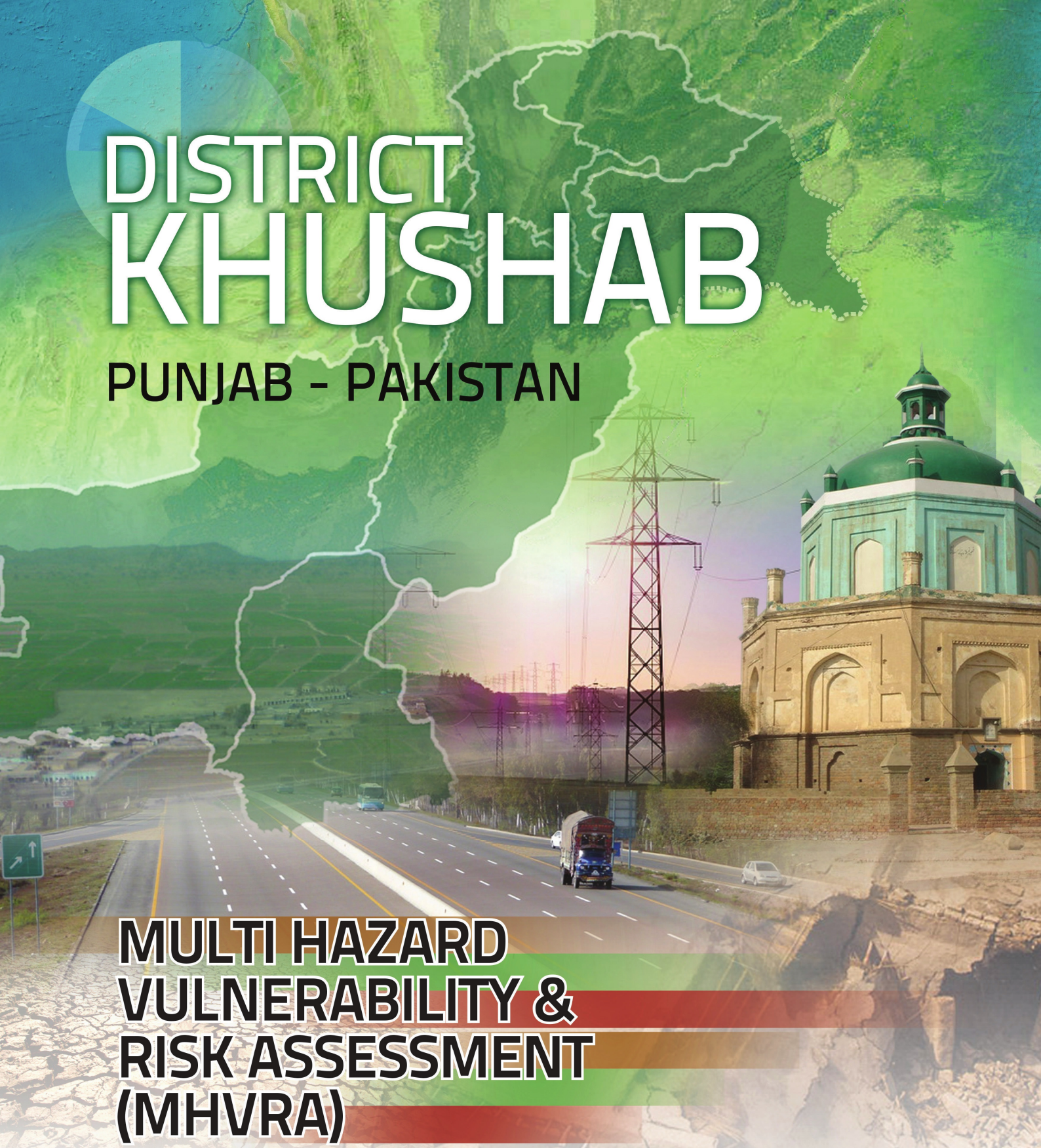
DISTRICT KHUSHAB

PUNJAB - PAKISTAN



MULTI HAZARD VULNERABILITY & RISK ASSESSMENT (MHVRA)

PAKISTAN National Disaster Management Authority NDMA

WFP United Nations World Food Programme

DISTRICT KHUSHAB

PUNJAB - PAKISTAN

MULTI HAZARD VULNERABILITY & RISK ASSESSMENT (MHVRA)

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The National Disaster Management Authority (NDMA) is the lead federal agency to deal with the whole spectrum of Disaster Management in Pakistan. It was established in 2007 through NDM Ordinance and was finally provided parliamentary cover by an act of Parliament in 2010. The NDMA is the executive arm of the National Disaster Management Commission (NDMC), which was established under the Chairmanship of the Prime Minister of Pakistan, as an apex policy making body in the field of Disaster Management. The NDMA aims to develop sustainable operational capacity and professional competence to coordinate the emergency response of Federal Government in the event of a national disaster.

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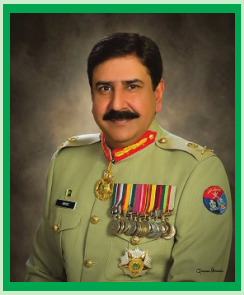
FOREWARD



One of the goals of the National Disaster Management Authority (NDMA) is to achieve sustainable social, economic and environmental development in Pakistan through reducing risks and vulnerabilities by effectively responding to and recovery from all types of disasters.

Pakistan is among the countries most vulnerable to natural and man-made disasters. The country's acute vulnerability to disasters is due to its geographical location, diverse topography, hydrological configuration and extended fault-lines. Recurrent disasters have taken a heavy toll on the long-term development goals of the country. The vulnerability to disasters is growing in both urban and rural areas, placing even more lives and livelihoods at risk.

NDMA, being the country's apex body for implementing, coordinating and monitoring whole spectrum of disaster management activities in Pakistan, has always remained focused to achieve its vision of building disaster resilient Pakistan. Significant efforts have been made in this direction to reduce the country's vulnerability to several types of impending disasters. National DRR Policy and National Disaster Management Plan (NDMP) 2012-2022 reflect our priorities i.e. adopting a proactive approach towards disaster risk management. For implementation of NDMP's key interventions, NDMA conceived an implementation roadmap for NDMP (2016-2030) wherein particular emphasis has been laid on Multi Hazard Vulnerability & Risk Assessment (MHVRA) Intervention.

MHVRA study plays an instrumental role in integrated Disaster Risk Reduction (DRR) planning and mainstreaming DRR into development at local, provincial, and national level. It guides the relevant agencies/ line departments in requisite land-use planning and implementation of national level programs aligned to vulnerabilities at a community level. The knowledge gained from the study can also play a cardinal role in development of robust knowledge management framework for long-term socio-economic sustainable growth.

For MHVRA related activities, NDMA has successfully conducted the MHVRA study of five selected districts of Punjab by utilizing the in-house technical resources. It is important to mention that this Project demonstrates high degree of expertise for data processing and visualization. I am hopeful that this document will act as a constant source for informed decision making for all stakeholders and assist in development of NDMA in-house capacity to take similar endeavors in the future as well. I would like to extend my gratitude to the Members of National Disaster Management Plan (NDMP) Steering Committee for taking keen interest in providing strategic guidance throughout the course of this Study and endorsing its results.

I would like to place on record my sincere appreciation for the contributions of Development Partners, NGOs/INGOs and academia for their valuable inputs during the execution of this Study. A profound gratitude goes to the United Nation World Food Program, Pakistan for their support and cooperation for initiating and pioneering MHVRA initiatives in Pakistan and for their long-term support in establishing PMU in NDMA.

I believe that this is the first step of a long journey ahead which would require commitment, steadfast support of the partners to achieve the ultimate aim of a Resilient Pakistan.

Lieutenant General
Omar Mahmood Hayat, HI (M)
Chairman, National Disaster
Management Authority (NDMA)

ACKNOWLEDGEMENT

The National Disaster Management Authority (NDMA) is pleased to launch the Multi Hazards Vulnerability and Risk Assessment (MHVRA) Atlas of five selected districts of Punjab, prepared mainly as a dynamic planning tool for Disaster Risk Management (DRM) officials of Government, Humanitarian Agencies and Development Partners at provincial and district levels for improved and informed Disaster Risk Reduction (DRR), Preparedness and Contingency Planning.

An esteem of gratitude is owed to the Former Chairman NDMA, Major General (R) Asghar Nawaz HI(M) and the Current Chairman Lieutenant General Omar Mahmood Hayat HI(M), for their visionary approach, guidance and direction in constituting this Study. They remained a source of guidance at each stage of this project which ultimately had resulted in successful execution of this Project..

We profoundly acknowledge Senior DRM Officer, Mr. Sultan Mehmood of Disaster Risk Reduction (DRR) Unit and Program Officer Mr. Iftikhar Abbas of Vulnerability Analysis & Mapping (VAM) Unit of World Food Program (WFP) for their support and cooperation for all our initiatives and endeavors throughout the working of this project. We acknowledge and express our sincere and deep appreciation for their assistance in this regard.

Our sincere and passionate felicitations to Former Member Disaster Risk Reduction (DRR) NDMA, Mr. Ahmed Kamal, Current Member DRR, NDMA, Mr. Idrees Mehsud, Director Implementation Lieutenant Colonel (R) Raza Iqbal and Assistant Director Projects Mr. Shafi Agha for their continuous support, prized guidance and relevant inputs based on their vast experience and knowledge that contributed immensely in this endeavor.

We acknowledge significant contributions made by institutions and individuals at district, provincial, national by providing data and information required to smoothly carryout this project. In addition, the proficiencies provided by the consultant of different disciplines were crucial, as it helped to maintain precision throughout the assessment.

In the end, we would like to extend our heartiest gratitude to all our relevant stakeholders who rendered their full support, contribution and active participation during execution of this Study. Their contributions are sincerely appreciated and acknowledged.

PREFACE

Pakistan by virtue of its diverse topographic features is vulnerable to wide degree of natural and man-made disasters. Events exhibited under many forms in the past are the testimonies to the country's susceptibility to disasters. Until recently, a reactive emergency response approach remained chiefly applicable to deal with disasters in Pakistan. However, disasters continued to exact a heavy toll on country's economy, human lives and environment and, consequently, manifested the need for developing a different strategy towards Disaster Risk Reduction (DRR). Against this backdrop, a shift from hitherto response based approach to proactive disaster management was adopted through 2007 National Disaster Management Ordinance, now known as National Disaster Management (NDM) Act 2010.

National Disaster Management Authority (NDMA), with provision of NDMA Act 2010 and in-line with the DRR Policy, formulated a 10-year comprehensive National Disaster Management Plan (NDMP) 2012–2022 outlining ten priority areas and 118 specific interventions and projects for implementation over the span of ten years. The priority number 3 and 4 under NDMP 2012-2022 warrants execution of Multi Hazard Vulnerability and Risk Assessment (MHVRA) Intervention in the Country. In this regard, NDMP implementation roadmap 2016-2030 was chalked out for phase-wise execution of MHVRA Intervention at micro level, down to UC Level, for all districts of Pakistan and AJ&K.

In view of the Country's vulnerability to multiple disasters, the implementation of MHVRA Intervention is considered essential for achieving national and global commitments, some of which are outlined in Millennium Development Goals (MDGs) & Sustainable Development Goals (SDGs), Sendai Framework for Disaster Risk Reduction (SFDRR), Climate Change Policy 2012, National Disaster Risk Reduction (DRR) Policy 2013, NDMP 2012-2022 and Pakistan Vision 2025.

Cognizance of the importance of MHVRA component, NDMA, being an apex body to deal with the whole spectrum of disaster management, embarked upon establishing holistic and well-structured methodology for country-specific MHVRA activity. To this end, Project Management Unit (PMU) has been established in NDMA for execution and monitoring of the MHVRA Studies in the Country, with an aim to clearly estimate and map the risk of communities nationwide. PMU, as the first step, laid down "NDMA Policy & Execution Guidelines for the conduct of MHVRA" to maintain unanimity in risk assessment methodology across the Country and AJ&K. The Guidelines constitute an important part of NDMA's effort towards provision of unified standards and procedures for the hazard, exposure, vulnerability and risk assessments.

To test the various attributes of the MHVRA Guidelines, PMU with the support of World Food Programme (WFP), conducted a micro-level MHVRA intervention, down to Union Council level, for five selected districts of Punjab namely Bahawalpur, Jhang, Khushab, Multan and Rahim Yar Khan. This Project has a distinction of being the only study to be endorsed by Steering Committee formulated to oversee implementation of NDMP. The NDMP Steering Committee consists of members from all lead technical agencies of Pakistan including representatives from S/GB/F/PDMA, Pakistan Meteorological Department (PMD), Planning Commission, Planning Development & Reforms Division, Finance Division, Economic Affairs Division, Ministry of Water & Power, Ministry of Climate Change, Federal Flood Commission (FFC), Geological Survey of Pakistan (GSP), Space & Upper Atmosphere Research Commission (SUPARCO) and Survey of Pakistan (SOP) as well as representatives from academia.

METHODOLOGY

This Study involved identification and analysis of prevailing hazards in the study districts through field level consultation with local stakeholders and analysis of historical records. Three hazards namely drought, flood, earthquake have been considered for hazard analysis owing to their frequent recurrence in the study districts. The project covered various scientific and technical activities, including a review of past and ongoing studies related to hydrological, seismological and geological phenomenon. For hazard modelling and analysis, probabilistic and scenario based hazard assessment tools have been employed in the project. Technical parameters used for hazard estimation include information concerning soil moisture condition, climatic, biotic & edaphic factors of soil, temperature condition, vegetation health, water flow paths, flood catchment area, streamline data, land use data, river discharge information, flood extent, flood velocity, precipitation, seismic sources, plate tectonics, geomorphology, soil data, bore hole data, fault zones, ground motion prediction equations, seismic intensity (PGA), soil ground motion amplification factor and so on.

Exposure has been mapped in the dimensions of population, physical elements, life lines, essential facilities, transportation facilities, socio-economic aspects, economic activities, environmental elements, critical infrastructure, agriculture and livestock elements; being termed as elements at risk. Various statistical tools such as projection equations, dissimilarity index, have been employed in the Project to extrapolate information beyond the available frame.

Vulnerability analysis has been conducted considering three dimensions i.e. physical, social and agriculture (Food Insecurity). For physical vulnerability, fragility curves have been developed using available technical and statistical tools (Probabilistic or Empirical fragility models). For social vulnerability, several technical tools such as Principal Component Analysis (PCA) and Social Vulnerability Indicator (SoVI) have been utilized to obtain possible driving factors contributing to the social vulnerability in the study area. Vulnerability analysis in the context of agriculture and food security have also also been undertaken to determine sets of contributing factors to food insecurity and agricultural vulnerability. The stressor covered epidemic, endemic, biotic and edaphic factors and sudden shocks such as earthquake, flood and drought.

Coping capacity has been anticipated by assessing existing capacities of organization to manage disasters. The coping capacity has further been divided into three main factors i.e. capacity to anticipate risk, capacity to respond and capacity recover. Adaptive capacity has been evaluated using fifteen indicators.

For Risk Assessment, Analytical Hierarchy Process (AHP) and Multi Criteria Decision Making approaches have been employed in the Study. The risk assessment has been carried out using qualitative, quantities or semi quantitative approach. On basis of these factor components, the cumulative risk

(Continued)

profile of the study districts (risk indexing down to UC Level) have been developed. Various DRR intervention and mitigation measures have formulated and finally Cost Benefit Analysis (CBA) of proposed DRR interventions have been performed to estimate their economic feasibility.

Close linkages with the National, provincial and district organizations have been established through stakeholder consultation arrangements in order to facilitate secondary data collection, hazard specific information exchange, and sharing of any other relevant data. For this purpose, several data collection tools have been utilized in the Study such as focus group discussion, key informant interviews, participatory rural appraisal, semi structured interviews and one-to-one interviews with community level stakeholders and line departments.

ABOUT THIS ATLAS

An accurate, easy-to-interpret and up-to-date information is one of the most fundamental elements of decision-making process. Information, particularly in the realm of disaster management, plays an instrumental role in the risk-informed Disaster Risk Reduction (DRR) planning. It makes the relevant departments aware of the likely losses, relative vulnerabilities, exposure and impending disaster risks in the study area, enabling them to effectively undertake prevention, mitigation, preparedness and response based measures before or at the onset of any emergency situation. However, compilation and visualization of information concerning Multi Hazard Vulnerability & Risk Assessment (MHVRA) study is fairly a challenging task since it demands multi-dimensional analysis of different natural processes to understand their composite effects over the study area. Similarly, presentation of the outputs of MHVRA study to the end user, in an easy manner, is yet another challenging task, which requires development of data visualizing tools, graphic aids, catalog of charts and map composition with effective cartographic language. This Atlas in one major step to achieve the said objectives. Much effort has been put in to provide easy to comprehend and interactive information to the users.

This Atlas provides detailed baseline maps of the study district covering several dimensions to include geology, climatology, land use, land cover, elevation, population, settlements, buildings, transportation, telecommunication, health, education, irrigation infrastructure, industries, livestock, agriculture etc. Several graphical tools have been employed to produce easy to grasp charts, these include pie-charts, histograms, ring charts, matrix diagram, bar charts, line graphs, 3D charts and informative tables. The Atlas also provides brief hazard assessment methodologies for each selected hazards i.e. drought, earthquake and flood, along with maps for various return periods. Exposure Matrix Tables identifying the exposed elements at risk have also been developed along with the exposure maps. A brief risk assessment methodology is also provided in the atlas with the risk maps. All the study has been conducted at micro-level, down to the level of Union Council. This Study is first of its kind and demonstrates high level of expertise, arduous work and coordinated approach involving cross-sectorial stakeholder linkages.

The Product shall be useful for policymakers and practitioners for risk-informed land-use planning, mainstreaming DRR into development programs and implementation of national scale programs aligned to ground. The project would render substantial baseline information over which other micro level DRR plans could be devised and will serve as a state of the art planning tool enabling mapping of resources in the study district.

List of Officers/Officials involved in MHVRA Punjab Study

Technical Team

Name	Designation/Position
Mr. Ehtisham Khalid Khan	Project Director / Team Lead
Ms. Nimrah Khalid	MHVRA Expert
Mr. Asif Jan Turangzai	Senior MHVRA Expert (Till October, 2016)
Mr. Saad Shams Butt	GIS Expert (Till September, 2016)
Mr. Syed Muhammad Tayyab Shah	Project Officer
Mr. Aamir Qayyum	Project Officer
Ms. Mashal Riaz	MHVRA Officer
Ms. Sana Zahid Shah	GIS Officer
Ms. Zahra Hassan	GIS Officer
Mr. Ismail Khan	Project Officer (Till September, 2016)
Mr. Malik Zaheer-ud-Din	Project Officer (Till August, 2016)
Ms. Sarah Ovais	GIS Associate (Till September, 2016)
Ms. Saman Mushtaq	GIS Associate (Till September, 2016)
Mr. Muhammad Waqas	MHVRA Associate (Till February, 2017)
Mr. Sheikh Rafay Ehsan	MHVRA Intern

Consultants

Name	Consultancy Area
Dr. Naveed Ahmad	Seismic Hazard Analysis and Vulnerability Analysis
Dr. Bashir Ahmad	Drought Hazard Analysis
Dr. Athar Ashraf	Flood Hazard Analysis
Dr. Wajid Pirzada	Food Insecurity Study
Dr. Shahzad Ali Khan	Cost & Benefit Analysis
Mr. Amjad Ahmad	Risk Assessment

Support Team

Name	Designation/Position
Ms. Muqaddas Iqbal	Project Coordinator (Till September, 2016)
Mr. Ghulam Rasool	Admin and Account Officer
Mr. Shahid Malik	Field Surveyor
Mr. Ali Tassadaq	Account Intern (Till February, 2017)
Mr. Tilwat Khan	Office Assistant
Mr. Nasir Khan	Office Assistant

National Disaster Management Plan (NDMP)

Steering Committee - Participants List (19th Sep & 9th Dec 2016)

Name	Designation	Position	Department
Maj. Gen. Asghar Nawaz	Chairman	Chair	National Disaster Management Authority (NDMA), Pakistan
Mr. Ahmed Kamal	Member (Disaster Risk Reduction)	Member/ Secretary	
Brig. Ishtiaq Ahmed	Member (Operations)	Member	
Mr. Ehtisham Khalid Khan	Project Director/Team Lead	Member	
Mr. Chaudhry Muhammad Anwar	Chief (PPH)	Member	Planning and Development Division
Mr. Syed Zawad Haider Shah	Section Officer	Member	Economics Affairs Division
Mr. Syed Zakria Ali Shah	Deputy Secretary (UN)		
Mr. Muhammad Saleem Khatak	Deputy Secretary	Member	Ministry of Climate Change
Mr. Wasim Akhtar	Deputy Secretary (Development)		
Mr. Muhammad Afzal Shabzada	Deputy Director		
Mr. Arshad Ahmed	Senior Joint Secretary	Member	Finance Division
Mr. Malik Aman	DSA (NDMA)		
Mr. Khalid Sher Dil	Director General	Member	Provincial Disaster Management Authority, Punjab
Mr. Hameedullah Malik	Project Director		
Mr. Nisar Ahmed Sani	Documentation Officer		
Mr. Syed Ahmed Fawad	Director (Operations)	Member	Provincial Disaster Management Authority, Sindh
Mr. Amer Afaq	Director General	Member	Provinicial Disaster Management Authority, Khyber Pakhtoonkha
Mr. Wajid Ali Khan	Deputy Director (Relief)		
Mr. Israr Muhammad	Director (R&R)		
Mr. Faisal Khan Baloch	Assistant Director	Member	Provincial Disaster Management Authority, Balochistan
Mr. Muhammad Khalid Sherdil	Director General	Member	FATA Disaster Management Authority
Mr. Main Adil Zahoor	Assistant Director (Operations & Relief)		
Mr. Zaheer-udin-Babar	Deputy Director	Member	Gilgit Baltistan Disaster Management Authority
Mr. Abdul Waheed Shah	Director General		
Mr. Zaheer-udin-Qureshi	Director General	Member	State Disaster Management Authority Azad Jammu & Kashmir
Dr. Muhammad Hanif	Director (NWFC)	Member	Pakistan Meteorological Department
Mr. Zafar Iqbal	Senior Engineer	Member	Federal Flood Commission, Ministry of Water and Power
Mr. Alamgir	Chief Engineer		
Mr. Muhammad Ishtiaq	Director	Member	Survey of Pakistan
Mr. Syed Zuhair Bukhari	Director	Member	Pakistan Space and Upper Atmosphere Research Commission (SUPARCO)
Mr. Zafar Iqbal	Director		
Mr. Muhammad Farooq	General Manager		
Mr. Sardar Saeed Akhter	Director	Member	Geological Survey of Pakistan
Mr. Simon Sadiq	Deputy Director		
Brig Sajid Naeem (R)	Senior Capacity Building Expert	Member	National Institute of Disaster Management
Dr. Talat Iqbal	Deputy Chief Scientist / Director	Co-opted Member	Center for Earthquake Studies, PAEC
Dr. Muhammad Ali Shah	Manager (DM & R Division)	Co-opted Member	Micro Seismic Studies Program, Pakistan Automic Energy Commission (MSSP,PAEC)
Ms. Thai Van Hoary	Head of Vulnerability Analysis & Mapping	Observer	World Food Program, Pakistan (UN- WFP)
Mr. Iftikhar Abbas	Program Officer (Spatial Analyst)		
Ms. Umber Khan	Program Officer	Observer	Department for International Development (DFID)
Mr. Sherwan Asif	Program Manager		
Mr. Shaukat Shafi	Senior Project Officer	Observer	Asian Development Bank (ADB)

