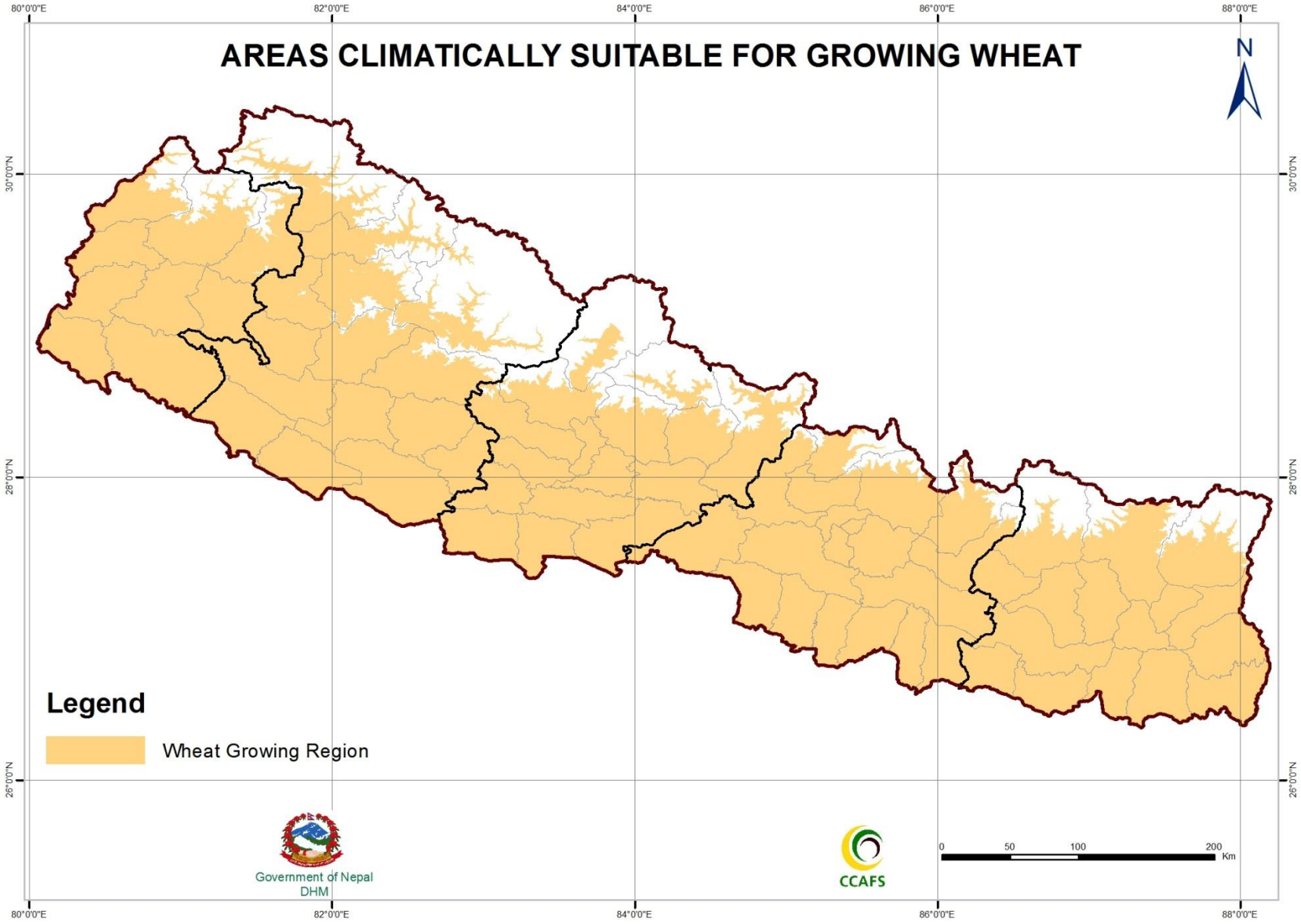
Maize Growing Region
Government of Nepal
DHM
CCAFS
0
50
100
200
Km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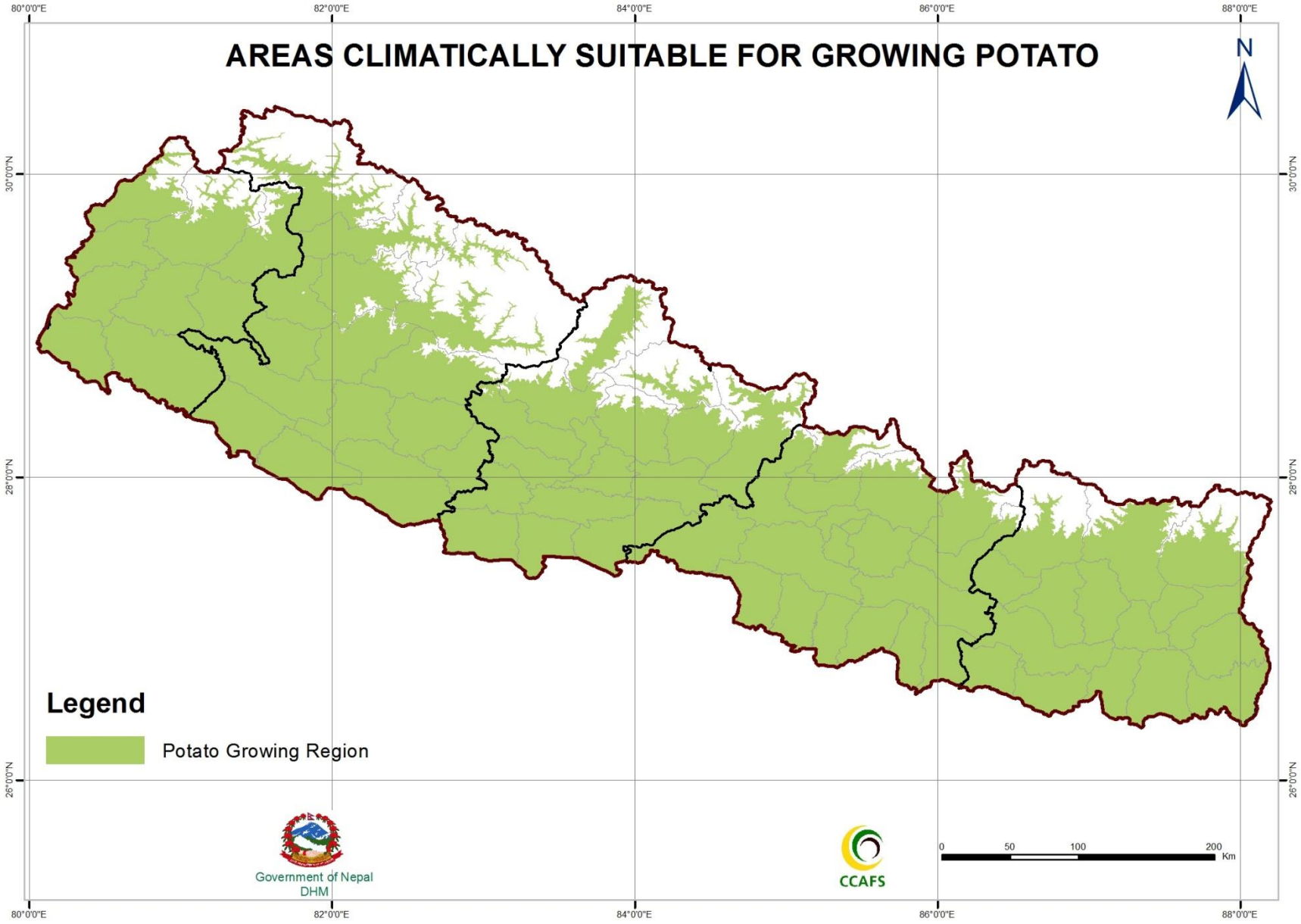
Legend
Wheat Growing Region
Government of Nepal
DHM
CCAFS
0
50
100
200
Km