GLOSSARY OF TERMS

Acceptable Risk	The level of potential losses that a society or community considers acceptable given existing social, economic, political, cultural, technical and environmental conditions.
Accountability	Obligation to demonstrate that work has been conducted in compliance with agreed rules and standards or to report fairly and accurately on performance results vis a vis mandated roles and/or plans. This may require a careful, even legally defensible, demonstration that the work is consistent with the contract terms.
Activity	Actions taken or work performed through which inputs, such as funds, technical assistance and other types of resources.
Adaptation	The adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.
Affected Area	An area or part of country affected by disaster.
Alluvium Deposits	A deposit of clay, silt, and sand left by flowing floodwater in a river valley or delta, typically producing fertile soil.
Avalanche	An avalanche (also called a snow slide) is a rapid flow of snow down a sloping surface of a mountain. Avalanches are triggered due to mechanical failure of the snow when the forces on the snow exceed its cohesion strength.
Average Household Size	Average Number of persons per household.
Bare Area with Sparse Natural Vegetation	Sand Dunes with natural vegetation, bare rocks (with sparse vegetation) and desert flat pains are included in this class.
Bare Areas	This class describes areas that have very less natural and manmade vegetation cover which include sand dunes and barren land.
Base-Line Study	An analysis describing the situation prior to a development intervention, against which progress can be assessed or comparisons made.
Basic Health Unit (BHU)	The BHU is located at a Union Council and serves a catchment population of up to 25,000. Services provided at BHU are promotive, preventive, curative and referral. BHU provides all PHC services along with in tegral services that include basic medical and surgical care. MCH services are also part of the services package being provided at BHU. BHU provides first level referral to patients referred by LHWs. BHU refers patients to higher level facilities as and when necessary.
Built-up Area	It defines all built areas (urban, industrial, airport etc.) with all vegetated areas linked to the built-ups such as gardens, golf courses, urban recreation parks, plots devoted to urban expansion etc.
Capacity	The combination of all the strengths, attributes and resources available within a community, society or organization that can be used to achieve agreed goals.
Capacity Building	Efforts aimed to develop human skills or societal infrastructure within a community or organization needed to reduce the level of risk. In extended understanding, capacity building also includes development of institutional, financial, political and other resources, at different levels of the society.
Census	Census is an official count or a survey, especially of a population.
Climate Change	(a) The Inter-governmental Panel on Climate Change (IPCC) defines climate change as: "a change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external force or to persistent anthropogenic changes in the composition of the atmosphere or in land use". (b) The United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods".
Climatology	Climatology or climate science is the scientific study of climate, scientifically defined as weather conditions averaged over a period of time.
Coping Capacity	The means by which people or organizations use available resources and abilities to face a disaster. In general, this involves managing resources, both in normal times as well as during crises or adverse conditions.
Craton	The term craton is used to distinguish the stable portion of the continental crust from regions that are more geologically active and unstable. Cratons can be described as shields, in which the basement rock crops out at the surface, and platforms, in which the

	basement is overlaid by sediments and sedimentary rock.
Critical Facilities	The primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency.
Crop Irrigated	Areas used for the production of annual crops, such as corn, vegetables, soybeans, tobacco and cotton. This class also includes all land being actively tilled.
Crop Marginal and Irrigated Saline	Crop marginal and irrigated saline are identified as those areas which are currently used for agriculture with low and unstable rainfall or higher rainfall areas intensively used, relative to user capability, under existing population densities, traditional technologies and institutional structures.
Crop Rainfed	The term rainfed agriculture is used to describe farming practicesthat rely only on rainfall for water.
Cyclone	A large-scale system of winds that spiral in toward a region of low atmospheric pressure. Because low-pressure systems generally produce clouds and precipitation, cyclones are often simply referred to as storms. A tropical cyclone is one that forms over warm tropical waters. Such a system is characterized by a warm, well-defined core and can range in intensity from a tropical depression to a tropical cyclone. While tropical cyclones can produce extremely powerful winds and torrential rain, they are also able to produce high waves and damaging storm surge.
Debris Flow	This is a phenomenon in which soil and rock on the hillside or in the riverbed are carried downward at a dash under the influence of continuous rain or torrential rain.
Demographics	It is the statistical data relating to the population and particular groups within it.
Density	Density refers to number of elements (population, buildings, roads etc.) per unit area.
Disaster	A catastrophe or a calamity in an affected area arising from natural or man-made causes or by accident which results in substantial loss of life or human suffering or damage to, and destruction of property. A serious disruption of the functioning of a community or a society involving widespread human, material, economic or environmental losses and impacts, which exceeds the ability of the affected community or society to cope using its own resources.
Disaster Management	Managing the complete spectrum of disaster including preparedness, mitigation, response, recovery, relief and rehabilitation.
Disaster Risk	The potential disaster losses, in lives, health status, livelihoods, assets and services, which could occur to a particular community or a society over some specified future time period.
Disaster Risk Management (DRM)	The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of hazards and the possibility of disaster.
Disaster Risk Reduction (DRR)	The concept and practice of reducing disaster risks through systematic efforts to analyses and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.
District Head Quarter (DHQ)	The District Head Quarters (DHQ) Hospital is located at District headquarters level and serves a population of 1 to 3 million, depending upon the category of the hospital. The DHQ hospital provides promotive, preventive, curative, advance diagnostics, inpatient services, advance specialist and referral services. All DHQ hospitals are supposed to provide basic and comprehensive care.
Drought	A drought is an extended period when an area notes a deficiency in its water supply when the demand for water exceeds the supply. Generally, this occurs when an area receives consistently below average precipitation. It can have a substantial impact on the ecosystem and agriculture of the affected region.
Early Warning	The provision of timely and effective information, through identified institutions, to communities and individuals so that they could take action to reduce their risks and prepare for effective response.
Earthquake	Earthquake is defined as shaking and vibration at the surface of the earth resulting from underground movement along a fault plane of from volcanic activity or due to movement of plate boundaries of the Earth. The scale of earthquakes is measured by moment magnitude and the shaking intensity at each location is usually reported by Mercalli intensity scale.
Effectiveness	The extent to which the development intervention's objectives were achieved, or are expected to be achieved, taking into account their relative importance.
Efficiency	A measure of how economically resources/inputs (funds, expertise, time, etc.) are converted to results.
Element at Risks	Elements at Risk include all tangible (population, essential and critical infrastructure, building, crops and so on) and intangible elements (monetary values) that are at risk to any potential damage during extreme events.
Elevation	The measurement of height of a surface above sea level or ground level.

Emergency Management	The management and deployment of resources for dealing with all aspects of emergencies, in particularly preparedness, response and rehabilitation.
Employment	The "employed" comprises all persons ten years of age and above who worked at least one hour during the reference period and were either "paid employed" or "self-employed". Persons, employed on permanent/regular footings, who have not worked for any reason during the reference period are however, treated as employed.
Entity	Any government or non-government organization, national or international stakeholders including Federal, Provincial and District agencies and United Nations' agencies relevant to Disaster Management as described in Section 23-2 [(a) and (d)] of NDM Act 2010, which is interested in the execution of MHVRA activity hereinafter referred to as Entity.
Eolian Deposits	Eolian Deposits are the Wind-blown deposits on Planetary surface.
Evaluation	The systematic and objective assessment of an on-going or completed project, program or policy, its design, implementation and results. The aim is to determine the relevance and fulfillment of objectives, development efficiency, effectiveness, impact and sustainability. An evaluation should provide information that is credible and useful, enabling the incorporation of lessons learned into the decision making process of both recipients and donors.
Evaporites	Evaporites are individual minerals found in the sedimentary deposit of soluble salts that results from the evaporation of water.
Exposure	People, property, systems, or other elements present in hazard zones that are subject to potential losses.
Flash Flood	A flash flood is a phenomenon of rapid flooding (mostly less than 6 hours) of geomorphic low-lying areas due to downpour or heavy rains caused by low depression, climate front line (thunderstorm) or cyclone.
Flood	Flood is a phenomenon of inundation by water coming from a direct rainfall or river, drainage or other water bodies, such as lakes or seas due to overflowing from ordinary boundary between land and water or water surging.
Flood Plain Deposits	Floodplain deposits are also called as Alluvial Plain, flat land area adjacent to a stream, composed of unconsolidated sedimentary deposits (alluvium) and subject to periodic inundation by the stream.
Food Insecurity	The state of being without reliable access to a sufficient quantity of affordable and nutritious food.
Forecast	Estimate of the occurrence of a future event (UNESCO, WMO). The term is used with different meanings in different disciplines.
Geography	Geography is the study of the Earth and its features, its inhabitants, and its phenomena.
Geological Composition	Geological composition is the fundamental unit of lithostratigraphy that contain certain amount of rock strata that have a comparable lithology, facies or other similar properties.
Geology	Geology is an earth science concerned with the solid Earth, the rocks of which it is composed and the processes by which they change over time.
Geospatial Data Bank	Spatial Data and Geographic Information Management System (GIS) data relevant to disaster and the corresponding data integration in the form of geospatial data bank. In the context of disaster management, following types of data is required: i. Data on the disastrous phenomena (e.g. landslides, floods, earthquakes), their location, frequency, magnitude etc. ii. Data on the environment in which the disastrous events might take place: topography, geology, geomorphology, soils, hydrology, land use, vegetation etc. iii. Data on the elements that might be destroyed if the event takes place: infrastructure, settlements, population, socioeconomic data etc. iv. Data on the emergency relief resources, such as hospitals, fire brigades, police stations, warehouses etc.
GLOF	"GLOF" refers to a Glacial Lake Outburst Flood that occurs when water in a glacier lake suddenly discharges due to a breach of a moraine dam (glacier lake). The results can be catastrophic to the downstream riparian area. (Richardson and Reynolds 2000).
Hazard	A dangerous phenomenon, substance, human activity or condition that may cause loss of life, injury or other health impacts, property damage, loss of livelihoods and services, social and economic disruption, or environmental damage.
Hazard Analysis	Identification, studies and monitoring of any hazard to determine its potential, origin, characteristics and behavior.
Hill Torrent (Flood)	Hill torrent floods are basically a rapid flooding of geomorphic steep surface areas at alluvial cones or floodplain areas caused by overflowing water from channels due to rapid velocity and any amount of flow quantity.
Household	A household is defined to be constituted of all those persons who usually live together and share their meals. A household may consist of one person or more than one person who may or may not be related to each other.
Human-Induced Disasters	Natural disasters that are accelerated/ aggravated by human influence. A landslide, for example, may be purely natural, as a result of a heavy rainfall or earthquake, but it may also be human induced, as a result of an over steepened road-cut.

Human-Made Disasters	Events which are caused by human activities (such as atmospheric pollution, industrial chemical accidents, major armed conflicts, nuclear accidents, oil spills etc.)
Impacts	Positive and negative, primary and secondary long-term effects produced by a development intervention, directly or indirectly, intended or unintended.
Indicators	Indicators are variables or parameters used to describe drought conditions. Examples include precipitation, temperature, streamflow, groundwater and reservoir levels, soil moisture, snowpack, etc.
Indices	Indices are typically a computed numerical representation of drought severity, assessed using climatic or hydro-meteorological inputs including the indicators listed above. In short, they aim to measure the qualitative state of drought on the landscape for a given time period. Indices are technically indicators as well. Monitoring the climate at various timescales allows identification of short-term wet periods within long-term droughts or short-term dry spells within long-term wet periods.
Infant Mortality Rate	The number of deaths of infants under one year of age per 1000 live births in a given year.
Irrigated Area	Irrigated agricultural area refers to the area in which the moisture of soil is controlled for the better growth of seeds and better crop production by providing water through different mode of water supply such as rivers, major, minor or distributary canals, tube wells, wells, spraying or other water to the crops.
Irrigation Sources	It refers to the source(s) by means of which the cultivated area is irrigated partially or wholly.
Land Cover	Land Cover is defined as the observed (bio) physical cover on the earth's surface.
Land Use	Land Use is characterized by the arrangements, activities and inputs that people undertake in a certain type of land in order to produce, change or maintain it.
Land Use Planning	The process undertaken by public authorities to identify, evaluate and decide on different options for the use of land, including consideration of long term economic, social and environmental objectives and the implications for different communities and interest groups, and the subsequent formulation and promulgation of plans that describe the permitted or acceptable uses. Land-use planning can help to mitigate disasters and reduce risks by discouraging high-density settlements and construction of key installations in hazard-prone areas, control of population density and expansion Mitigation Structural and non-structural measures undertaken to limit the adverse impact of natural hazards, environmental degradation and technological hazards.
Landslide	A landslide is a phenomenon in which the movement of a mass of rock, debris, or earth down a slope due to gravity. The materials may move by falling, toppling, sliding, spreading, or flowing. Since a large amount of soil mass usually moves, serious damage can occur.
Latitude	Latitude is a geographic coordinate that specifies the north–south position of a point on the Earth's surface. Latitude is an angle (defined below) which ranges from 0° at the Equator to 90° (North or South) at the poles.
Longitude	Longitude is a geographic coordinate that specifies the east-west position of a point on the Earth's surface. It is an angular measurement, usually expressed in degrees
Meander-Belt	The part of a valley bottom across which a stream shifts its channel from time to time especially in flood.
Middle Schools	Middle Schools are the schools that provide education from 5th to 8th grade.
Mitigation	The lessening or limitation of the adverse impacts of hazards and related disasters.
Monitoring & Evaluation (M&E)	A continuing function that uses systematic collection of data on specified indicators to provide management and the main stakeholders of an ongoing development intervention with indications of the extent of progress and achievement of objectives and progress in the use of allocated funds.
Mortality Rate	Number of deaths recorded in a population of particular region in a year.
Mouza / Deh	It is a territorial unit with a separate name, definite boundaries, and area precisely measured and divided into plots / khasras / survey numbers. Each mouza is a revenue estate and has a cadastral map maintained in the land revenue record with a Hadbast Number except Sindh Province. Mouza, Deh, Village, Killi and Chak are the names commonly used for it. The term mouza / deh is widely used in the settled areas while the term village and or killi are used in the unsettled areas. There may be one or more settlements, abadies, basties, dhokes, goths, etc. in the territory of a mouza / deh. The mouzas / dehs may also have scattered inhabitation while there may be some mouzas without population as well.
Multi Hazard Vulnerability and Risk Assessment (MHVRA)	Multi Hazard Vulnerability and Risk Assessment is a comprehensive study which intends to evaluate the expected vulnerabilities, risks and losses due to different hazardous events; both natural or man-induced.
Multi Hazards	The term Multi Hazards, as the name would suggest, are the hazards evolved from multiple sources, either inter-related or independent phenomena, and are subject to joint probability theory and analysis.

National Authority	National Authority means National Disaster Management Authority (NDMA).
Natural Disasters	Events which are caused purely by natural phenomena such as earthquakes, floods, cyclones etc.
Nullah	A Pakistani term, used for small rivers a streams carrying fresh water or sewerage disposal.
Performance Indicator	A variable that allows the verification of changes in the development intervention or shows results relative to what was planned.
Physical / Structural Vulnerability	The measure of the fragility structure, engineered or non-engineered, and its associated susceptibility to the natural stresses such as earthquake, flood etc.
Piedmont	Piedmont, in geology, landform created at the foot of a mountain or mountains by debris deposited by shifting streams.
Population Growth Rate	The growth rate is the rate at which a population is increasing (or decreasing) in a given year.
Population Projections	Population Projections are estimates of population number typically based on an estimated population consistent with most recent decennial census and are produced using cohort-component method.
Precipitation	Precipitation is the water that falls from the clouds towards the ground, especially as rain or snow.
Preparedness	Activities and measures taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and the temporary evacuation of people and property from threatened locations.
Prevention	Activities to ensure complete avoidance of the adverse impact of hazards.
Primary Healthcare	The primary care facilities include Basic Health Units (BHUs) and Rural Health Centers (RHCs) mainly preventive, outpatient and basic inpatient care.
Primary School	A primary school is an education facility in which children receive primary or elementary education, coming after preschool and before secondary school.
Quality Assurance	Quality assurance encompasses any activity that is concerned with assessing and improving the merit or the worth of a development intervention or its compliance with given standards. Note: examples of quality assurance activities include appraisal, RBM, reviews during implementation, evaluations, etc.
Range Lands	Range Lands are vast natural landscapes grasslands, shrub lands and wood lands.
Recovery	Decisions and actions taken after a disaster with a view to restoring or improving the pre-disaster living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce disaster risk.
Relative Humidity	The amount of water vapour present in air expressed as a percentage of the amount needed for saturation at the same temperature.
Reliability	Consistency or dependability of data and evaluation judgments, with reference to the quality of the instruments, procedures and analyses used to collect and interpret evaluation data.
Relief / Response	The provision of assistance during or immediately after a disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration.
Residual Risk	The risk that remains in unmanaged form, even when effective disaster risk reduction measures are in place, and for which emergency response and recovery capacities must be maintained.
Resilience	The ability of a system, community or society exposed to hazards to resist, absorb, accommodate to and recover from the effects of a hazard in a timely and efficient manner, including through the preservation and restoration of its essential basic structures and functions.
Retrofitting	Reinforcement of existing buildings and structures to become more resistant and resilient to the forces of natural hazards.
Risk	The combination of the probability of an event and its negative consequences.
Risk Assessment	A methodology to determine the nature and extent of risk by analyzing potential hazards and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.
Risk Management	The systematic approach and practice of managing uncertainty to minimize potential harm and loss.
Risk Transfer	The process of formally or informally shifting the financial consequences of particular risks from one party to another whereby a household, community, enterprise or state authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.

River	A river is a natural waterway, usually freshwater, flowing toward lower level of water surface such as a lake, a sea, or another river.
Riverine Flood	Flood is a phenomenon of inundation by water coming from a river, drainage or other water bodies, such as lakes or seas due to overflowing from ordinary boundary between land and water or water surging.
Rural Area	A rural area is an open area that has very low population and building density. Generally rural areas are away from cities/towns and its inhabitants are mostly linked with agriculture based livelihood.
Rural Health Centre (RHC)	The RHCs have 10-20 inpatients beds and each serves a catchment population of up to 100,000 people. The RHC provides promotive, preventive, curative, diagnostics and referral services along with inpatient services. The RHC also provides clinical, logistical and managerial support to the BHUs, LHWs, MCH Centers, and Dispensaries that fall within its geographical limits. RHC also provides medico-legal, basic surgical, dental and ambulance services.
Secondary Health Care	It is an intermediate level of health care that is concerned with the provision of specific technical, therapeutic or diagnostic services. It is the first referral level serving a district or a tehsil. Specialist consultation procedures and hospital admissions fall into this category of care. The role of a district hospital in primary health care has been expanded beyond being dominantly curative and rehabilitative to include promotional, preventive and educational roles as part of a primary health care approach.
Secondary School or Higher School	Secondary Schools are the schools which provide education from grade 8 till Intermediate Level, i.e. 12th Grade or FSc.
Sedimentary Rocks	Sedimentary rocks are types of rock that are formed by the deposition and subsequent cementation of that material at the Earth's surface and within bodies of water.
Slope Failure	In this phenomenon, a slope abruptly collapses when the soil that has already been weakened by moisture in the ground loses its self-cohesiveness under the influence of rain or an earthquake. Due to sudden collapse, many people fail to escape if it occurs near a residential area, thus leading to a higher rate of fatalities.
Social Vulnerability	Characteristics of social systems that create the potential for harm or loss to it
Steppe Climate	A semi-arid climate or steppe climate is the climate of a region that receives precipitation below potential evapotranspiration, but not as low as a desert climate.
Storm Surge	A Storm Surge is phenomena of sea level rise associated with a low-pressure weather system, typically a tropical cyclone. Therefore, an early warning plan for "storm surge" should be incorporated with that of "cyclone".
Streambed	A stream bed is the channel bottom of a stream or river, the physical confine of the normal water flow
Structural / Non-Structural Measures	Structural measures refer to any physical construction to reduce or avoid possible impacts of hazards, which include engineering measures and construction of hazard-resistant and protective structures and infrastructure. Non-structural measures refer to policies, awareness, knowledge development, public commitment, and methods and operating practices, including participatory mechanisms and the provision of information, which can reduce risk and related impacts.
Sustainable Development	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It contains within it two key concepts: the concept of "needs", in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and the future needs. (Brundtland Commission, 1987)
Tehsil Head Quarter (THQ)	These hospitals are located at each THQ and serves a population of 0.5 to 1.0 million. At present majority of THQ hospitals have 40 to 60 beds. The THQ hospital provides promotive, preventive, curative, diagnostics, in patients, referral services and also specialist care. THQ hospitals are supposed to provide basic and comprehensive Emergency Obstetric and New born Care (EmONC). THQ hospital provides referral care to the patients including those referred by the Rural Health Centers, Basic Health Units, Lady Health Workers and other primary care facilities.
Tertiary Healthcare	Tertiary care hospitals are located in the major cities for more specialized inpatient care. Tertiary care is specialized consultative health care, usually for inpatients and on referral from a primary or secondary health professional.
Tsunami	A tsunami is a series of waves in a water body caused by the displacement of a large volume of water, generally in an ocean or a large lake. Earthquakes, volcanic eruptions and other underwater explosions, landslides, avalanche, meteorite impacts and other disturbances above or below water all have the potential to generate a tsunami.
Unemployment	The "unemployed" comprises all the persons ten years of age and above who during the reference period were without work, currently available for work and are seeking work.
Urban Area	An Urban area is human settlement with high population density and infrastructure of built environment. Urban areas are created through urbanization and are categorized by urban morphology as cities, towns, conurbations and suburbs.
Urban Flood	Flood and inundation phenomena occurring in the city or built-up areas.

Veterinary Facility	It refers to the availability of veterinary facilities for livestock with qualified veterinarian (Doctor / Assistant) for provision of medical facilities for farm animals.
Vulnerability	The characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a hazard.
Wet Areas	Areas which are naturally covered with fresh or saline water such as river and lakes are grouped in this class.
Wheat Procurement Centre	These centres are established every year at the time of wheat harvest in surplus wheat producing areas particularly of the Punjab and Sindh provinces by the Provincial Food Departments and or Pakistan Agricultural Services and Storage Corporation (PASSCO) at appropriate locations. These centres are not permanent in nature and their number in a tehsil / district varies on year to year basis depending upon the procurement policy.