AREAS CLIMATICALLY SUITABLE FOR GROWING POTATO
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30°0'0"N
28°0'0"N
26°0'0"N
Legend
Potato Growing Region
Government of Nepal
DHM
CCAFS
0
50
100
200
Km

Section III

EXPLANATORY NOTES ON CLIMATE INDICATORS AND THRESHOLD VALUES OF CLIMATIC

PARAMETERS RELATED TO CROPS

The various Indices used for the Agro-climatic Atlas of Nepal

Sr.no.	Climatic Variables	No. of Maps
Precipitation		
1	Mean annual precipitation	1
2	Mean monthly Precipitation (Jan- Dec)	12
3	Precipitation during Pre-monsoon (Mar-May), Monsoon(Jun-Sept), Post-Monsoon(Oct-Nov) and Winter seasons(Dec-Feb)	4
4	Extremes precipitation on daily,monthly, seasonal basis	3
5	Annual No. of days with precipitation : >1.0mm (rainy days), >10.0mm >25mm, 50mm, 100mm	5
6	Mean Length–of Rainy Season (based on Precipitation Regime- use daily data)	1
Temperature		
1	Mean Annual Temperature	1
2	Mean Monthly Maximum Temperature	12
3	Mean Monthly Minimum Temperature	12
4	Mean Monthly Temperature	12
5	Extreme Maximum Temperature (highest daily value) (May-July)	3
6	Extreme Minimum Temperature (lowest Recorded Value) (Dec-Feb)	3
7	Frost days (<=0^0C), Frost Free Period (Days) (>=0^0C) (Average)	2
8	Annual and Seasonal 'Total Degree days' above 5^0C, 10^0C (base temperature for different crops)	10
9	Length of Growing Period above 5^0C, 10^0C (base temperature for different crops)	
10	Warmest Temperature (in the coldest month)	1
11	Coolest Temperature (in the warmest month)	1
12	Annual No. of Hot days (>30^0C)	1
13	Annual No. of Cold Days (<5^0C)	1
Humidity		
1	Number of days with Morning RH >80% (conducive for pest incidence)	1
2	Number of days with mean Rh >50% (wet and Dry atmospheric conditions) in each season	8
Drought Index		
1	SPI (Standard Precipitation Index) – 4 season	12
Soil Moisture		
1	Soil Moisture Index: Thornthwaite Method	5

Growing Degree Days (GDD)

DD is calculated by using the formula as,

GDD= (Tmax+Tmin)/2- Tbase And Accumulated GDD = $\sum$In=1{(Tmax+Tmin)/2- Tbase};

Where Tmax= maximum temperature; Tmin= minimum temperature and Tbase=minimum threshold (base) temperature. The Atlas contains accumulated GDD of different growing seasons.

The base temperatures for some crops are given below.

Base Temperature	Crop
40°F (4.4°C)	**Wheat**, barley, rye, oats, lettuce
45°F (7.2°C)	Sunflower, **potato**
50°F (10°C)	**Corn**, sorghum, **rice**, soybeans, tomato

Source: DHM, (http://mcc.sws.uiuc.edu/FAQ/dd.html)

Drought Index: Standardized Precipitation Index (**SPI)**

Standardized Precipitation Index (**SPI)** is simply calculated by taking the difference of the precipitation from the mean for a particular time step, and then dividing it by the standard deviation. The SPI is a dimensionless index where negative values indicate drought; positive values wet conditions. Drought intensity, magnitude, and duration can be determined, as well as the historical data based probability of emerging from a specific drought.

$$SPI = \frac{x_i - \bar{x}_i}{\sigma}$$

SPI was chosen for this study because of its simplicity and based only on precipitation data. The SPI is calculated from monthly precipitation record by first fitting in the gamma probability distribution function and then transforming into a normal distribution in such a way that the mean SPI is set to zero (McKee et al.,1993; Edwards and McKee, 1997).The program used for the computation of SPI is SPI_SL_6.exe developed by National Drought Mitigation Center, USA**.** The program can compute the SPI for up to six intervals of time (i.e. 1-, 2-, 3-, 4-, 6-, 12month SPI).This temporal flexibility allows the SPI to be useful in both long-term hydrological applications and short-term agriculture (Sirdaș et al, 2003**)**. The negative and positive values of SPI stand for drought and wet conditions.The input file must be an ascii text file containing 3-columns as Year, Month and Monthly Precipitation Value in order. The precipitation total must NOT include decimals and can be in either inches or mm. The missing data should be reported as -9900. The output file can be named anything with a .dat (or .txt or .spi etc.) extension.