LIST OF ACRONYMS

AMS	Assistant Medical Superintendent
APWMO	Assistant Principal Women Medical Officer
AWO	Automatic Weather Observation
AWS	Automatic Weather Station
C&W	Communication & Works
CBDRM	Community Based Disaster Risk Management
CBEWS	Community-Based Early Warning System
CMO	Casualty Medical Officer
CRI	Composite Risk Index
DC	Deputy Commissioner
DCO	District Coordination Officer
DDMA	District Disaster Management Authority
DDRMP	District Disaster Risk Management Plan
DEWS	Disease Early Warning System
DHQ	District Headquarter Hospital
DM	Disaster Management
DMS	Deputy Medical Superintendent
DRR	Disaster Risk Reduction
DSHA	Deterministic Seismic Hazard Assessment
ENT	Ear, Nose, Throat
EPI	Expanded Program on Immunization
EWS	Early Warning System
PDMA	Provincial Disaster Management Authority
FFC	Federal Flood Commission
FGD	Focus Group Discussion
GIS	Geographic Information System
GLOF	Glacial Lake Outburst Flood
GMPE	Ground Motion Prediction Equation
GOERE	Government Officer Emergency Response Exercise
GPS	Global Positioning System
GSP	Geological Survey of Pakistan
HFA	Hyogo Framework for Action
HTC	Hydro-Thermal Coefficient
INGOs	International Non-governmental Organizations
LSWI	Land Surface Water Index
M&E	Monitoring and Evaluation
MBT	Main Boundary Thrust
MCE	Maximum Considered Earthquake
MGDs	Millennium Development Goals
MHVRA	Multi Hazard Vulnerability and Risk Assessment
MKT	Main Karakorum Thrust
MMT	Main Mantle Thrust
MO	Medical Officer
MOVERE	Mobilization of Volunteer for Emergency Response Exercise
MPE	Most Probable Earthquake
MS	Medical Superintendent
MSSP	Micro Seismic Study Program (Pakistan Atomic Energy Commission)
MM	Moment Magnitude
NARC	National Agricultural Research Center
NCEG	National Center of Excellence in Geology
NDI	NOAA Drought Index
NDMA	National Disaster Management Authority
NDMC	National Disaster Management Commission
NDMP	National Disaster Management Plan
NDMP-SC	Steering Committee for National Disaster Management Plan
NDRIS	National Disaster Risk Information System
NDVI	Normalized Difference Vegetation Index
NDWI	Normalized Difference Water Index
NEOC	National Emergency Operations Centre
NFPP	National Flood Protection Plan
NHA	National Highway Authority
NHEPRN	National Health Emergency Preparedness and Response Network
NIDM	National Institute of Disaster Management
PARC	Pakistan Agricultural Research Council
PASSCO	Pakistan Agricultural Services and Storage Corporation
PBC	Pakistan Broadcasting Corporation
PBS	Pakistan Bureau of Statistics
PCIW	Pakistan Commissioner for Indus Waters
PCRWR	Pakistan Center for Research on Water Resources
PDMA	Provincial Disaster Management Authority
PDSI	Palmer Drought Severity Index
PGA	Peak Ground Acceleration
PHDI	Palmer Hydrological Drought Severity Index
PIPD	Provincial Irrigation and Power Department
PMD	Pakistan Meteorological Department
PMO	Principal Medical Officer
PMU	Project Management Unit
PRA	Participatory Risk Assessment
PSC	Project Steering Committee
PSHA	Probabilistic Seismic Hazard Assessment
PTA	Pakistan Telecommunication Authority
PTCL	Pakistan Telecommunication Company Limited
PTWC	Pacific Tsunami Warning Center
PWMO	Principal Women Medical Officer

R&D	Research and Development
RDMC	Regional Drought Monitoring Centre
RP	Return Period
SFDRR	Sendai Framework for Disaster Risk Reduction
SMA	Soil Moisture Anomaly
SMDI	Soil Moisture Deficit Index
SMO	Senior Medical Officer
SMRFC	Specialized Medium Range Forecasting Centre
SOP	Survey of Pakistan
SoVI	Social Vulnerability Index
SPEI	Standardized Precipitation Evapotranspiration
SPI	Standard Precipitation Index
SPI	Stream Power Index
SPT	Standard Penetration Test
SRSI	Standardized Reservoir Supply Index
SSFI	Standardized Stream Flow Index
SSI	Semi Structured Interviews
SUPARCO	Pakistan Space and Upper Atmospheric Research Commission
SWI	Standardized Water-Level Index
SWMO	Senior Women Medical Officer
SWS	Soil Water Storage
SWSI	Surface Water Severity Index
SWSI	Surface Water Supply Index
TCI	Temperature Condition Index
THQ	Tehsil Headquarter Hospital
TMA	Tehsil Municipal Administration
UC	Union Council
UN	United Nations
VCI	Vegetation Condition Index
VegDRI	Vegetation Drought Response Index
VIC	Variable Infiltration Capacity
WAPDA	Water and Power Development Authority
WASA	Water and Sanitation Agency
WFP	World Food Program
WHO	World Health Organization
WMO	World Meteorological Organization
WMO	Women Medical Officer
WOE	Weight of Evidence (Statistical Model)
WRF	Weather Research and Forecast (Name of Numerical Calculation Model)

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A BASELINE INFORMATION



1 KHUSHAB DISTRICT OVERVIEW

Khushab District lies in the province of Punjab, Pakistan, with its administrative capital in Jauharabad (founded 1953). The district is named after the historical city of Khushab, meaning "sweet water", located within its boundaries. The district consists of four tehsils, Khushab, Noorpur, Naushera and Quaidabad (founded in 1951 by Sardar Abdur Rab Nishtar, a close companion of Quaid e Azam Muhammad Ali Jinnah during Pakistan's movement).

History

Khushab was an agricultural region with number of forests during the Indus Valley Civilization. The Vedic period is characterized by Indo-Aryan culture that invaded from Central Asia and settled in Punjab region. After overrunning the Achaemenid Empire in 331 BC, Alexander marched into present-day Punjab region with an army of 50,000 men. The region had been ruled over by many empires, some of these include Maurya Empire, Indo-Greek kingdom, Kushan Empire, Gupta Empire, White Huns, Kushano-Hephthalites and Shahi kingdoms.



Water colour of an Awan Sepoy, painted by Major A.C. Lovett, circa the early 20th century. The painting is included in the book, The Armies of India (published in 1911).

In 997 AD, Sultan Mahmud Ghaznavi, took over the Ghaznavid dynasty empire established by his father, Sultan Sebuktegin. In 1005 he conquered the Shahis in Kabul in 1005, and followed it by the conquests of Punjab region. The Delhi Sultanate and later Mughal Empire ruled the region. The Punjab region became predominantly Muslim due to missionary Sufi saints whose dargahs dot the landscape of Punjab region.

After the decline of the Mughal Empire, the Sikh Empire invaded and occupied Khushab Tehsil. The Muslims faced restrictions during the Sikh rule during the period of British rule. During British rule Khushab was a tehsil of the old Shahpur District, the tehsil at that time had an area of 6,570 sq.km. The population according to the 1901 census was 161,885 a rise of over 10,000 since 1891.

The Awans of the Soon Valley were also amongst those the British considered to be "martial race". The British recruited army heavily from Soon Valley for service in the colonial army, and as such, the Awans of this area also formed an important part of the British Indian Army, serving with distinction during World Wars I and II. Of all the Muslim groups recruited by the British, proportionally, the Awans produced the greatest number of recruits during the first and second World Wars. Contemporary historians Professor Ian Talbot and Professor Tan Tai Yong have asserted that the Awans (amongst other tribes) are viewed as a martial race by not only the British, but neighboring tribes as well.

Sir Lepel H. Griffin writes in his book 'The Panjab Chiefs'(1865 Edition) writes that:

"All branches of the tribe (Awans) are unanimous in stating that they originally came from neighborhood of ghazni to India, and all trace their genealogy to Hazrat Ali the son-in-law of the Prophet. Qutab Shah, who came from Ghazni with Sultan Mahmud, was the common ancestor of the Awans.....It was only in the Rawalpindi, Jhelam and Shahpur districts that they became of any political importance..... In Shahpur District the Awans held the hilly country to the north west, Jalar, Naoshera (Naushera) and Sukesar, where the head of the tribe still resides."

— From "Sir Lepel H. Griffin, The Panjab Chiefs' (1865 Edition) p.570-571

The head of the tribe or village in the Soon valley was known as Raees-Azam. The last Raees-Azam of Naushera was Qazi Mazhar Qayyum.

The predominantly Muslim population supported Pakistan Movement and after the independence of Pakistan in 1947, the minority Hindus and Sikhs migrated to India while the Muslim refugees from India settled in the Khushab.



Temple of Amb Sharif at Soon Valley



Land Scape

It has extreme hot and cold climate. Its land comprises mainly of hills, plateaus, plains and deserts with Jhelum river flowing on its East. Some of the areas of tehsil Khushab are low lying and get flooded in rainy season.

Khushab is situated between the district Mianwali and Sargodha with Jhelum river to its eastern boundary. To its North lies the district Chakwal and Jhelum whereas District Jhang and Bhakkar are situated in its South. It consists of agricultural lowland plains, lakes, plateaus, hills desert. Parts of the Thal desert touch the district, which has a breadth of over 110 km and is situated between the Indus River and the Jhelum River.

There are three lakes (Ochali, Khabbaki and Jahlar) in the district. Kanhatti Garden is the largest forest, in the Soon valley, in Naushehra Tehsil. The lakes are important tourist destinations for people coming from different parts of the country and important source of direct jobs to the community, such as tour guides or hotel housekeeping etc.

These lakes attract thousands of migratory birds during winters, including rare white-headed ducks (Oxyura leucocephala) from Central Asia. Every year thousands of birds migrate from Siberia, including Houbara Bustards, Cranes, Teals, Pintails, Mallards, Geese, Spoon Bills, Waders, Flamingos and Pelicans, using the Indus Flyway, also known as the International Migratory Bird Route Number 4, covering a distance of about 4,500 km.

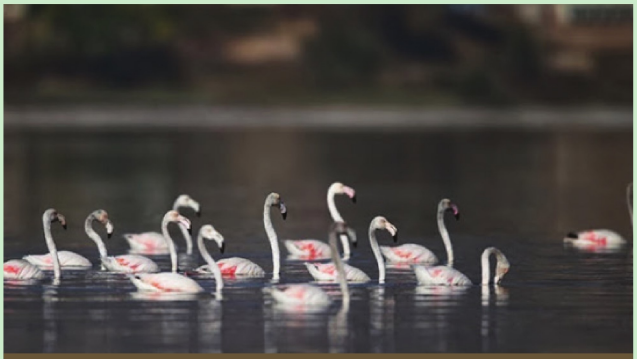
Naushehra town is situated 48 km from Khushab city and 68 km from Kallar Kahar town in the heart of the valley, surrounded by high hills, lakes, jungles, natural pools and ponds. It is also an area of ancient civilization, natural resources, and fertile farms. The general height of surrounding hills is around 2500 feet above sea level, with several peaks reaching over 3000 feet. Sakesar is the highest mountain in the region with summit of 1522 meters / 4946 feet high.



Night View at Ochali Lake



Sunset at Khabbaki Lake



Migratory Birds during Winter in Ochali Lake

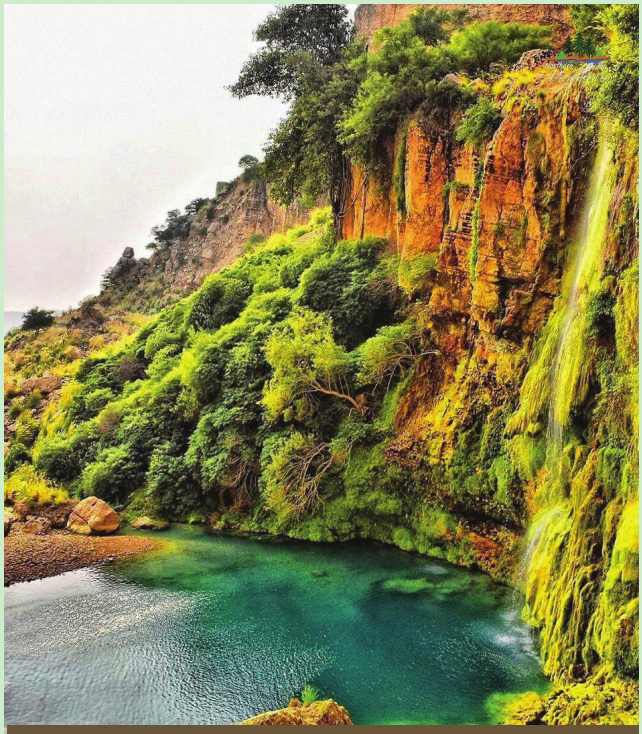


Wild Birds gathering around Khabbaki Lake



Khadumi Waterfall Soon Valley

Khushab District has the distinction of having lush green hills at one end and desert on other end in noorpur Tehsil. The climate in Noorpur Tehsil is called a desert climate. During the year, there is virtually no rainfall in Noorpur. According to Koppen and Geiger, this climate is classified as BWh, in which precipitation is too low to sustain any vegetation at all, or at most a very scanty shrub. According to historical record, Noorpur use to be an agricultural region with forests during the Indus Valley Civilization but with the passage of time, due to climate change and desertification, its terrain converted into desert.



Soon Valley



A Camel Caravan passing through Thal Desert

Culture

Various people of the valley descend from tribes of Arab origin. Islamic culture and customs are the norm. Practices involve arranged marriages in accordance to the Islamic traditions, where the wedding events take place at a mosque. The Nikah is attended by close family members, relatives, and friends of the groom and bride. Basically males and females are separated, either sitting in distinctive rooms or with a purdah (curtain) separating them.

Luddi is a popular folk dance for celebratory events, when the music is mostly played on the dhol (drum) and shehnai similar to oboe.



Girls Performing Cultural Dance

Languages

Inhabitants of the Khushab district speak a variety of Punjabi dialects, including:

- Shapuri (Main dialect of the district)
- Majhi or Standard Punjabi (in cities)
- Pothohari (northern hilly regions)
- Thalochi (southern areas in Thal)
- Jandali (western areas near Mianwali)

Urdu is spoken and understood by the majority of the population, whereas English is understood by people with a higher education background.

Traditional Crafts

According to Commerce & Investment Department, Government of Punjab, Khaddar weaving on hand looms is the main traditional craft of Khushab district. Because of lower over-heads and lesser cost of production coupled with attractive appearance and good quality, the demand for Khaddar is gaining popularity and progressively large numbers of people are getting engaged in this craft. Moreover, production of following traditional commodities provides livelihood opportunities in local cottage industry:

- Pateesa (Sweets)
- Dhodha (Sweets)
- Khari Tillawali (Shoes)
- Bed Dari
- Truck Body
- Salara (Shawls)
- Salt Rock Handicraft
- Lungi
- Khes (Thin Cotton Blanket)
- Daree (Rug)
- Khairi (Traditional Sandals)





Tourist Attractions

- Akrand Fort of Janjua's (Road way & Tracking Way from Kanhati Garden).
- Lakes: Uchalli Lake, Khabikki Lake and Jahlar Lake
- Waterfalls at Kufri
- Amb Sharif is a historical place in Hinduism.
- Kanahti Garden, Sodhi Garden, Khabakki Jheel, Ugalisharif & Uchali Jheel, Sakesar and Daip Shareef and the hiking experiences of hills
- Angah, an important village.
- Sodhi village has waterfalls, a Rest House, and wild animals like Cheetah, Rabbit, Deer, Teetar (Urdu name of a bird).
- Koradhi is famous for its historical Madrissa, where Qari Qamar Din (R.A) used to teach
- Surraki is the highest village of Soon valley









DISTRICT KHUSHAB AT A GLANCE

Geography

Location



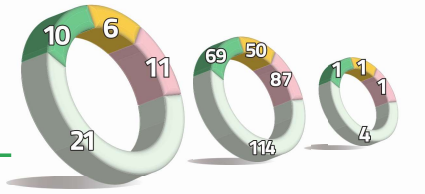
Lat: 31° 31′ 48″ - 32° 42′ 43.2″
Long: 71° 37′ 30″ - 72° 39′ 50.4″

Neighbouring Districts

- **North** — Chakwal and Jhelum Districts
- **East** — Sargodha District
- **West** — Mianwali District
- **South** — Jhang and Bhakkar Districts

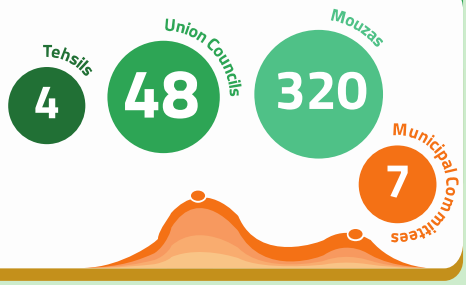
Administrative Setup

Area	6,629 sq.km
District Capital	Khushab City
Language	Punjabi
Elevation to District	1st July 1982



Union Councils | Mouzas | Municipal Committees

Tehsils
- Noorpur
- Khushab
- Quaidabad
- Naushera



Population Distribution

Total Population in District

905,711	1998 Census
1,281,299	2017 Census

Population Density (Person per sq.km)

140	1998 Census
193	2017 Census

Growth Rate

1.84% (2017 Census)

2.05% (1998 Census)



Educational Facilities

Govt. Schools	Colleges	Universities
1001	5	2



Public Health Care Facilites (Numbers)



89

Tourist Attractions

Hill Stations
Soon Valley Hill Station

Shrines
Khanqah e Hameedia Makan Sharif Siddique Abbad (Kuffri), Sultan Haji Ahmad in Uchhala, Baba Shikh Akbar and many other notable shrines

Lakes
Uchali, Khabbaki, Jahlar

Historical Sites
Akrand Fort of Janjua's Koradhi Madrassa, Fort Akrand, Amb Shareef

Agriculture

Major Crops
Sugarcane, Gram, Wheat and Rice

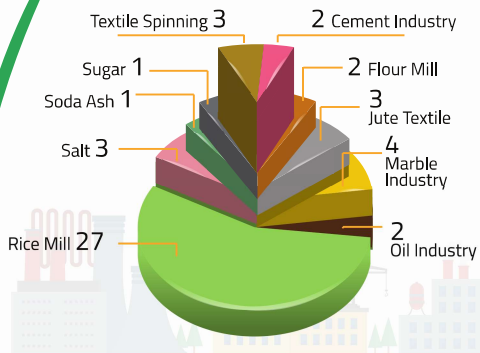
Major Fruits
Citrus, Guava and Banana

Major Vegetables
Potato, Cauliflower and Tomato

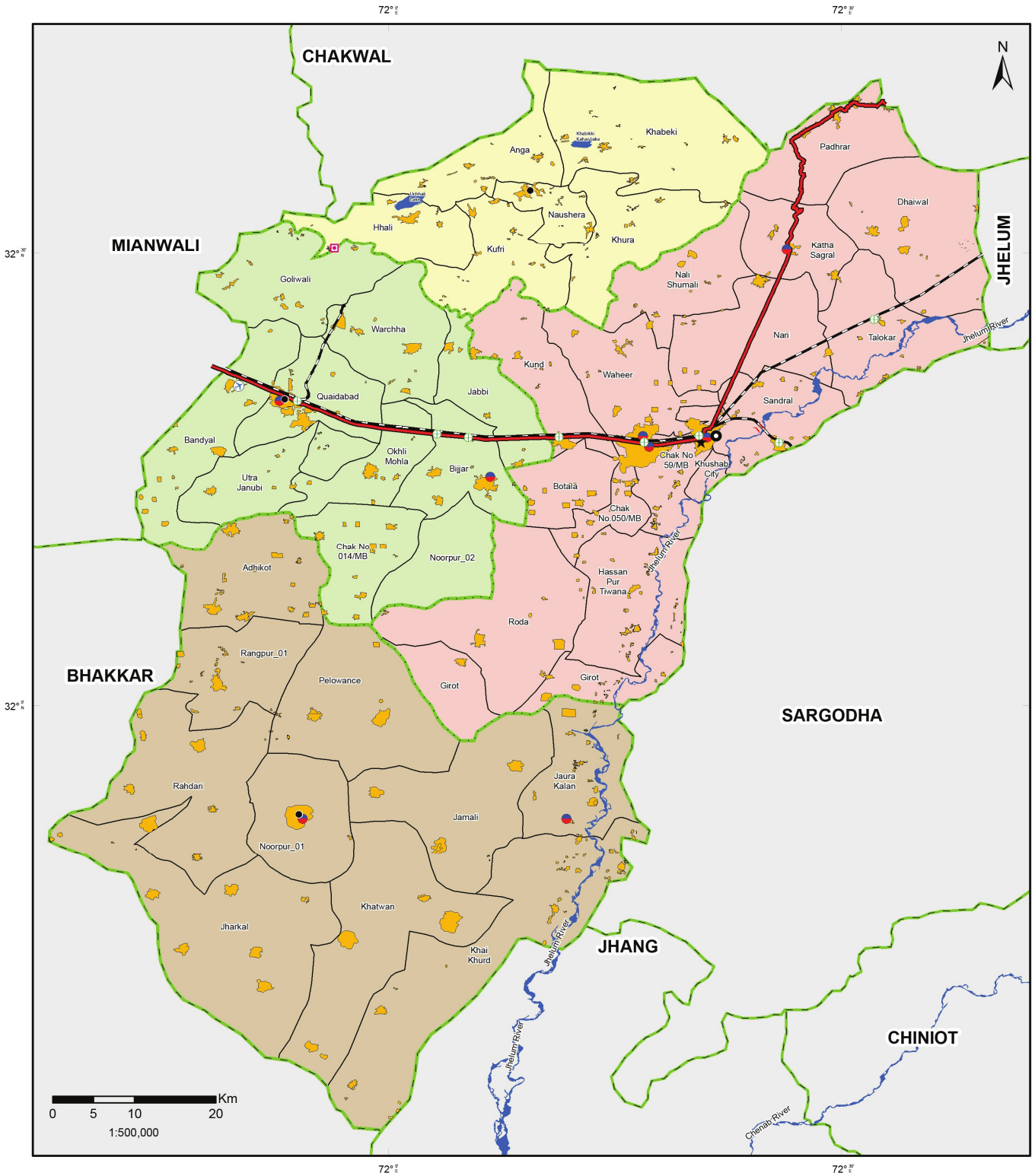
Major Livestock
Buffalos, Cows, Sheeps, Goats and Poultry



Major Industries



DISTRICT ADMINISTRATIVE MAP



Legend

- Rescue 1122
- Police Station
- Airport
- Air Field/Landing Strips
- RailwayStations
- Archaeological Sites
- District Headquarter
- Tehsil Headquarter
- Bridge
- Broad Gauge Railway Track
- Other Gauge Railway Track
- Motorway
- GT Road
- River and Water Body
- Builtup Area
- Union Council Boundary (Abc)

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur
- District Boundary (ABC)
- Provinvial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
The Punjab Emergency Service - Rescue 1122,
Punjab Police,
Survey of Pakistan
National Highway Authority

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-001
Prepared by: Project Management Unit, NDMA
Last Updated: 9th March, 2017

2 GEOLOGY



The geology of Khushab is remarkably diverse. It includes nearly 84% of Quaternary rocks i.e. Alluvium, Eolian Sand, Flood Plain Deposits, Piedmont Deposits, Streambed Deposits, Meander-Belt Deposits, Undivided Eolian Sand deposits and Extinct Streams (Qsc), whereas 16% is Cambrian Sedimentary Rocks, Eocene Rocks, Paleocene Sedimentary Rocks, Jurassic Rocks, Triassic Sedimentary Rocks and Permian Sedimentary Rocks.

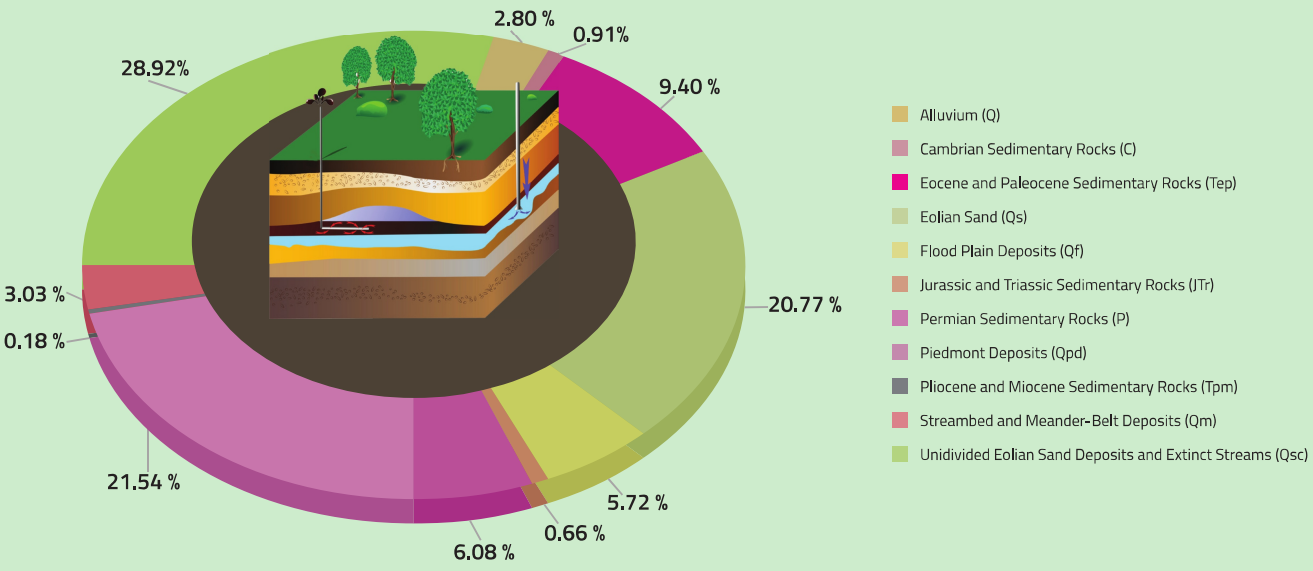
The district lies in Salt Range hill system of Punjab. Geologically, salt range is a thrust belt that emerged in response to the under thrusting of Cratonic Indian Plate beneath its own sedimentary cover. The main difference between the Salt Range and the mighty Himalayan mountain chain is that the Salt Range has undergone strong folding and uplifting in narrow zone. These hill systems are composed of thick evaporates which constitute the lubricated zone of decollement.

There are abundant minerals and coal deposits in the district, the exploitation of which played a leading role in industrial growth of the region. The majority of mineral exploitation are concentrated on industrial minerals, among these the prominent are Limestone, Argillaceous Clay, Gypsum, Fire Clay, Silica Sand, Bauxite, Ochers, Bentonite, Calcite, Dolomite, Marble, Iron Ore and Laterite.

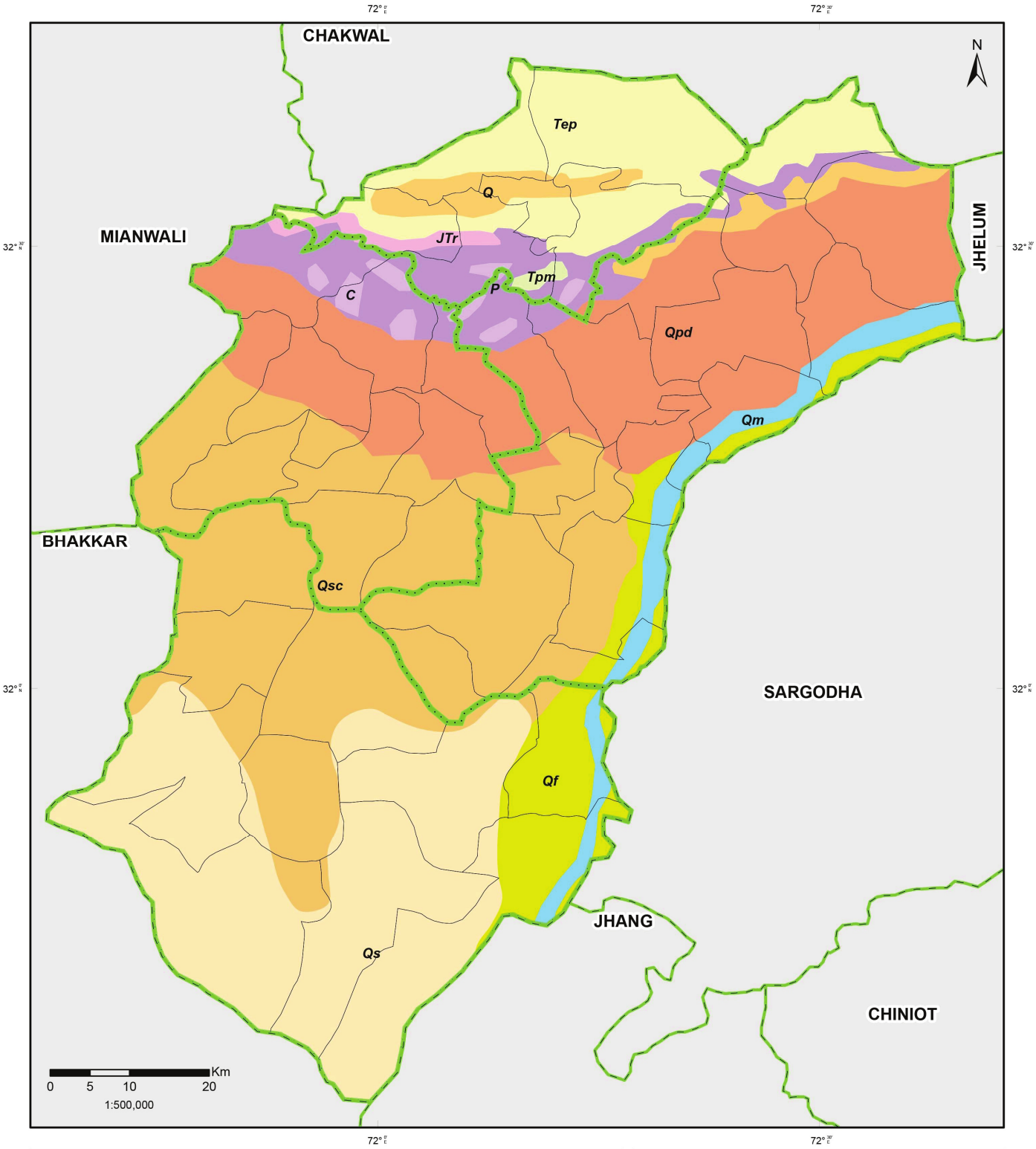
Khushab has arid hills of salt range with bushy vegetation in its north (Soon Sakesar Valley). The central part of this district has irrigated low land plains while Southern part consists of dry deserts (thal) with scarce vegetation. The area wise geological compostion of the district is shown in table and Chart below:

Geological Formation	Area (sq.km)	Composition
Alluvium (Q)	185.75	2.80 %
Cambrian Sedimentary Rocks (C)	60.19	0.91 %
Eocene and Paleocene Sedimentary Rocks (Tep)	622.98	9.40 %
Eolian Sand (Qs)	1376.53	20.77 %
Flood Plain Deposits (Qf)	379.49	5.72 %
Jurassic and Triassic Sedimentary Rocks (JTr)	43.52	0.66 %
Permian Sedimentary Rocks (P)	402.78	6.08 %
Piedmont Deposits (Qpd)	1427.86	21.54 %
Pliocene and Miocene Sedimentary Rocks (Tpm)	11.62	0.18 %
Streambed and Meander-Belt Deposits (Qm)	200.96	3.03 %
Unidivided Eolian Sand Deposits and Extinct Streams (Qsc)	1917.39	28.92 %
	6,629	

Geological Composition



GEOLOGY MAP



Legend

- Alluvium (Q)
- Cambrian Sedimentary Rocks (C)
- Eocene and Paleocene Sedimentary Rocks (Tep)
- Eolian Sand (Qs)
- Flood Plain Deposits (Qf)
- Jurassic and Triassic Sedimentary Rocks (JTr)
- Permian Sedimentary Rocks (P)
- Piedmont Deposits (Qpd)
- Pliocene and Miocene Sedimentary Rocks (Tpm)
- Streambed and Meander-belt Deposits (Qm)
- Undivided Eolian Sand deposits and Extinct Streams (Qsc)

- Abc Union Council Boundary
- Abc Tehsil Boundary
- ABC District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Geological Survey of Pakistan
Survey of Pakistan
Pakistan Bureau of Statistics

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-004
Prepared by: Project Management Unit, NDMA
Last Updated: 10th March, 2017

3 LAND USE & LAND COVER

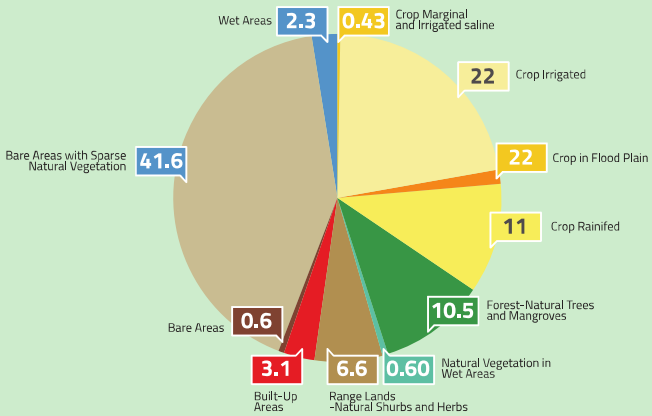
Land Cover (LC) is defined as the observed (bio) physical cover on the earth's surface, whereas Land Use (LU) is characterized by the arrangements, activities and inputs that people undertake in a certain type of land in order to produce, change or maintain it. Knowledge of the LC/LU distribution helps Land Use Planners and Policy Makers to determine pragmatic land use polices.

Land Cover/ Land Use (LC/LU) processes are important to be monitored since they are the direct drivers of Climate & Ecosystem Change. For this study, LC/LU demarcation carried out by Space & Upper Atmosphere Research Commission (SUPARCO) has been used which provides a comprehensive description of the biotic and abiotic resources of the study area and includes, inter alia, numerous categories of cultivated land; natural vegetation and non-vegetated areas including bare and rocky areas, and areas of human settlements. In this study, Land Cover Classification System (LCCS) approach has been used with an aim to capture the physiographic characteristics down to a UC level.

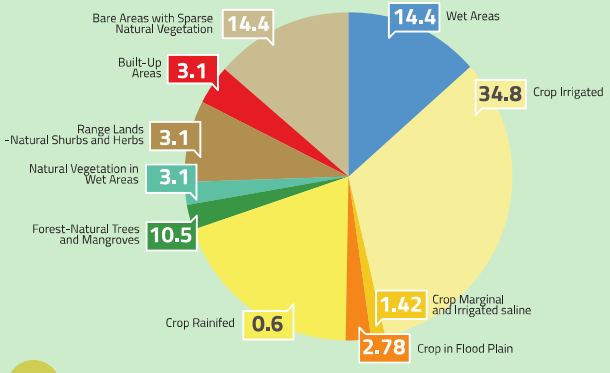
The geospatial database, prepared by SUPARCO, is used to provide basis for the development of an improved capacity for natural resources monitoring and management.

The legend consisting 13 main land cover classes have been used in this study which are being further subdivided into 36 classes, and have been mapped based on the analysis, interpretation and validation of SPOT-5 high resolution satellite imagery (5 meter). For this purpose, satellite images were segmented into homogeneous polygons and labeled using the LCCS classification system.

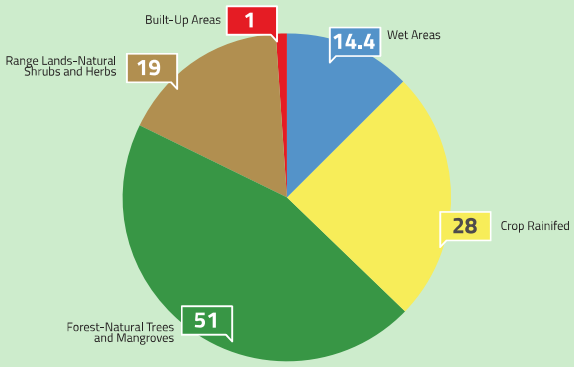
Land Cover Distribution of District
(Percentage)



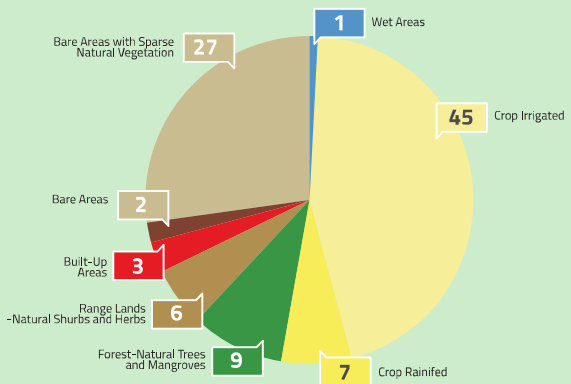
Tehsil Khushab



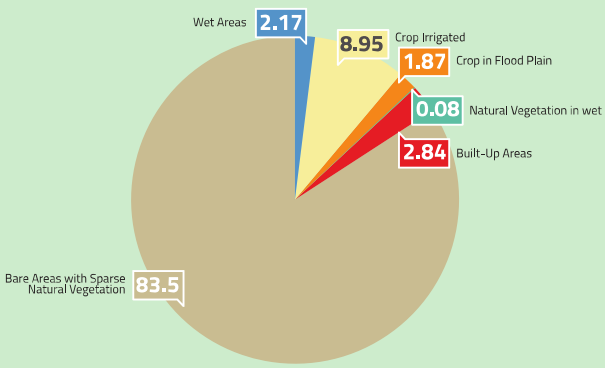
Tehsil Naushera



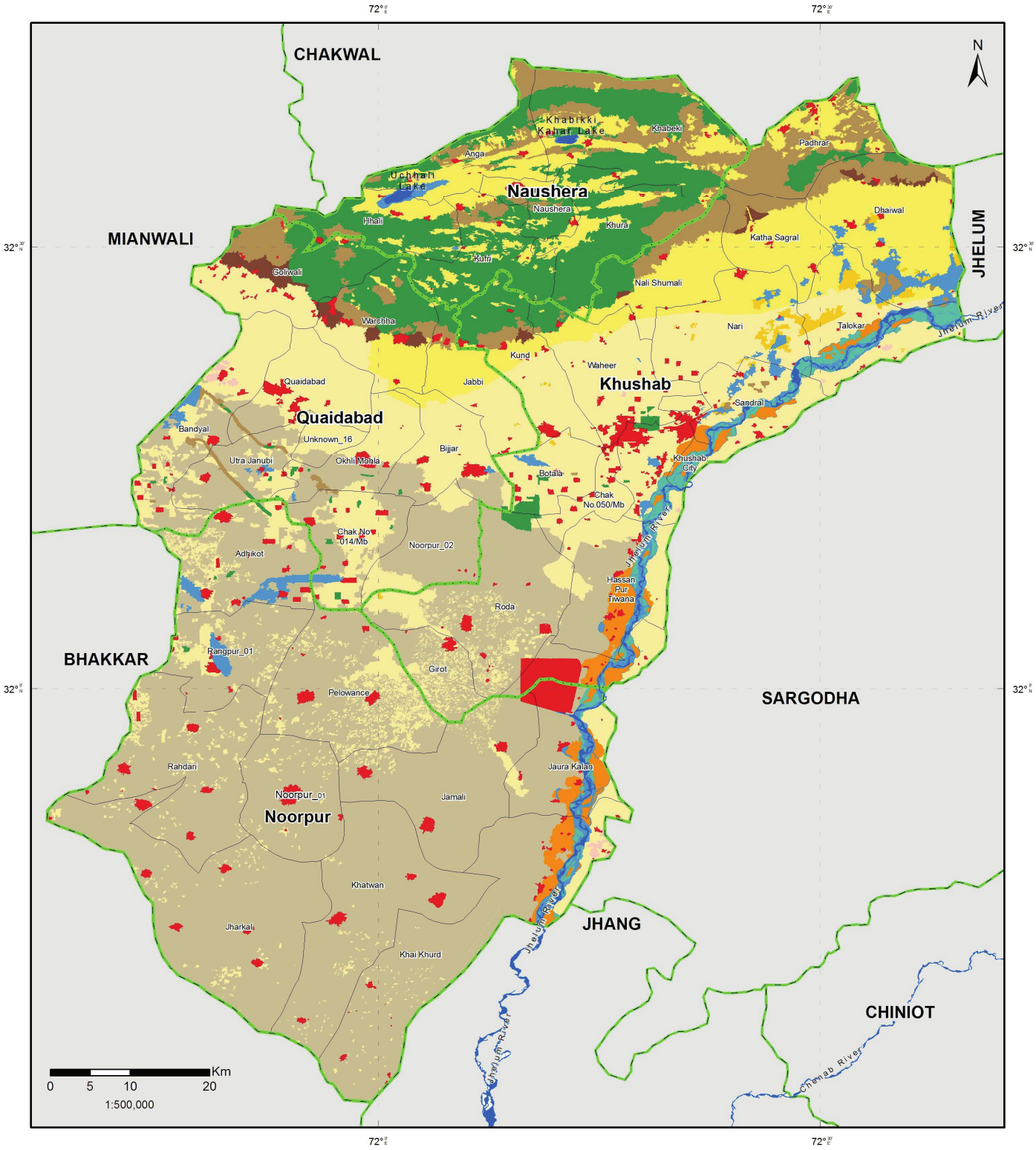
Tehsil Quaidabad



Tehsil Noorpur



LAND USE & LAND COVER MAP



Legend

- Bare Areas
- Bare Areas with Sparse Natural Vegetation
- Built-up
- Crop in Flood Plain
- Crop Marginal and Irrigated Saline
- Crop Rainfed
- Crop Irrigated
- Forest - Natural Trees and Mangroves
- Natural Vegetation in Wet Areas
- Orchards
- Range Lands - Natural Shrubs and Herbs
- Snow and Glaciers
- Wet Areas
- River and Water Body
- Union Council Boundary
- Tehsil Boundary
- District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Landcover-SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-002
Prepared by: Project Management Unit, NDMA
Last Updated: 10th May, 2017

4 ELEVATION



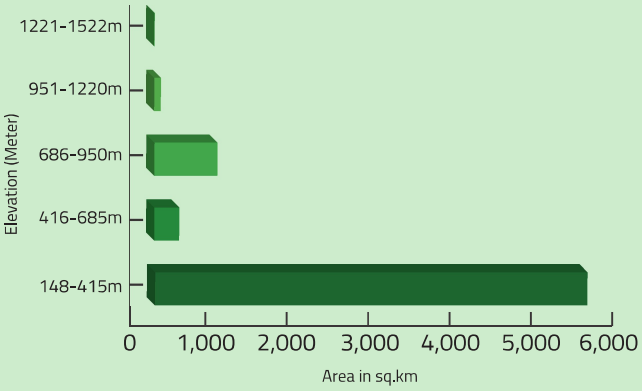
Elevation is the measurement of height of the land with respect to sea level or the sea floor. Elevation maps are used to identify how flat, elevated or hilly an area is, as well as to analyze other features of land using contour lines and symbols.

District Khushab is famous for its Salt Range Mountains. The Salt Range is the hill system in Punjab with extensive deposits of rock salts. As depicted in the map, the range extends over the northern part of the district, with Sakesar being one of the highest peaks of Salt Range.

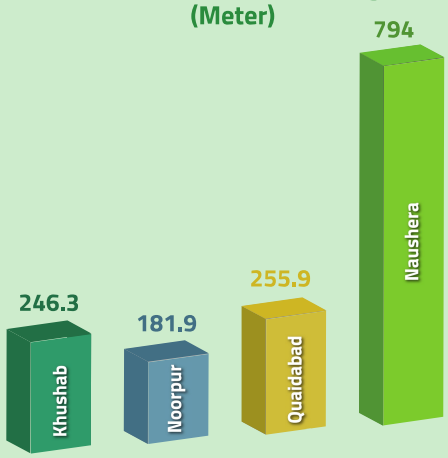
The district has arid hills with bushy vegetation in its north (Soon Sakesar Valley). The central part of this district has irrigated low land plains while Southern part consists of dry deserts (Thal) with scarce vegetation.

Majority of the area of district consists of pediment plain stretching from north in the Naushera to South towards Noorpur. The elevation of the district is between 1522m (High) to 148m (Low). It can be analyzed from the map that Tehsil Naushera falls under highest elevation band with highest peak of 1522m (from sea level) at Sakesar. There is a gradual decrease in the elevation slope from tehsil Naushera to Tehsil Noorpur with North to South Western trend. The average height of district is 293.55m.

Elevation Distribution of District Khushab

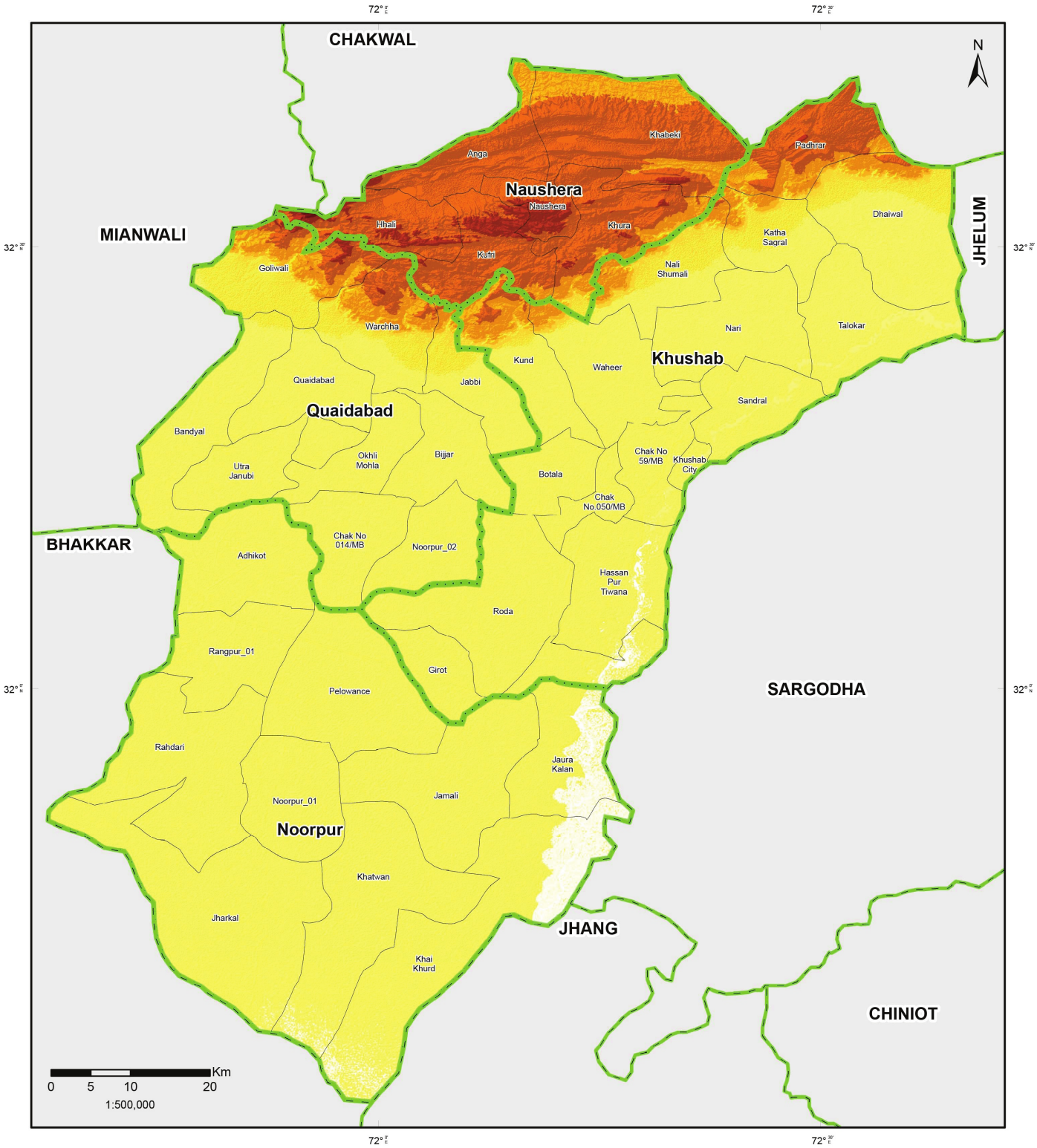


Tehsil Wise Mean Height (Meter)



Elevation Bands	Tehsil Wise Area Coverage (sq.km)				District Total (sq.km)
	Khushab	Noorpur	Quaidabad	Naushera	
148-415m	1,892	2,402	1,138	13	5,445
416-685m	114	-	74	123	311
686-950m	111	-	61	619	791
951-1220m	1	-	9	70	80
1221-1522m	-	-	-	2	2

ELEVATION MAP



Legend

Elevation (m)

	148 - 170
	171 - 215
	216 - 315
	316 - 415
	416 - 685
	686 - 950
	951 - 1,220
	1,221 - 1,489

Abc	Union Council Boundary
Abc	Tehsil Boundary
ABC	District Boundary
	Provincial Boundary
	Line of Control
	International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
NASA (SRTM 30m DEM)
Survey of Pakistan
Pakistan Bureau of Statistics

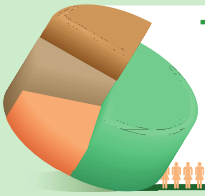
Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-003
Prepared by: Project Management Unit, NDMA
Last Updated: 10th March, 2017

5 POPULATION DISTRIBUTION

As per the 1998 Census, the total population of district Khushab was 905,711 with an annual growth rate of 2.05%. The total urban population was 228,969 and rural population of 676,742. For this study, projected population of 1,309,475 as of 2015 is used based on inter census growth rate of 1981 and 1998.