McKee et al. (1993) used the classification system shown in the SPI Values table to define drought intensities resulting from the SPI (Table 1). They also defined the criteria for a "drought event" for any of the time scales. A drought event occurs at any time when the SPI is less than or equal to -1.

Table 1: Standardized precipitation index classification system

SPI Values	Category	Abbreviation
2.0 +	Extremely wet	EXW
1.5 to 1.99	Very wet	VEW
1.0 to 1.49	Moderately wet	MOW
-.99 to .99	Near normal	N
–1.00 to –1.49	Moderate drought (**threshold**)	MOD
-1.50 to –1.99	Severe drought	SED
< –2.00	Extreme drought	EXD

The purpose is to assign a single numeric value to the precipitation which can be compared across regions with markedly different climates. Here, three categories of drought based on McKee *etal*., 1993, 1995 in four seasons were considered in the Atlas for computation of the indices which can be used for analysis of drought hazard in Nepal. SPI value from -0.99 to 0.99 is considered as normal.

Threshold rainfall of 40 station (priority based) for drought occurrence (corresponding to SPI equal to minus one) is also computed for all seasons at each station (Table 2). Seasonal rainfall equal to or below the threshold rainfall (mm) implies drought condition for that season in the given station.

Table 2: Threshold rainfall values (mm) at different stations

Index No	**Station name**	**District**	Winter	Premonsoon	Monsoon	Postmonsoon
0104	DADELDHURA	Dadeldhura	80	111	760	4
0105	MAHENDRANAGAR	Kanchanpur	34	31	1175	No drought
0202	CHAINPUR (WEST)	Bajhang	83	105	1012	8
0203	SILGADHI (DOTI)	Doti	75	122	760	No drought
0209	DHANGADHI (ATARIYA)	Kaliali	33	43	1235	No drought
0303	JUMLA	Jumla	48	92	442	7
0401	PUSMA CAMP	Surkhet	46	71	1001	No drought
0402	DAILEKH	Dailekh	47	100	1000	1
0405	CHISAPANI (KARNALI)	Bardiya	40	58	1290	8
0406	SURKHET (BIRENDRA NAGAR)	Surkhet	43	75	1090	3
0416	NEPALGANJ (REG.OFF.)	Banke	25	48	840	No drought
0508	TULSIPUR	Dang Deukhuri	25	66	1088	9
0513	CHAUR JHARI TAR	Rukum	33	66	820	8
0601	JOMSOM	Mustang	6	21	82	No drought
0706	DUMKAULI	Nawalparasi	16	122	1650	25
0707	BHAIRAHAWA (AGRIC)	Rupandehi	15	51	1220	8
0715	KHANCHIKOT	Arghakhanchi	27	110	1106	7
0802	KHUDI BAZAR	Lamjung	41	265	2405	29
0804	POKHARA AIRPORT	Kaski	39	405	2612	36
0809	GORKHA	Gorkha	25	182	914	5
0814	LUMLE	Kaski	59	378	3984	126
0815	KHAIRINI TAR	Tanahun	28	305	1424	20

0902	RAMPUR	Chitawan	9	139	1362	26
0905	DAMAN	Makwanpur	12	171	966	9
0906	HETAUNDA N.F.I.	Makwanpur	12	170	1625	36
0909	SIMARA AIRPORT	Bara	10	101	1172	20
0911	PARWANIPUR	Bara	11	88	918	22
1007	KAKANI	Nuwakot	25	206	1892	37
1029	Khumal tar	Lalitpur	15	118	745	12
1043	NAGARKOT	Kathmandu	12	150	1177	20
1103	JIRI	Dolkha	18	237	1418	34
1111	JANAKPUR AIRPORT	Dhanusa	9	60	837	3
1206	OKHALDHUNGA	Okhaldhunga	20	147	1184	21
1303	CHAINPUR (EAST)	Sankhuwasabha	16	240	815	23
1307	DHANKUTA	Dhankuta	13	131	580	9
1319	BIRATNAGAR AIRPOART	Morang	7	151	1090	13
1320	TARAHARA	Sunsari	9	190	1157	28
1405	TAPLEJUNG	Taplejung	29	349	1197	37
1407	ILAM TEA ESTATE	Ilam	10	142	801	15
1416	KANYAM TEA ESTATE	Ilam	22	285	1620	33