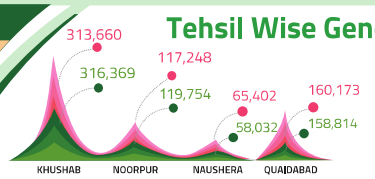
Tehsil Wise Population



Total Population (Projected 2015) **1,309,457**

Khushab	Noorpur	Naushera	Quaidabad
630,030	237,005	123,435	318,987

Tehsil Wise Gender Distribution



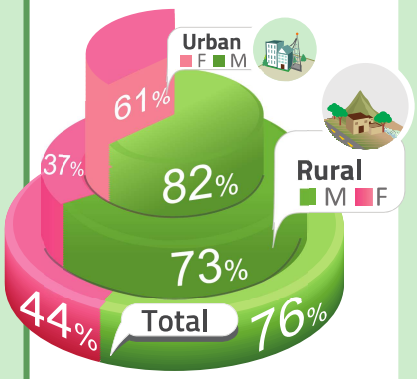
	MALE	FEMALE
Total	652,969	656,483

Population on Basis of Religion (1998)

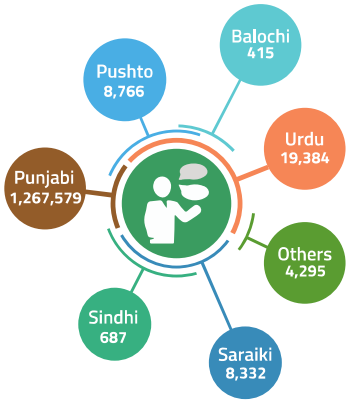
Muslims	Christians	Qadiani Ahmadi	Hindu / Jati	Others	Scheduled Castes
891,821	11,154	2,426	123	143	44

905,711	1998 Census
1,309,475	2015 Projected
1,281,299	2017 Census

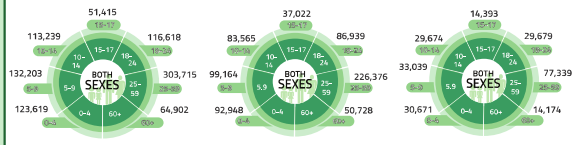
Literacy Rate (%) 2015



Mother Tongue



Age & Location Wise Disaggregated Population (1998 Census)



Population			Rural Population			Urban Population		
FEMALE	Age Group	MALE	FEMALE	Age Group	MALE	FEMALE	Age Group	MALE
60,122	0 to 4	63,497	45,097	0 to 4	47,851	15,025	0 to 4	15,646
64,033	5 to 9	68,170	48,005	5 to 9	51,159	16,028	5 to 9	17,011
54,543	10 to 14	58,696	40,206	10 to 14	43,359	14,337	10 to 14	15,337
23,927	15 to 17	27,488	17,009	15 to 17	20,013	6,918	15 to 17	7,475
63,373	18 to 24	53,245	47,743	18 to 24	39,196	15,630	18 to 24	14,049
157,509	25 to 59	146,206	118,308	25 to 59	108,068	39,201	25 to 59	38,138
30,765	60+	34,137	24,150	60+	26,578	6,615	60+	7,559
454,272		451,439	340,518		336,224	113,754		115,215
905,711			676,742			228,969		

Tehsil Khushab

Union Councils	
12,209	Botala
10,324	Chak No 59/mb
13,584	Chak No.050/mb
10,793	Dhaiwal
14,815	Girot
13,562	Hassan Pur Tiwana
10,280	Katha Sagral
71,961	Khushab City
39,255	Kund
10,224	Nali Shumali
10,475	Nari
13,120	Padhrar
14,628	Roda
10,130	Sandral
10,591	Talokar
47,709	Waheer
12,280	
10,231	
14,568	
10,510	
14,895	
13,048	
11,023	
73,486	
38,768	
10,904	
9,696	
12,690	
15,021	
10,026	
10,041	
49,184	

Tehsil Noorpur

Union Councils	
14,665	Adhikot
10,829	Jamali
11,041	Jaura Kalan
11,139	Jharkal
11,403	Khai Khurd
10,200	Khatwan
8,759	Noor Pur_01
13,217	Pelowance
11,529	Rahdari
14,466	Rangpur_01
14,858	
11,171	
10,530	
11,381	
11,337	
11,073	
9,036	
13,778	
11.921	
14,669	

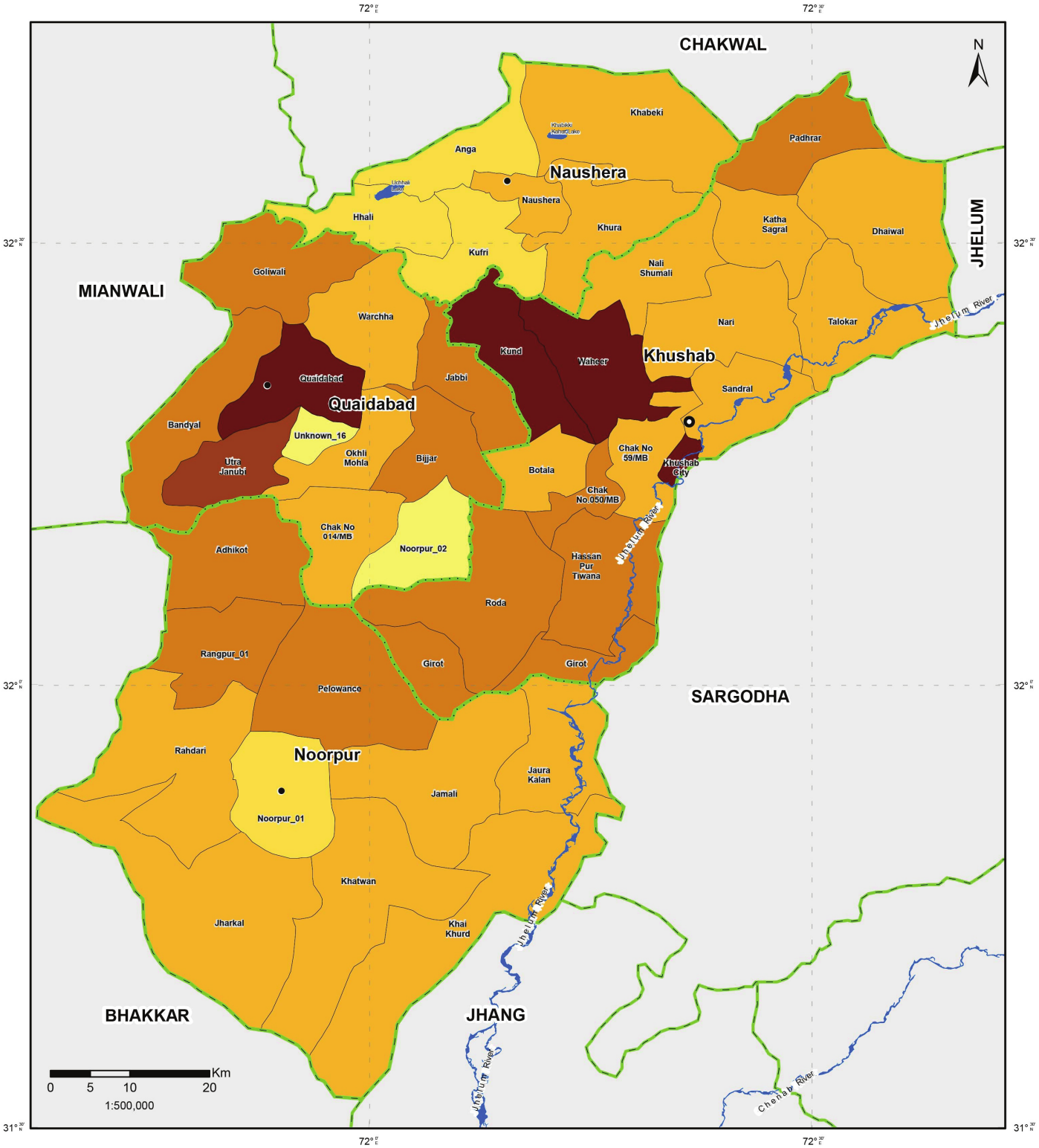
Tehsil Naushera

Union Councils	
10,953	Anga
10,093	Hhali
10,988	Khabeki
10,805	Khura
10,374	Kufri
12,189	Nowshera
8,998	
9,284	
9,879	
10,357	
9,071	
10443	

Tehsil Quaidabad

Union Councils	
13,333	Bandyal
14,323	Bijjar
10,797	Chak No 014/mb
14,726	Goliwali
13,169	Jabbi
3,935	NoorPur-02
10,931	Okhli Mohia
48,703	Quaidabad
18,180	Utra Janubi
12,076	Warcha
13,944	
13,792	
11,600	
14,249	
12,002	
3,989	
10,338	
49,177	
18,741	
10,982	

POPULATION DISTRIBUTION (2015) MAP



Legend

- District Headquarter
- Tehsil Headquarter

Population Distribution

- < 10000
- 10001 - 20000
- 20001 - 25000
- 25001 - 30000
- 30001 - 40000
- > 40000

- River and Water Body
- Tehsil Boundary
- District Boundary
- Line of Control
- International Boundary
- Provinvial Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Pakistan Bureau of Statistics,
Survey of Pakistan

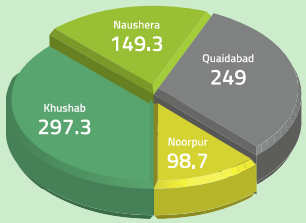
Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-005
Prepared by: Project Management Unit, NDMA
Last Updated: 7th March, 2017

6 POPULATION DENSITY

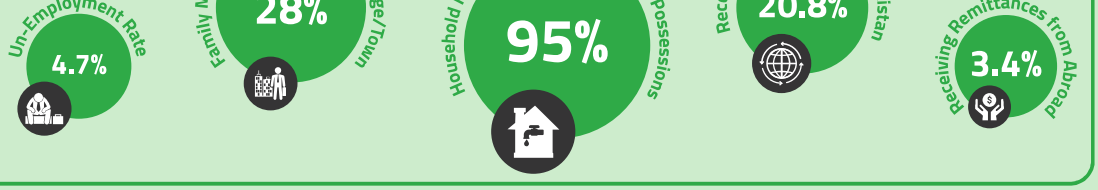
The average population density of Khushab district was nearly 140 persons per sq.km as per 1998 census which in 2015 has grown to 198 persons per sq.km. The most densely populated Tehsil of the district is Khushab whereas Qaidabad is the sparsely populated. Khushab City is the most densely populated with density of 9188 persons/ sq km.

Tehsil Wise Population Density
(Persons/sq.km)

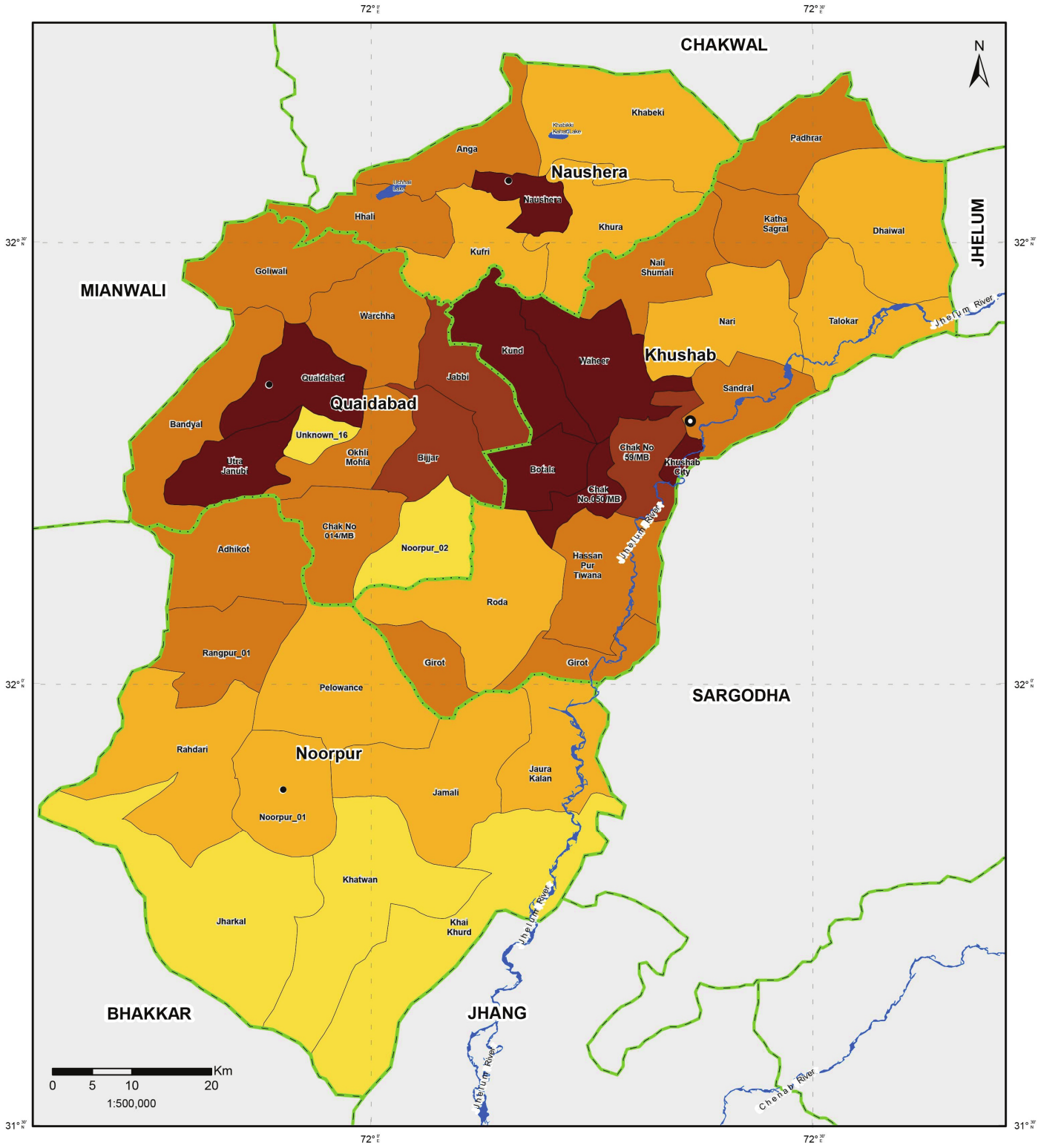


	Union Councils	Population	Male	Female	Area (sq km)	Density (Person / sq.km)
Tehsil Khushab	Botala	24,489	12,280	12,209	77.77	314.87
	Chak No 59/mb	20,555	10,231	10,324	90.10	228.12
	Chak No.050/mb	28,152	14,568	13,584	47.65	590.72
	Dhaiwal	21,302	10,510	10,793	229.07	92.99
	Girot	29,710	14,895	14,815	143.27	207.36
	Hassan Pur Tiwana	26,608	13,046	13,562	166.71	159.60
	Katha Sagral	21,304	11,023	10,280	102.59	207.66
	Khushab City	145,447	73,486	71,961	15.82	9,188.90
	Kund	78,023	38,768	39,255	132.75	587.72
	Nail Shumali	21,128	10,904	10,224	129.35	163.32
	Nan	20,172	9,696	10,475	171.20	117.82
	Padhrar	25,810	12,690	13,120	134.14	192.40
	Roda	29,649	15,021	14,628	244.94	121.04
	Sandrai	20,156	10,026	10,130	114.02	176.77
	Taiokar	20,632	10,041	10,591	162.55	126.92
	Waheer	96,893	49,184	47,709	156.85	617.70
	Tehsil Total:	**630,030**	**316,369**	**313,660**	**2,118.9**	**297..34**
Tehsil Noorpur	Adhikot	29523	14,858	14,665	176.10	167.64
	Jamali	22000	11,171	10,829	241.21	91.20
	Jaura Kalan	21572	10,530	11,041	149.43	144.35
	Jharkal	22521	11,381	11,139	382.13	58.93
	Khai Khurd	22740	11,337	11,403	363.02	62.64
	Khatwan	21273	11,073	10,200	292.33	72.76
	Noor Pur_01	17795	9,036	8,759	147.11	120.95
	Pelowance	26996	13,778	13,217	242.30	111.41
	Rahdari	23450	11,921	11,529	267.26	87.73
	Rangpur_01	29135	14,669	14,466	141.12	206.44
	Tehsil Total:	**237,005**	**119,754**	**117,248**	**2402.1**	**98.66**
Tehsil Naushera	Anga	19,952	8,998	10,953	120.75	165.22
	Hhali	19,377	9,284	10,093	105.98	182.82
	Khabeki	20,867	9,879	10,988	261.50	79.79
	Khura	21,162	10,357	10,805	157.98	133.95
	Kufri	19,445	9,071	10,374	130.29	149.23
	Naushera	22,632	10,443	12,189	50.418	448.94
	Tehsil Total:	**1,23,435**	**58,032**	**65,402**	**826.9**	**149.26**
Tehsil Quaidabad	Bandyal	27,277	13,944	13,333	175.84	155.11
	Bijjar	28,115	13,792	14,323	118.01	238.23
	Chak No 014/mb	22,397	11,600	10,797	122.88	182.25
	Goliwali	28,975	14,249	14,726	168.06	172.40
	Jabbi	25,171	12,002	13,169	102.24	246.18
	Noor Pur_02	7,924	3,989	3,935	108.63	72.94
	Okhli Mohla	21,269	10,338	10,931	94.31	225.49
	Quaidabad	97,880	49,177	48,703	120.71	810.82
	Utra Janubi	36,921	18,741	18,180	96.14	384.00
	Warchha	23,058	10,982	12,076	143.77	160.37
	Tehsil Total:	**318,987**	**147,073**	**141,993**	**1250.59**	**255.11**
	District Total:	**1,309,457**	**652,969**	**656,483**	**6,629**	**198**

Socio-Economics Statistics (2015)



POPULATION DENSITY (2015) MAP



Legend

- District Headquarter
- Tehsil Headquarter

Population Density (Person/Sq. Km.)

- < 75
- 76 - 150
- 151 - 225
- 226 - 300
- > 300

- River and Water Body
- Tehsil Boundary
- District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Pakistan Bureau of Statistics,
Survey of Pakistan

Datum: WGS 1984
Units: Degree

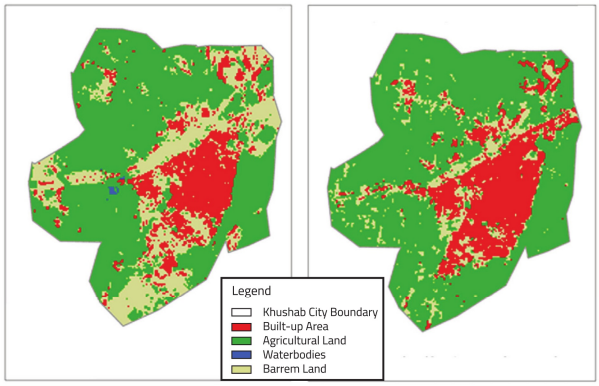
Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-006
Prepared by: Project Management Unit, NDMA
Last Updated: 7th March, 2017

7 SETTLEMENTS

The settlements of the district include tehsils, union councils, cities and villages. We can broadly classify the settlement of Khushab district into two forms i.e Urban Settlement and Rural Settlement. The geographic distribution of settlements over the district is manifested in the Settlement Map. It follows that Khushab is primarily a rural district with a large number of villages spread over entire area of district. However, due to the process of urban sprawl the urban settlement has been growing along the period of time.

Urban Sprawl of Khushab City in 2000 and 2013 is shown in the figure which shows that most part of the city is occupied by the Agricultural land use i.e. 58.01 %, followed by the built-up land i.e. 16.04 % and barren land about 25.83%. In 2013 the built-up area of the city has increased with a significant decrease in the barren land. The built-up land reached up to 19.83% from 16.04% while there was an increase of almost 9% in Agricultural land use and 13% decrease in the barren land of the City.

Land Use Pattern (2000 & 2013)



Land Use Class	Area		Change
	Year 2000	Year 2013	
Built-Up Area	16.04%	19.83%	3.79 % ↑
Agriculture	58.01%	67.38%	9.37% ↑
Water Bodies	0.13%	0.00%	-0.13% ↓
Barren	25.83%	12.79%	-13.04% ↓

Settlements Vulnerable to Riverine Flood on Basis of Inundation Frequency (2010 to 2017)

Tehsil Khushab			Tehsil Noorpur	Tehsil Quaidabad
Thatti Nihkkan	Kotla Saryidan	Jaura Jagir	Ahliamboh	Bijar
Sighwal	Mughlanwala	Ghauspur	Fateh Khan	Habib Khel
Girote	Jhok Mangur	Shah Aimal	Shergarh	Muhajir Branch
Shahpur City	Kachewala	Chak Muhammad Khan	Bhan Ahmad	Bolah Distributary
Noon Jagir	Dhak Railway Station	Dhok Darwiani	Kangan Shahid	Mir Ahmadwala
Nathuwala	Dhok Jaswal	Dhak	Chah Baluchwala	Mahram Khan
Shahpur City Railway Station	Kotla Chaddu	Meli Pir Bakhsh	Aura	One R Bolah Minor
Kot Maghrab	Chak Saiyid Rahian	Jhugian	Thatha Majoka	Dera Haji Fateh Muhammad
Birbal	Rajor		Ahmadabad Shimali	Shahbog Khel
Megha Kadhi	Bhin		Thathi Bakhsh Shah	Hasan Khel
Chandna	Chak MB 54/1		Dera Aladad	Dhurian
Hirra	Chak MB 56/3		Rarraisa Shah	Shahbaziwala
Dhupsari	Jore Wanne		Kanjuwala	
Bunga Sighwal	Jalalpur		Thatti Langar	
Kotla Jagir	Sind Saghar Doab		Jaura Kalan	
Thatti Lalewal	Sandral		Satah Shahani	
Muhabpur	Khairpur		Shaikh Panja	
Khhichi Jagir	Thatti Kalrani		Bhan Musaffar Khan	
Jhungian Shaikhowal	Namewali		Chah Ali Katal	
Anhagan	Gheg		Obhal Kalan	
Chak MB 55/2	Waryamwala		Thatti Kalak Shan	
Chak MB 57/4	Jandran		Haveli Majoka	
Chak MB 58/4	Bunga		Burhan	
Chak MB 59/6	Chhabil		Baggi	
Naiyan da Dera	Sakhi Saiyid Maroof Shah, Ziarat		Wagian	
Jhuggian Saiyidan	Hassan Shab		Khai Khurd	
Jorkial	Ghag Minor		Gum Ghora	
Husainabad	Shiwala Minor		Khai	
Chak 65	Bolah Drain		Thatti Baksh Shan	
Dhak Distributary	Rakh Rajar Railway Station		Kachohi Dhingani	
Sirdaruwali	Ghausnagar			
Chak MB 63/10	Dera Shahni			
Chak MB 62/9	Chak Kundan			
Chak MB 60/7	I L Minor			
Dumni	I R Minor			
Dhok Nuran	Nurowana			
Muhammad Ali Kalyar	Charchar			
Nurewala Distributary	Haji Mian Dad da Dera			
Burhananwala	Kaura			
Bhutianwala	Jalalpur			
Angra	Bagran			
Langarwala	Balwal			
Lal Hussain	Bharth			
Dhul Kandi	Wasu			
Bhutewala	Jaura Jagir			
Tetuan	Ghauspur			
Bhasinan	Shah Aimal			
Dhak Distributary	Chak Muhammad Khan			
Gogo Chakki	Dhok Darwiani			
Dilu	Dhak			
Sial	Meli Pir Bakhsh			
Joya	Jhugian			
Muhammad Shah				

Legend:

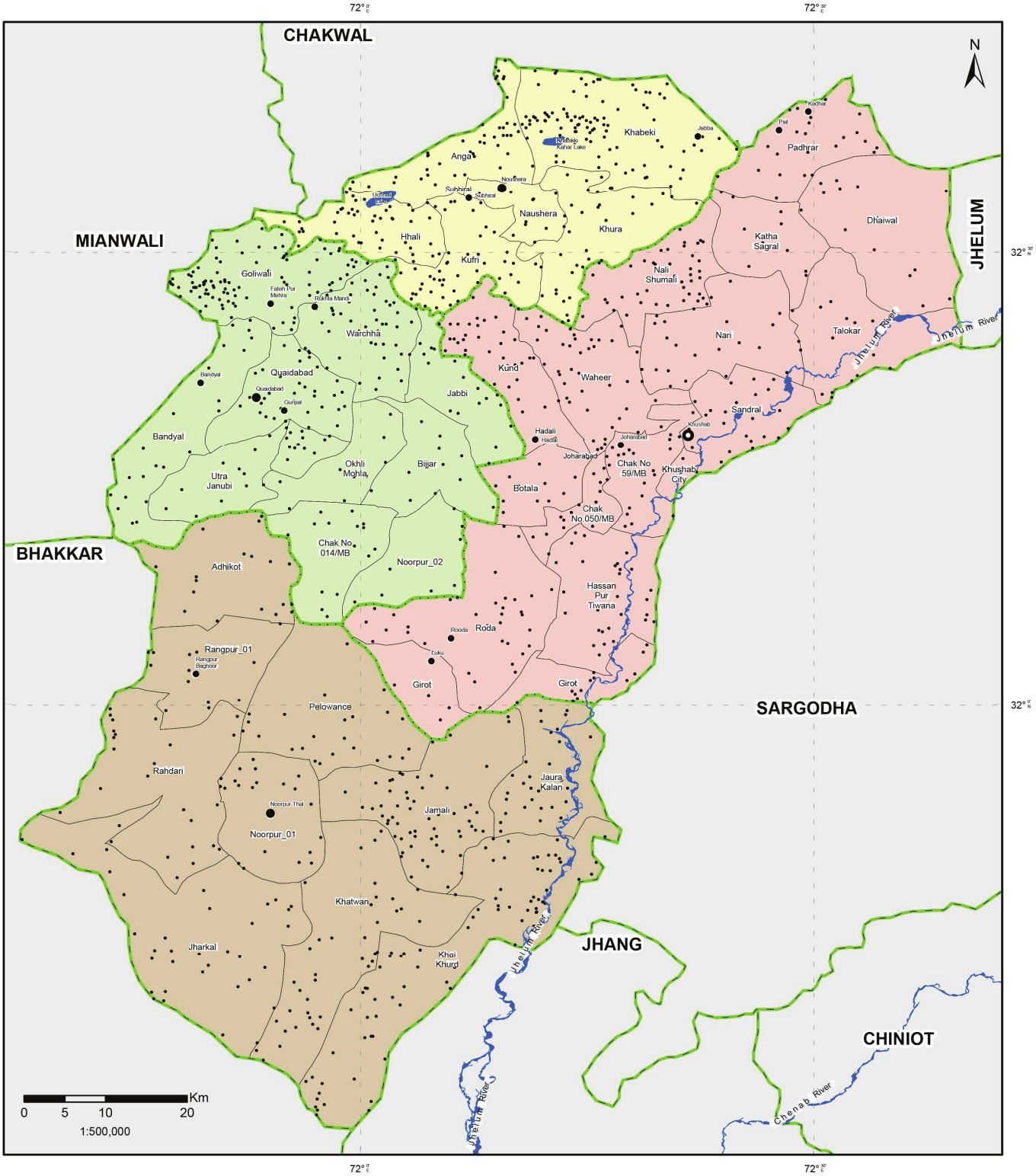
Flood Inundation Frequency

1 2 3

Villages Vulnerable to Hill Torrents

Tehsil Khushab		Quaidabad
HILLY AREAS		Quaidabad
Sabhral		Gunjial
Hardo Sodhi		Utra
Dhaka		Chak 5/tda
Uchala		Golewali
Jahlar		Warcha
Ugali		Choha
Kalyal		
Padhrar		
Dhadhar		
Khabaiki		
Mardwal		
Khura		
Uchali		
Naushera		
Kufri		
Sodhi		
Anga		
MOHAR AREAS		
Katha Saghral		
Nalli		
Nari		
Daiwal		
Mangwal		
Jabbi		
Dhorki		
Chanki		
Khaliqabad		
Kund		
Hadali		
Bola		
Waheer		

SETTLEMENTS MAP



Legend

- District Headquarter
- Tehsil Headquarter
- Major Towns
- Settlements / Villages
- River and Water Body
- Union Council Boundary
- District Boundary

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Pakistan Bureau of Statistics (PBS)
Survey of Pakistan (SOP)

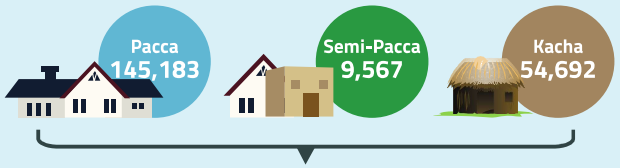
Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-628-FEB-2016-GEN-NDMA-007
Prepared by: Project Management Unit, NDMA
Last Updated: 7th March, 2017

8 BUILDING DISTRIBUTION

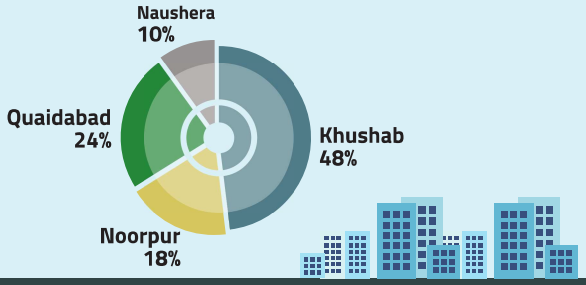
The distribution of building over different parts of the district is shown in the Building Distribution Map. Based on nature of building material used, buildings can be categorized as Kacha, Semi Pacca and Pacca as per Pakistan Bureau Statistics.

District Total

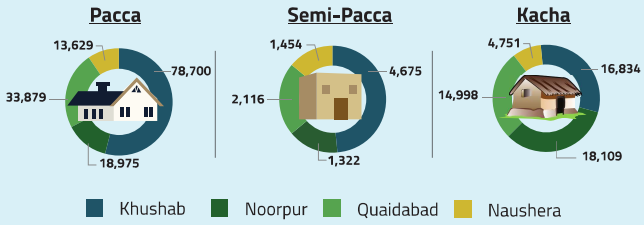


Total Buildings: 209,444

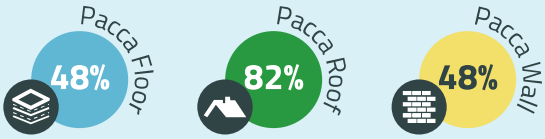
Tehsil Wise Building Distribution



Tehsil Wise Building Distribution by Type



House Hold Characteristics



UC Wise Building Distribution

Khushab

Botala	2,194	300	1,456
Chak No 59/MB	2,525	94	696
Chak No.050/MB	3,335	73	1,133
Dhaiwal	3,092	94	249
Girot	3,568	250	974
Hassan Pur Tiwana	2,082	274	1,935
Katha Sagral	2,680	198	558
Khushab City	19,684	1,082	1,961
Kund	8,585	821	2,889
Nali Shumali	2,598	24	786
Nari	2,805	63	386
Padhrar	3,081	281	800
Roda	3,754	99	929
Sandral	2,850	27	374
Talokar	2,842	126	360
Waheer	13,025	869	1,348

Noorpur

Adhikot	3,104	112	1,624
Jamali	1,374	77	2,155
Jaura Kalan	1,901	216	1,419
Jharkal	1,695	42	1,955
Khai Khurd	961	52	2,714
Khatwan	734	92	2,662
Noor Pur_01	2,095	26	351
Pelowance	1,658	76	2,691
Rahdari	2,197	81	1,566
Rangpur_01	3,256	548	972

Naushera

Anga	2,352	190	676
Hhali	2,139	196	790
Khabeki	2,064	93	1,209
Khura	2,012	286	1,115
Kufri	2,512	73	552
Naushera	2,550	616	409

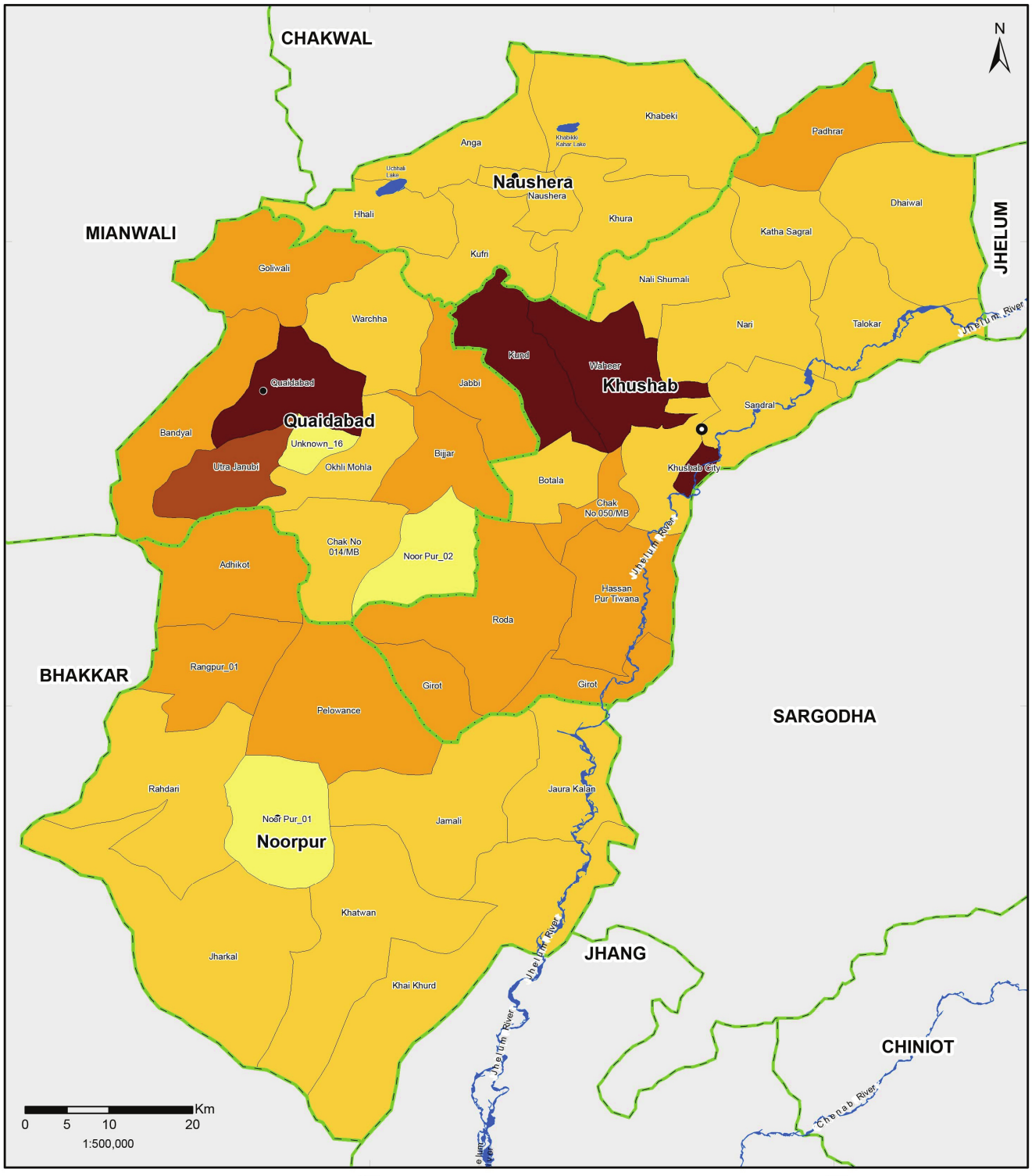
Quaidabad

Bandyal	2,590	84	1,725
Bijjar	2,770	72	1,693
Chak No 014/mb	1,998	75	1,539
Goliwali	2,762	94	1,817
Jabbi	2,930	32	1,097
Noor Pur_02	687	10	404
Okhli Mohla	2,146	124	1,161
Quaidabad	10,992	1,183	3,334
Utra Janubi	3,822	200	1,933
Warchha	3,182	242	295

Pacca Semi Pacca Kacha



BUILDING DISTRIBUTION (2015) MAP



Legend

- District Headquarter
- Tehsil Headquarter

Building Distribution

- < 3000
- 3000 - 4000
- 4000 - 5000
- 5000 - 6000
- > 6000

- River and Water Body
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):

NDMA
Pakistan Bureau of Statistics

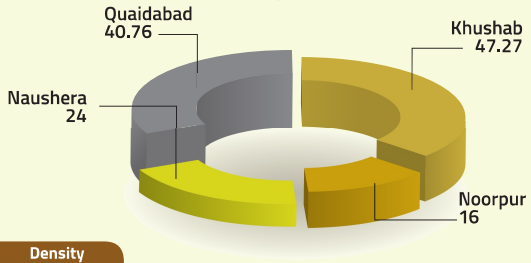
Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-008
Prepared by: Project Management Unit, NDMA
Last Updated: 4th May, 2017

9 BUILDING DENSITY

There are variety of building groups in Khushab, covering residential, nonresidential, office and administrative buildings, which are located in areas with relatively favorable geo-physical and socio-economic conditions.

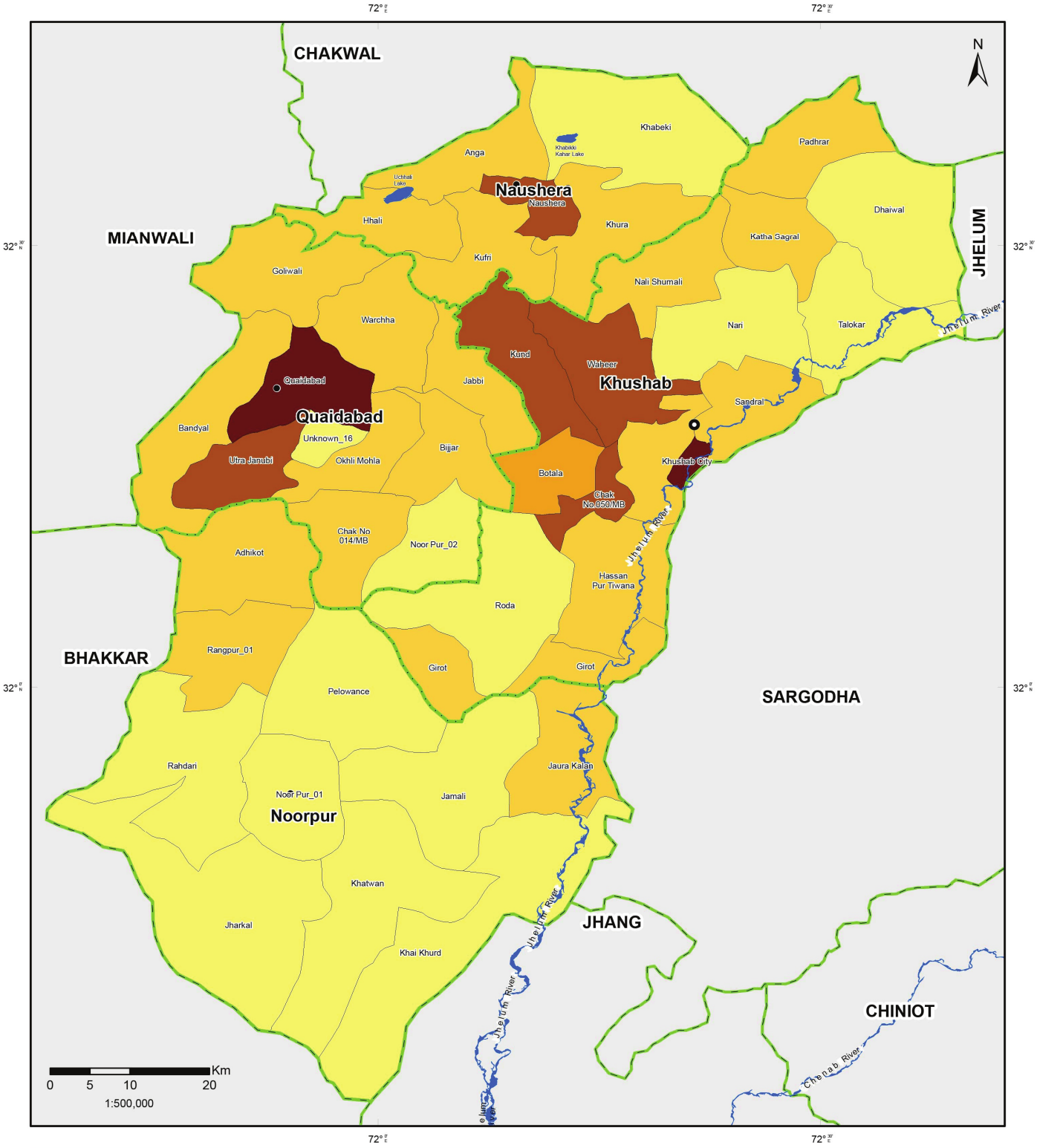
Tehsil Wise Building Density
(Buildings / sq.km)



	Union Council	Building Types: Pacca	Semi Pacca	Kacha	Total Buildings	Area (sq.km)	Density (Buildings / sq.km)
Tehsil Khushab	Botala	2,194	300	1,456	3,950	78	51
	Chak No 59/mb	2,525	94	696	3,315	90	37
	Chak No.050/mb	3,335	73	1,133	4,541	48	95
	Dhaiwal	3,092	94	249	3,436	229	15
	Girot	3,568	250	974	4,792	143	34
	Hassan Pur Tiwana	2,082	274	1,935	4,292	167	26
	Katha Sagral	2,680	198	558	3,436	103	33
	Khushab City	19,684	1,082	1,961	22,726	16	1,420
	Kund	8,585	821	2,889	12,295	133	92
	Nail Shumali	2,598	24	786	3,408	129	26
	Nan	2,805	63	386	3,253	171	19
	Padhrar	3,081	281	800	4,163	134	31
	Roda	3,754	99	929	4,782	245	20
	Sandrai	2,850	27	374	3,251	114	29
	Taiokar	2,842	126	360	3,328	163	20
	Waheer	13,025	869	1,348	15,241	157	97
	Tehsil Total:	**78,700**	**4,675**	**16,834**	**100,209**	**2,120**	**47.27**
Tehsil Noorpur	Adhikot	3,104	112	1,624	4,840	176	28
	Jamali	1,374	77	2,155	3,607	241	15
	Jaura Kalan	1,901	216	1,419	3,536	149	24
	Jharkal	1,695	42	1,955	3,692	382	10
	Khai Khurd	961	52	2,714	3,728	363	10
	Khatwan	734	92	2,662	3,487	292	12
	Noor Pur_01	2,095	26	351	2,472	147	17
	Pelowance	1,658	76	2,691	4,425	242	18
	Rahdari	2,197	81	1,566	3,844	267	14
	Rangpur_01	3,256	548	972	4,776	141	34
	Tehsil Total:	**18,975**	**1,322**	**18,109**	**38,407**	**2,400**	**16**
Tehsil Naushera	Anga	2,352	190	676	3,218	121	27
	Hhali	2,139	196	790	3,125	106	29
	Khabeki	2,064	93	1,209	3,366	262	13
	Khura	2,012	286	1,115	3,413	158	22
	Kufri	2,512	73	552	3,136	130	24
	Naushera	2,550	616	409	3,576	50	72
	Tehsil Total:	**13,629**	**14,54**	**4,751**	**19,834**	**827**	**24**
Tehsil Quaidabad	Bandyal	2,590	84	1,725	4,399	176	25
	Bijjar	2,770	72	1,693	4,535	118	38
	Chak No 014/mb	1,998	75	1,539	3,612	123	29
	Goliwali	2,762	94	1,817	4,673	168	28
	Jabbi	2,930	32	1097	4,060	102	40
	Noor Pur_02	687	10	404	1,101	109	10
	Okhli Mohla	2,146	124	1,161	3,431	94	36
	Quaidabad	10,992	1,183	3,334	15,509	121	128
	Utra Janubi	3,822	200	1,933	5,955	96	62
	Warchha	3,182	242	295	3,719	144	26
	Tehsil Total:	**33.879**	**2,116**	**14,998**	**50,994**	**1,251**	**40.76**
	District Total:	**145,183**	**9,567**	**54,692**	**209,444**	**6,629**	**32**



BUILDING DENSITY (2015) MAP



Legend

- District Headquarter
- Tehsil Headquarter

Building Density (Buildings/Sq. Km)

- < 20
- 21 - 40
- 41 - 60
- 61 - 100
- > 100

- River and Water Body
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):

NDMA
Pakistan Bureau of Statistics

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-009
Prepared by: Project Management Unit, NDMA
Last Updated: 4th May, 2017

10 TRANSPORTATION NETWORK

Khushab District has a total metalled road-length of 1702 kilometers, which links the district with Sargodha, Mianwali, Bhakkar and Jhang. The Transportation Network Map of the district identifies all the essential road links including trunk, primary, secondary, tertiary and residential roads.

Besides roads, the district also has a fully functioning railway network connecting with rest of Pakistan through Sargodha and Mianwali districts. The total length of railway network in the district is about 111 km.

There is only one landing strip in the district which is located at Bandial, Mitha Tiwana, Qaidabad Tehsil. The nearest major airport is Faisalabad International Airport which is 148 km from Khushab Tehsil whereas the nearest domestic airport is Sargodha Bhagatanwala Apt Airport located at the distance of approximately 38 km from Khushab Tehsil.

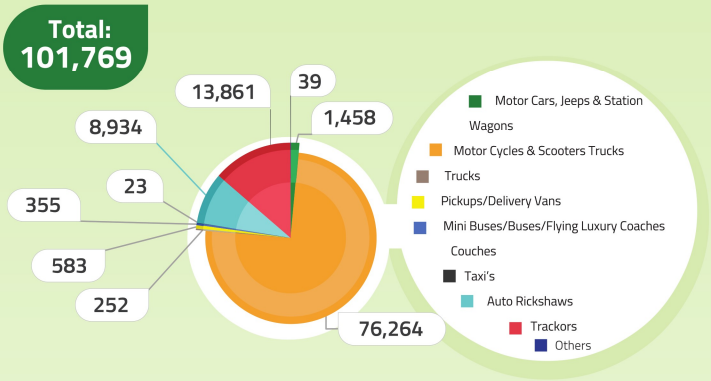
Road Length (km)



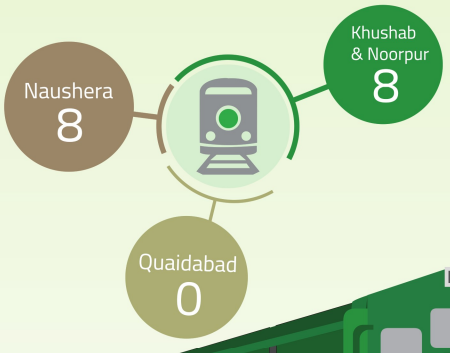
Motor Vehicles 'Registered'

by Type as on 30th June, 2014

Mini Buses / Buses / Flying Luxury Coaches	Motor Cars, Jeeps & Station Wagons	Pickups / Delivery Vans	Motor Cycles & Scooters	Trucks	Auto Rickshaws	Tractors	Taxi's	Others
355	1,458	583	76,264	252	8,934	13,861	23	39

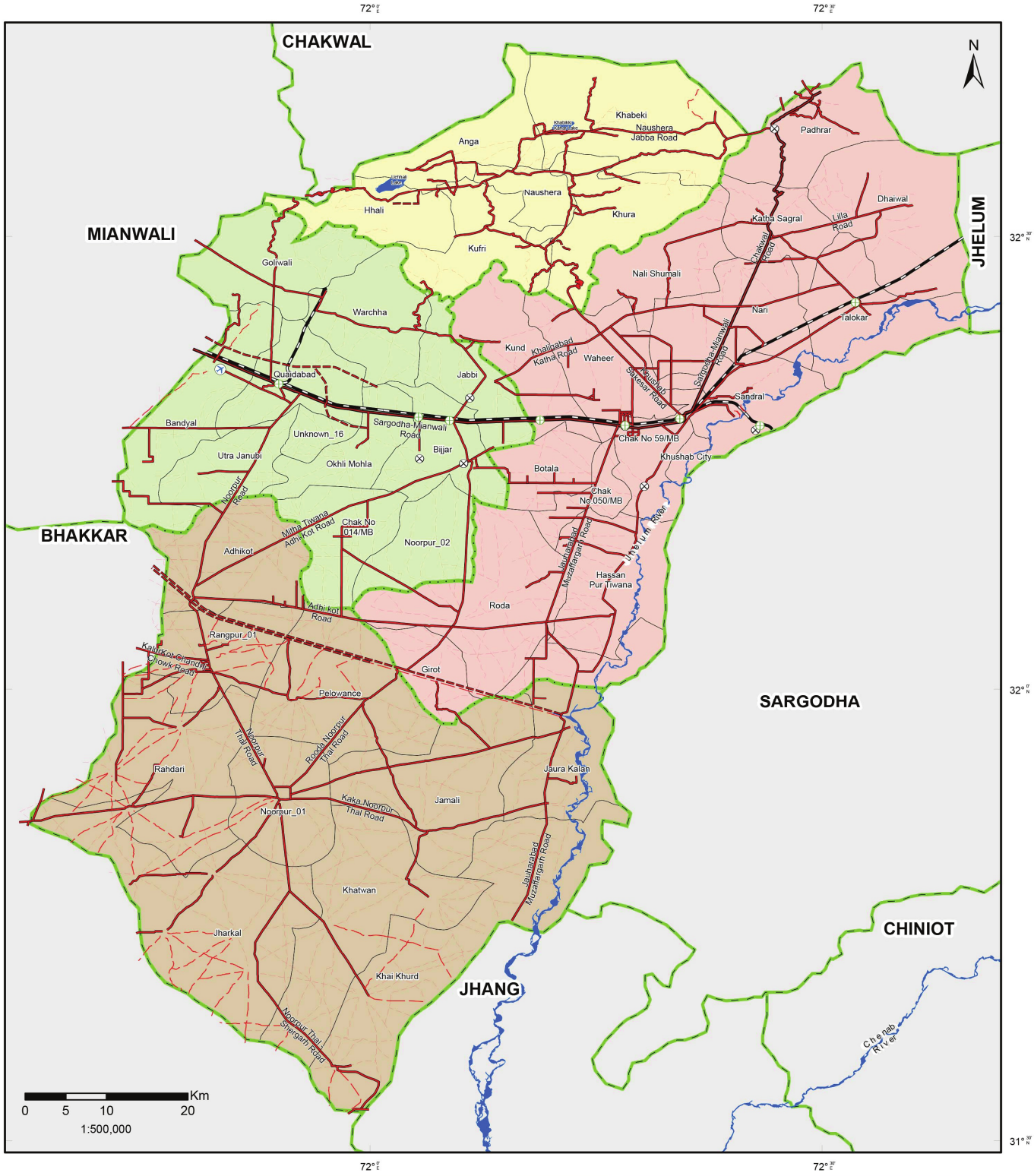


Number of Railway Stations



Nearest Major Airports from Khushab City

TRANSPORTATION NETWORK MAP



Legend

- Airport
- Air Field/Landing Strips
- Railway Station
- Bus Station
- Bridge
- Motorway
- Trunk/Highway
- Metalled Road
- Unmetalled Road
- Cart Track
- Pack Track
- Broad Gauge Railway Track
- Other Gauge Railway Track
- River and Reservoir
- Abc Union Council Boundary

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur
- ABC District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Survey of Pakistan

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-010
Prepared by: Project Management Unit, NDMA
Last Updated: 8th May, 2017

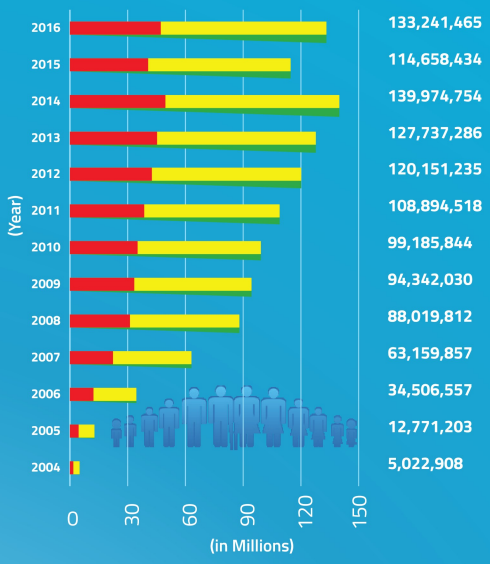
11 TELECOMMUNICATION

Communication System; particularly telecommunication services, plays a role of significant importance in connecting people either through wired or wireless services. The telecommunication technologies have been changed immensely in the last twenty years. Before the emergence of cellular systems, the communication system of District Khushab was primarily based on telephone services, known as Public Service Telephone Systems (landline services). However, with worldwide expansion /growth and recognition of wireless communication systems, cellular systems have also been deployed in the district.