Soil Moisture Index: Thornthwaite Method

Thornthwaite (1948) derived an empirical relationship between PET and mean air temperature. PET is expressed as an exponential function of mean monthly air temperature:

$PET = 1.6 \left(\frac{10}{I}\right)^{a}$

Where, PET is the potential evapotranspiration (mm/month), T is the mean air temperature (^{0}C), normally a month, **I** is the heat index which represents the sum of 12 monthly indices (i) and may vary from 0-160,

$\mathbf{I} = \sum_{i=1}^{12} \left(\frac{T_i}{5}\right)^{1.514}$

a is a cubic function of I for a given location which may vary from 0 – 4.25 and is defined as:

$\mathbf{a} = 6.75 \times 10^{-7}\mathbf{I}^3 - 7.71 \times 10^{-5}\mathbf{I}^2 + 1.79 \times 10^{-2}\mathbf{I} + 0.49$

The value of PET is for a day length of 12 hours and a month of 30 days; an adjustment must be made to estimate PET for a particular month and place. This method has been used worldwide because of limited inputs such as temperature and the local latitude.

Thus, Moisture index (*MI*) simply defines a measure of the water balance of an area in terms of gains from precipitation (*P*) and losses from potential evapotranspiration (*PET*) and thus calculated in **monthly** basis as (http://www.answers.com/topic/moisture-index):

$$MI = 100(P - PET)/PET \quad \text{----------1}$$

Moisture index is referred as Soil Moisture Index (SMI) mentioned in a website of encyclopedia (http://www.encyclopedia.com/doc/1O13-soilmoistureindex.html). Thus,

$$SMI\ (I_m) = 100(P - PET)/PET \quad \text{----------2}$$

Where *SMI* is the Soil Moisture Index and can be expressed in integer or percentage, water surplus in months when precipitation (P) exceeds potential evapotranspiration (PET), water deficit in months when potential evapotranspiration exceeds precipitation, and *PET* is the potential evapotraspiration.

GIS for interpolation and map creation for the areas climatically suitable for growing Rice, Maize, wheat and Potato

GIS is a family of software products that form a complete GIS with integrated systems for geographic data creation, management, integration, and analysis. The System was taken as a tool to manage, analyze, and present spatially related information combining multiple layers of environment and biological information related to a spatial location to gain a better understanding of a specific location. GIS provides the layout and drawing tools that present study results in visual documents. The tool is robust in the sense that any type of modelling (hydrothermal, agro-climatic, degree-day, and others) parameters can be utilized to create prediction maps. Spatial application of empirical data aided in decision-making that lead to a better understanding of biological systems.

The first step in utilizing GIS is to analyze the precipitation and temperature data to produce the spatial data sets relevant to crops zoning. Three interpolation techniques, Inverse Distance Weighted (IDW), Spline (Minimum Surface Curvature), and Kriging (Ordinary Point Kriging) were used and checked the result accuracy of spatial distribution of precipitation and temperature data. Inverse Distance Weighted and Spline techniques are deterministic interpolation methods that are based on the surrounding measured values or on specific mathematical formulas that determine the smoothness of the resulting map. Inverse Distance Weighted technique estimates temperature for cells averaging known values from sample points close to the cell of interest. IDW accepts that variables being mapped decrease in influence with the increase in distance from the sample location. An interpolation using the Spline method fits a minimized curved surface to known sample points. This fitted data results in a smoothing effect passing through the known data points. Two types of Spline interpolations are possible: regularized and tension. Use of the regularized method creates a smooth, gradually changing surface. The objective to use GIS was allowed for integration of historical weather data and biological data to create maps. Precipitation and temperature distribution map, and overlying of those two maps (layers) on conditional basis could produce a separate map of different crops.

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