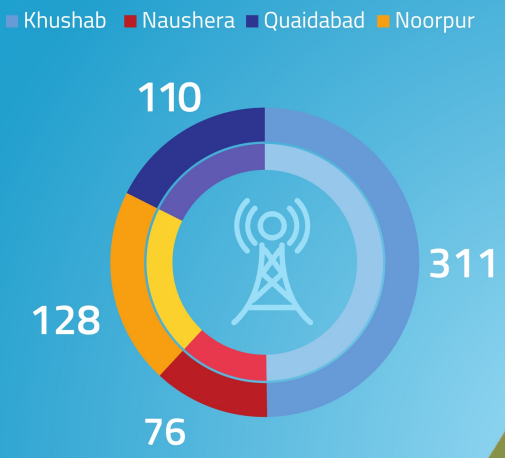
There are about 31 telephone exchanges operating in the district, ranging in capacities from 300 lines to 4000 lines and 625 cellular towers covering whole of the district.

The Cellular Service Providers in the districts include Mobilink, Telenor, Ufone, Warid and Zong. The map on next page, identifies telecommunication towers distributed over the different parts of the district.

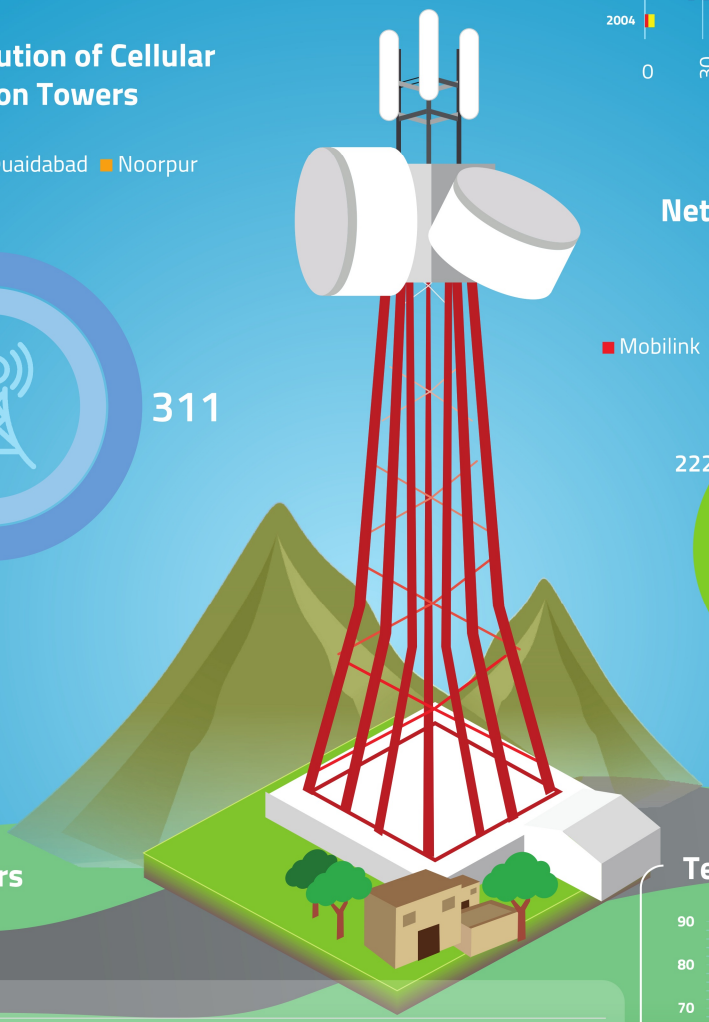
Cellular Subscribers in Pakistan



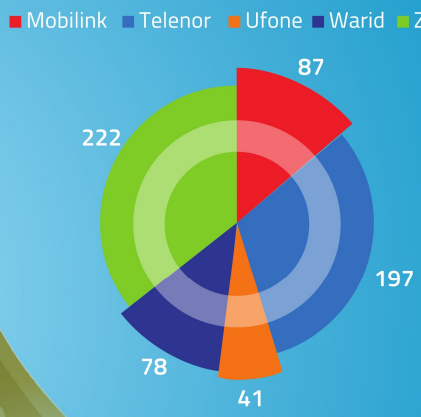
Tehsil Wise Distribution of Cellular Communication Towers



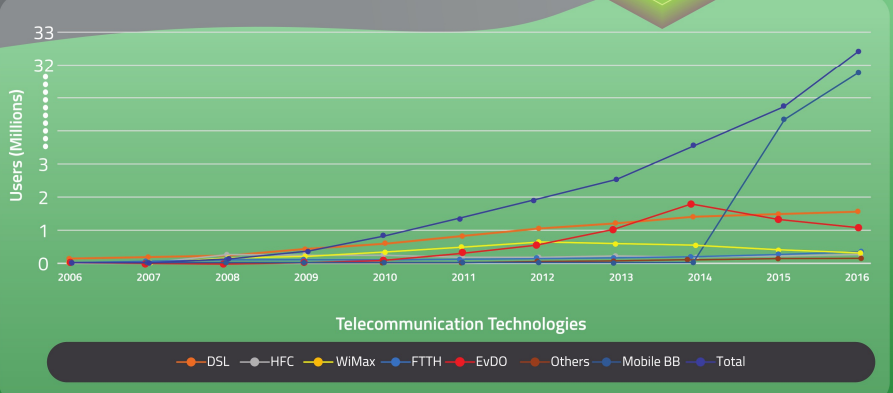
Total: 625



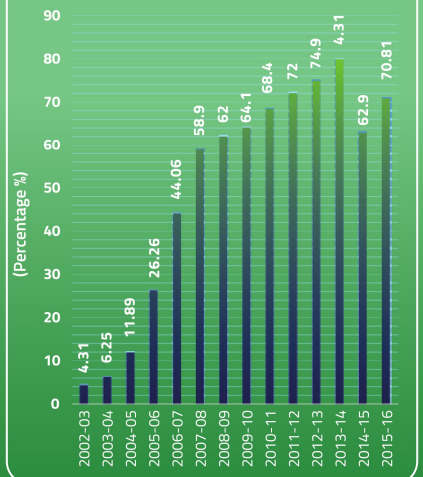
Network Wise Distribution of Cellular Towers (in Khushab District)



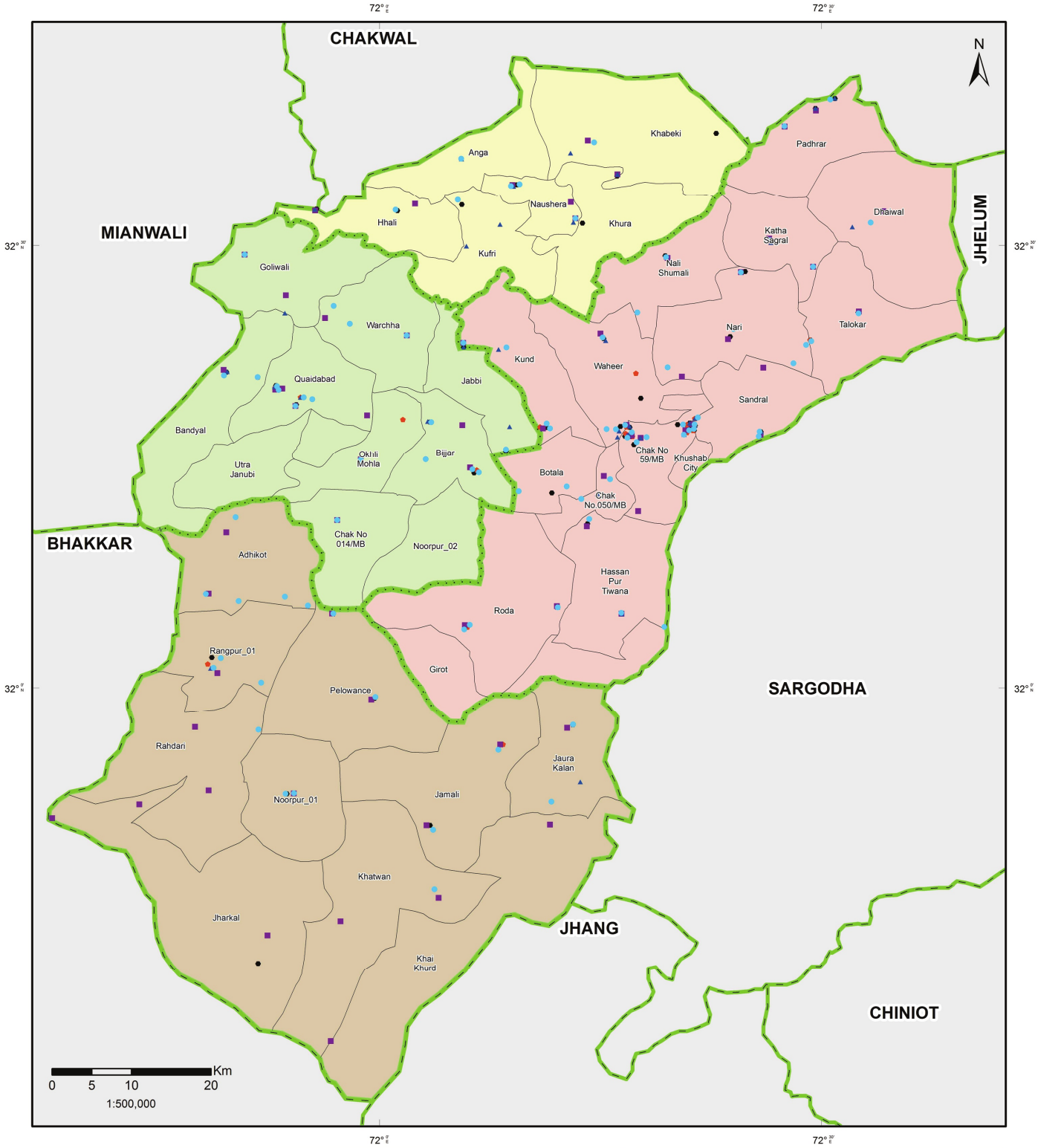
Internet Subscribers in Pakistan



Teledensity in Pakistan



COMMUNICATION TOWER MAP



Legend

- Mobilink
- Telenor
- Ufone
- Warid
- Zong
- Abc — Union Council Boundary

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur

- ABC — District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Pakistan Telecommunication Authority
Survey of Pakistan
Pakistan Bureau of Statistics

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-011
Prepared by: Project Management Unit, NDMA
Last Updated: 10th March, 2017

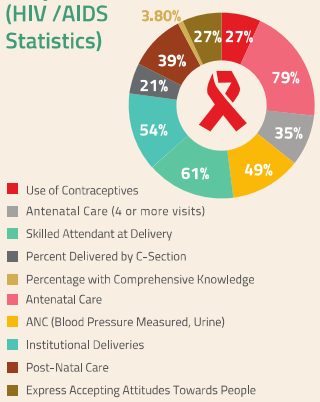
12 PUBLIC HEALTHCARE FACILITIES

The provision of easily accessible, affordable and quality Healthcare facilities is among the basic amenities of life that must be provided to the people for their wellbeing and health safety. Health facilities include hospitals, clinics, maternal & birth centers, dispensaries and other forms of health care centers. In District Khushab, for population of 3,088 there is one certified doctor avalible in public healthcare facilities.

Health Facilities by Type



Reproductive Health (HIV /AIDS Statistics)



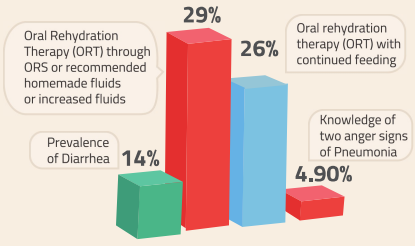
Primary Healthcare Sanctioned Staff

Health Facility Type	Medical Officers & Surgeons	Nurse (Head/ Staff/ Charge)	Assistants (Medical/ Xray/ Lab/ Dental)	LHVs / LHWs / Midwives / Vaccinators	Medical Tech/ Dispenser	Others
Basic Health Unit (BHU)	42	0	1	171	82	241
Government Rural Dispensaries (GRD)	6	0	0	18	33	53
Maternal & Child Health (MCH)	0	0	0	14	0	6
Rural Health Centre (RHC)	28	30	2	6	23	158
Others	76	30	3	209	138	458

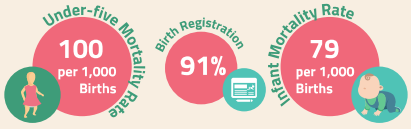
Secondary Healthcare Sanctioned Staff

Health Facility Type	MS/AMS/ Deputy MS	PMO/AP MO/CMO/ SMO/MO	PWMO/A PWMO/S WMO/W MO	Specialists (Eye/ENT/ Chest/Child/ Surgical/ Medical)	Surgeons (Cardio/Neuro/ Ortho/Gyne/ Dental)	Non Surgical Staff (Anesthetist/ pathologist/ Radiologist/ Physiotherapists	Assistants (Lab/ Medical/ X-Ray/ Dental/ ECG Techs)	Nurse (Head/Staff Nurse/ Matron)	LHVS/ LHWS/ Midwives /EPI Vacciantors/ LHWs	Health/ Medical Tech/ Dispensers	Other
District Headquarters (DHQ)	5	118	37	7	6	5	9	42	4	10	0
Tehsil Headquarters (THQs)	5	78	44	21	9	13	19	66	11	26	148
Total:	10	196	81	28	15	18	28	108	15	36	535

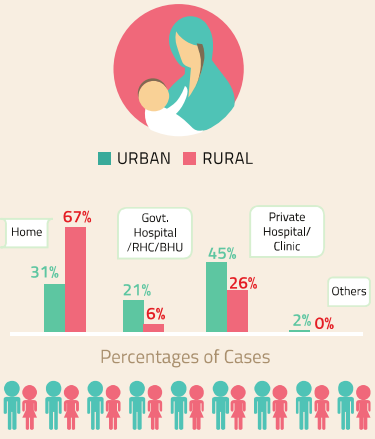
Statistics of Disease in Children



Child Mortality Statistics

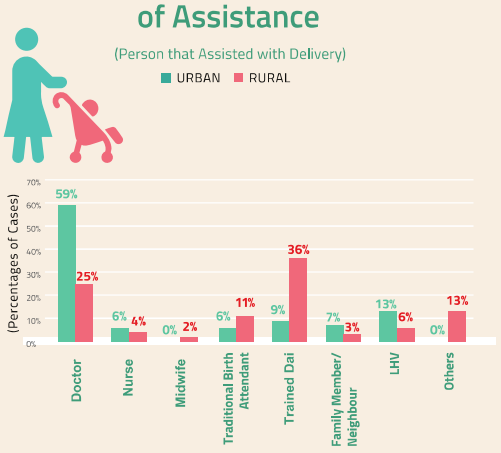


Child Delivery by Location



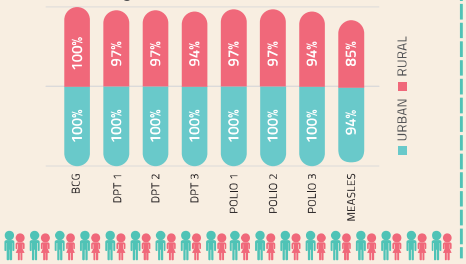
Child Delivery by Type of Assistance

(Person that Assisted with Delivery)

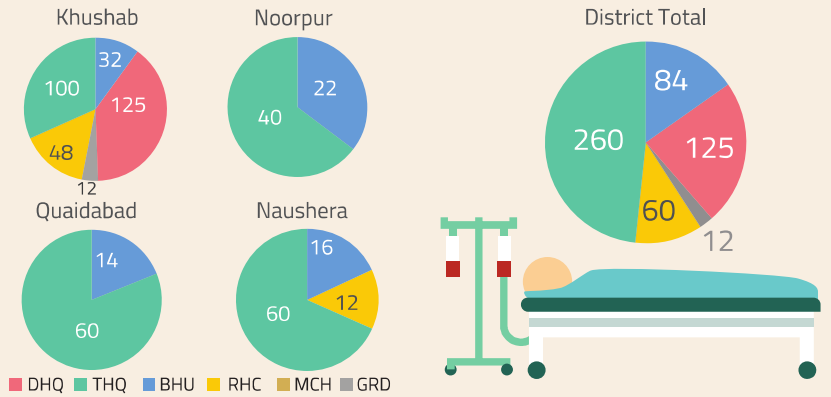


Children12-23 Months

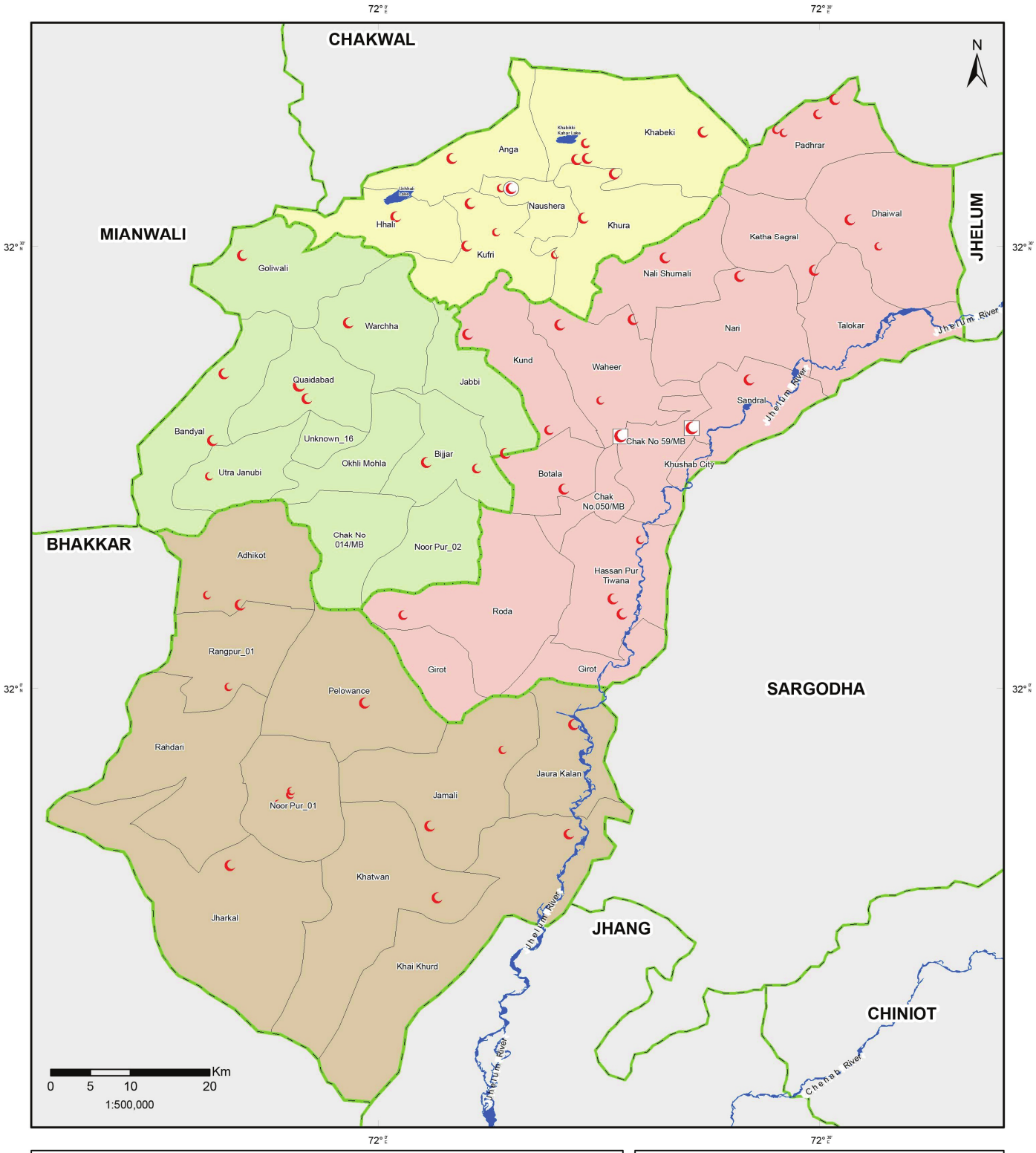
That have been immunized by type of antigen- based on record and recall



Tehsil Wise Bedding Capacity in Healthcare Facilities



HEALTH FACILITIES



Legend

- District Headquarters Hospital
- Tehsil Headquarters Hospital
- Civil Hospital & Tuberculosis Clinic
- Basic Health Unit
- Rural Health Centre
- Mental/Child Health/ Dispensary
- River and Water Body
- Union Council Boundary (Abc)
- District Boundary (ABC)
- Provincial Boundary
- Line of Control
- International Boundary

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

Data Source(s):
World Health Organization
Health Department Punjab

Datum: WGS 1984
Units: Degree

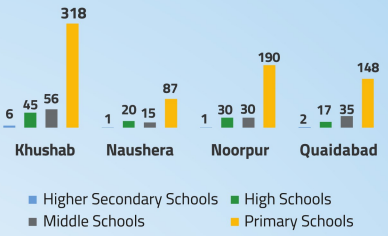
Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-013
Prepared by: Project Management Unit, NDMA
Last Updated: 4th May, 2017

13 PUBLIC EDUCATION FACILITIES

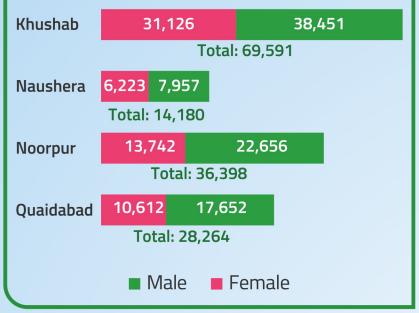
Education Facilities

Govt. Schools	Private Schools	Colleges	Universities
1,001	366	5	2

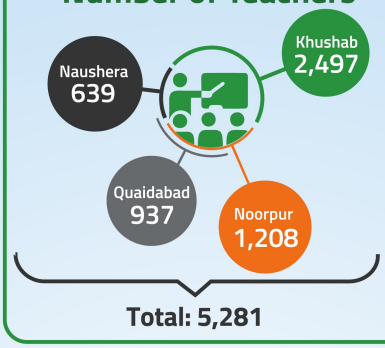
Tehsil Wise Govt. School by Type



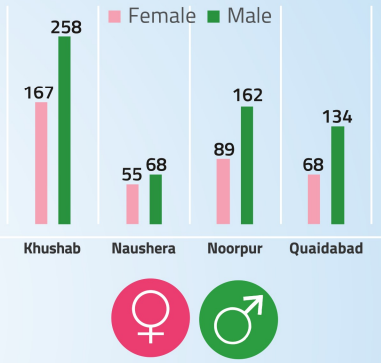
Total Enrollment by Gender



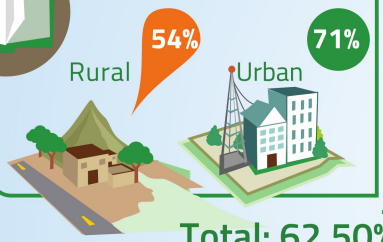
Number of Teachers



Tehsil Wise Govt. School by Gender



Literacy Ratio 2014-2015



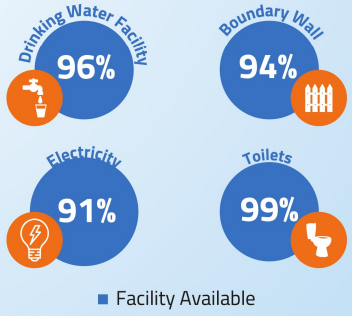
Total School Buildings



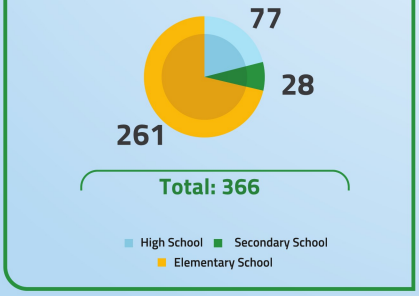
Tehsil Wise Govt. School by Building Type

Tehsils	Kacha	Semi Pacca	Pacca	Total
Khushab	3	7	415	425
Naushera	-	3	120	123
Noorpur	3	6	242	251
Quaidabad	7	6	189	202
Total:	13	22	966	1,001

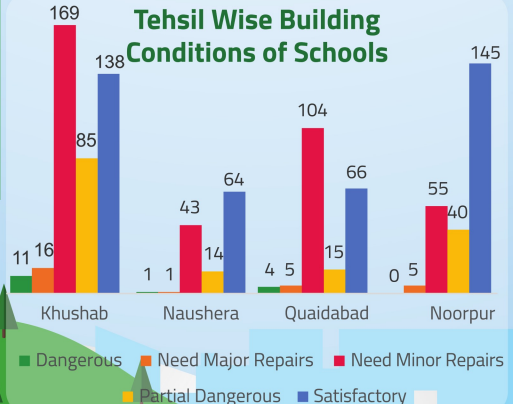
Tehsil Wise Facilities in Schools



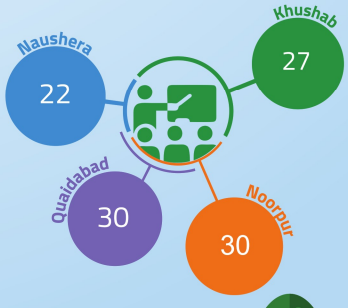
Private Education Facilities



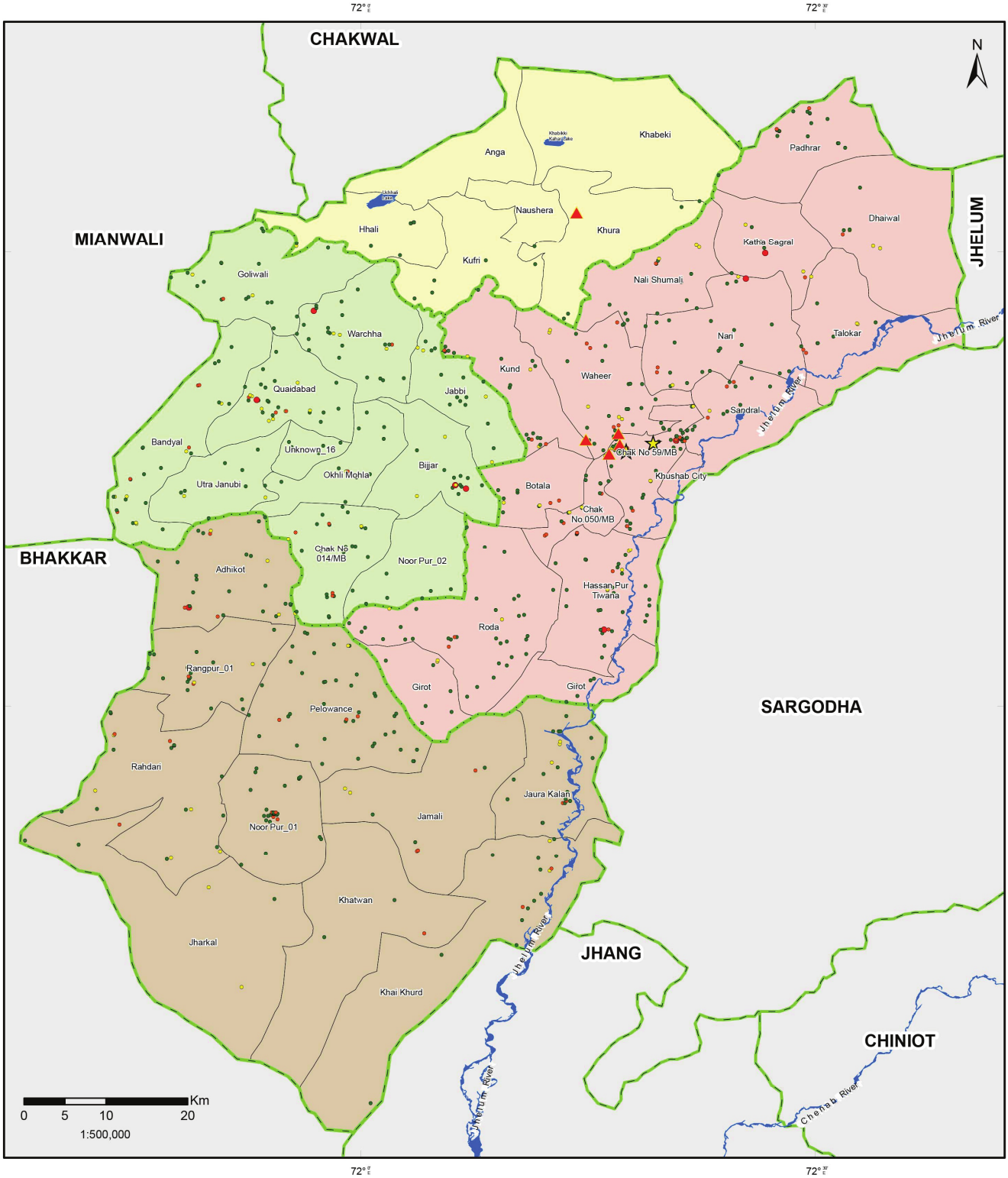
Tehsil Wise Building Conditions of Schools



Student to Teacher Ratio



EDUCATION FACILITIES MAP



Legend

- University
- College
- Higher Secondary School
- High School
- Middle School
- Primary School
- River and Water Body
- Union Council Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):

School Education Department,
Government of the Punjab

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-014
Prepared by: Project Management Unit, NDMA
Last Updated: 4th May, 2017

14 IRRIGATION INFRASTRUCTURE

Irrigation System plays a role of great importance for sustaining agriculture sector in the country. District Khushab is bounded by the salt range hills in the north and River Jhelum in the east. The underground water and discharge from hill torrent is Saline in nature with high concentration of sodium chloride and other salts.

The Irrigation System of Khushab mainly includes major, minor & distributary canals and other water reservoirs. List of major, minor and distributary canals are provided in the canal system table given below.

Chashma- Jhelum Link Canal is major canal which irrigates the district from East through Jhelum River and extends till Indus River in Mianwali District. The Indus flows on the northern outskirts of the districts of Dera Ghazi Khan and Muzaffargarh. River Jhelum flows toward east of the boundary of district Khushab and Sargodha. Two major lakes of the region are Uchhail Lake and Khabikki Lake in North-West of Khushab.

It can also be extracted from the map that most of the areas of Naushera and Noorpur tehsil are comprised of virgin land with most of the irrigation supply being at the mercy of River Jhelum.

Major Lakes

1.9 sq.km Khabikki Kahar

3.6 sq.km Uchali Lake

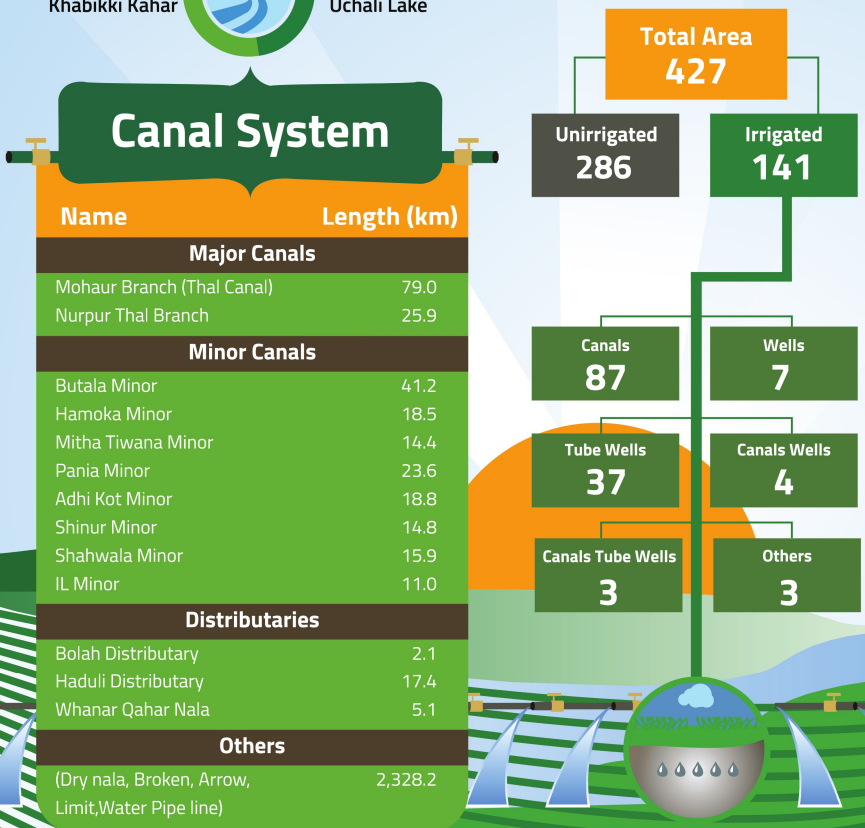
Canal System

Name	Length (km)
Major Canals	
Mohaur Branch (Thal Canal)	79.0
Nurpur Thal Branch	25.9
Minor Canals	
Butala Minor	41.2
Hamoka Minor	18.5
Mitha Tiwana Minor	14.4
Pania Minor	23.6
Adhi Kot Minor	18.8
Shinur Minor	14.8
Shahwala Minor	15.9
IL Minor	11.0
Distributaries	
Bolah Distributary	2.1
Haduli Distributary	17.4
Whanar Qahar Nala	5.1
Others	
(Dry nala, Broken, Arrow, Limit,Water Pipe line)	2,328.2

Area Sown

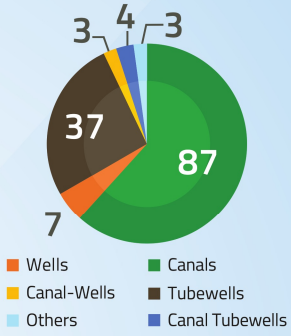
(Thousand Hectares)

Note: Excludes 485,000 hectares under orchards & 17,000 hectares under Tobacco, sown under "Zaid Rabi" Crop.

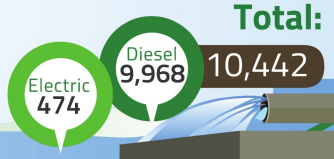


Area Sown by Different Irrigation Techniques

(Thousand Hectares)

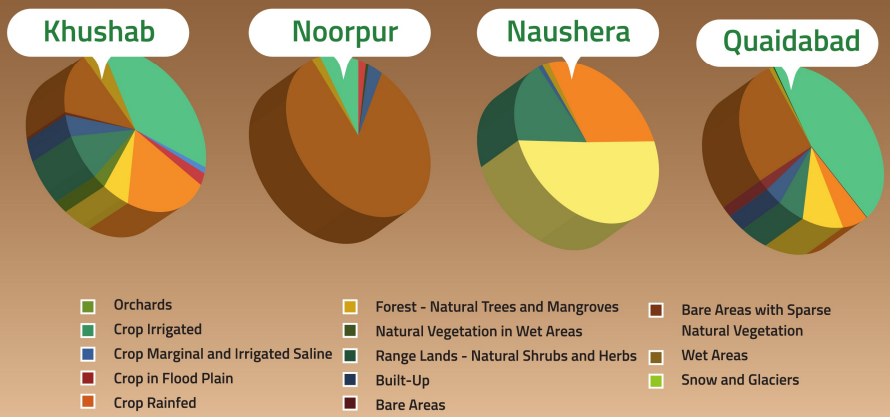


Tube Wells Installed by Energy Source (2013-14)

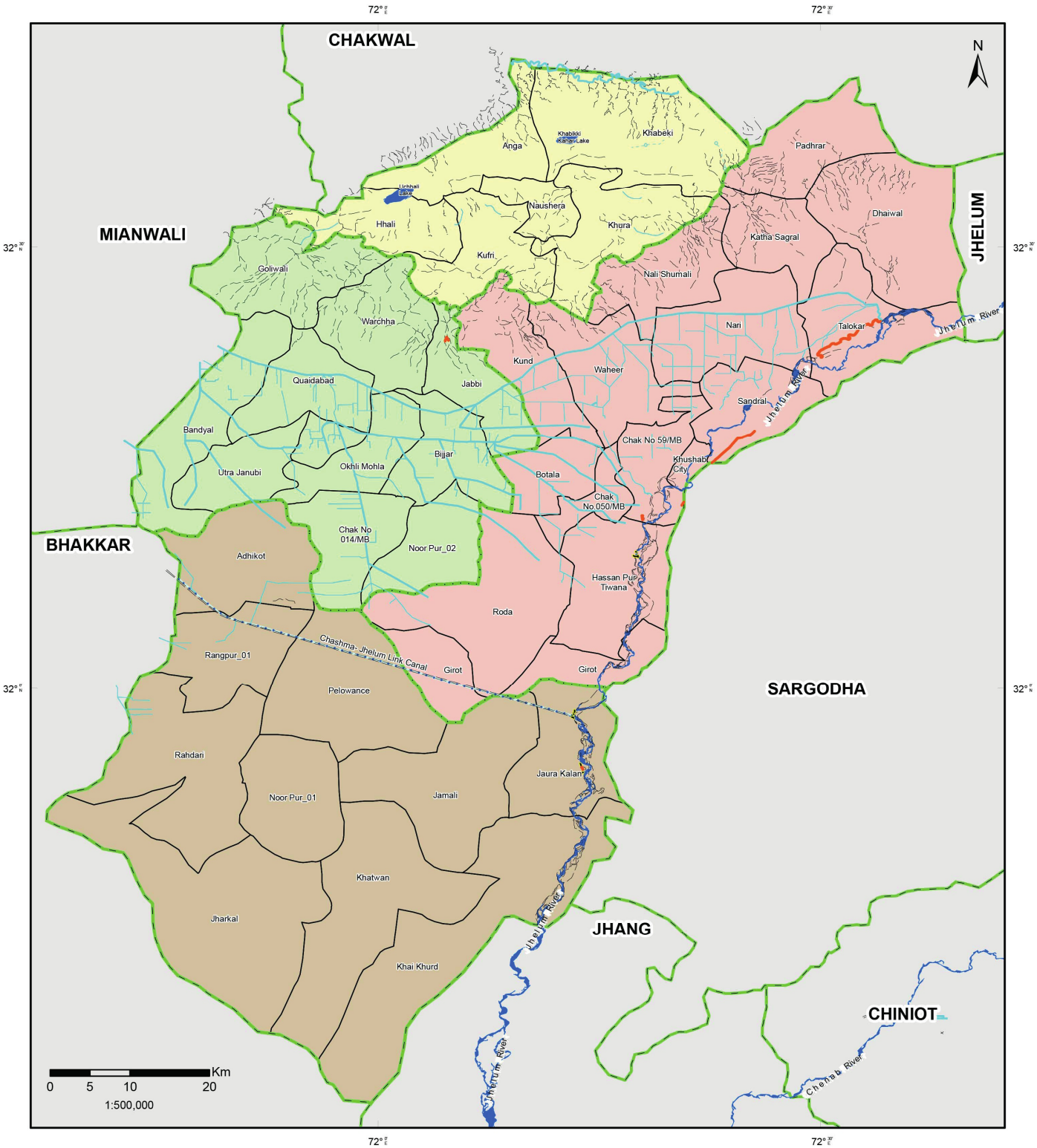


Flood Protection Structures	Length (m)
Embankments	
Stud No 2 of joya and ham	71.3
Safety Bund for Moza Dhok	992.1
Shahpur dy Flood Bund RD-	6,728.3
Guide wall No 2 thatti ka	298.9
Earthen Shank of Stud 1,2	518.4
Stud No 1 of joya and ham	88.6
Protection Bund Dhak	10,630.6
Stud No 3 of joya and ham	61.1
Spurs	
Guide Spur No.1 Thatti ka	300.9
Guide Spur 2 of Sher Garh	230.1
J Head Spur Tibba Qaim Di	720.1
Spur 1 of sher garh khush	259.0
Sloping Spur Jura Kalan k	100.4
Sloping Spur Tibba Qaim D	75.1
Spur 3 of Sher Grah	265.5

Tehsil Wise Land Use Classification



IRRIGATION MAP



Legend

- Main Canal
- Minor Canal
- Distributary
- Water Pipe line
- Others
- Embankments
- Spur
- Water Course
- Dikes/Studs
- Dams & Reservoirs
- Headworks
- Pondage/Ditch
- River and Reservoir
- Union Council Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Irrigation Department, Punjab
Survey of Pakistan
SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-015
Prepared by: Project Management Unit, NDMA
Last Updated: 7th March, 2017

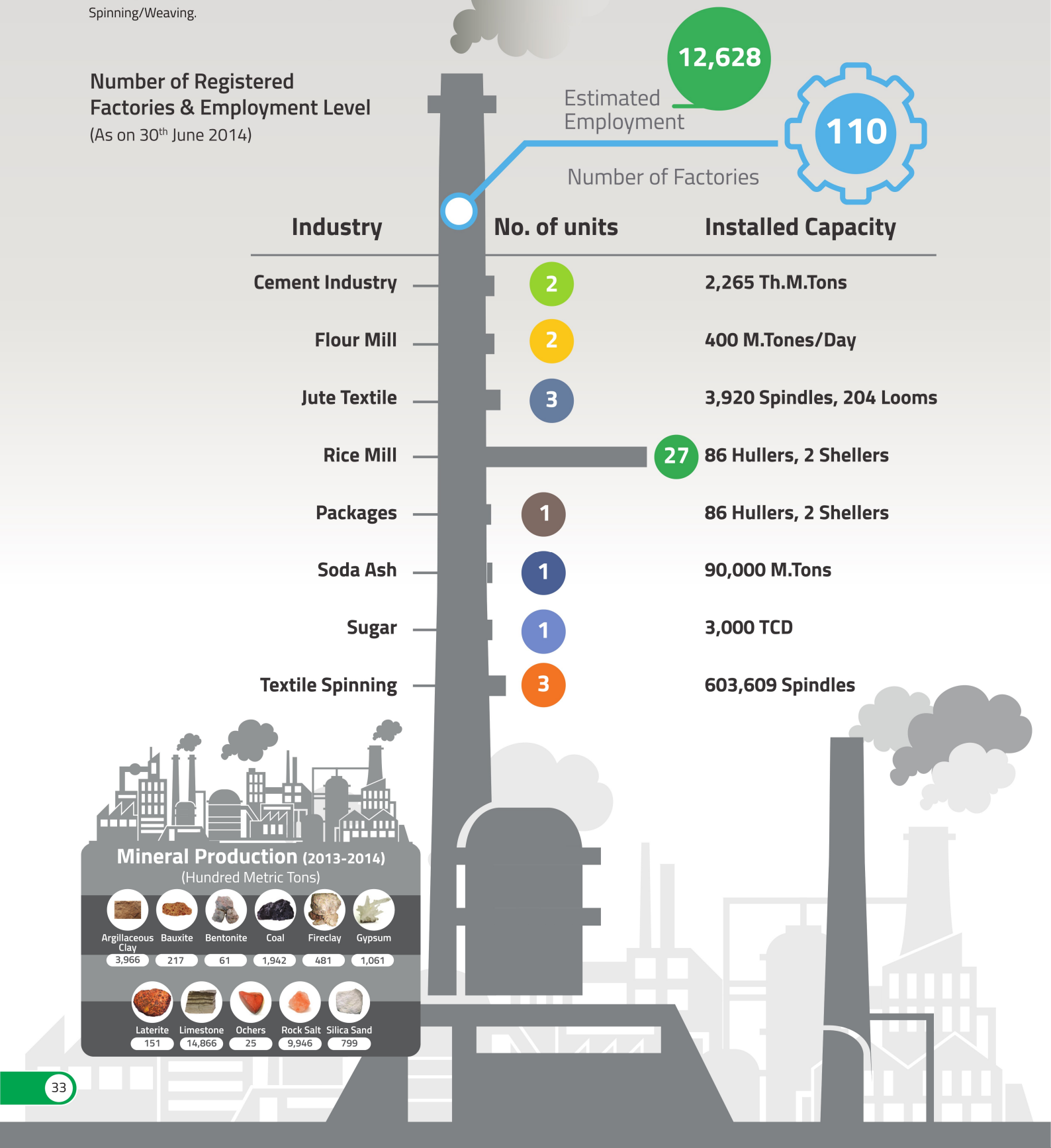
15 MAJOR INDUSTRIES

Industrial situation of district Khushab is in process of progress with more increasing trend towards agricultural based activities. The district is endowed with unprecedented resources in the form of rocks and mineral reserves. There is great degree of industrial potential in the district due to the availability of innumerable raw materials, compounded with skilled labors. According to PBS, there are 110 Industrial Units in the District, employing 12,628 persons. Mostly these Industries are related to Agricultural Implements, Cement Products, Flour Mills, Jute Textile Mills, Packages, Rice Mills, Sewing Machines Parts, Soda Ash, Sugar, Textile Spinning, Vegetable Ghee / Cooking Oil and Woolen Textile Spinning/Weaving.

As regards availability of skilled labour, there are 09 technical / commercial / vocational institutions (6 for men and 3 for women) imparting training in Pre-Investment Study Khushab District various trades e.g. mechanical, electrical, auto engineering, welding, wood working and commerce. Vocational institutions for women impart training in hand/machine embroidery, stitching and knitting, etc. In all about 1349 trained technicians/artisans/workers are turning out every year.

Number of Registered Factories & Employment Level

(As on 30th June 2014)



Industry	No. of units	Installed Capacity
Cement Industry	2	2,265 Th.M.Tons
Flour Mill	2	400 M.Tones/Day
Jute Textile	3	3,920 Spindles, 204 Looms
Rice Mill	27	86 Hullers, 2 Shellers
Packages	1	86 Hullers, 2 Shellers
Soda Ash	1	90,000 M.Tons
Sugar	1	3,000 TCD
Textile Spinning	3	603,609 Spindles

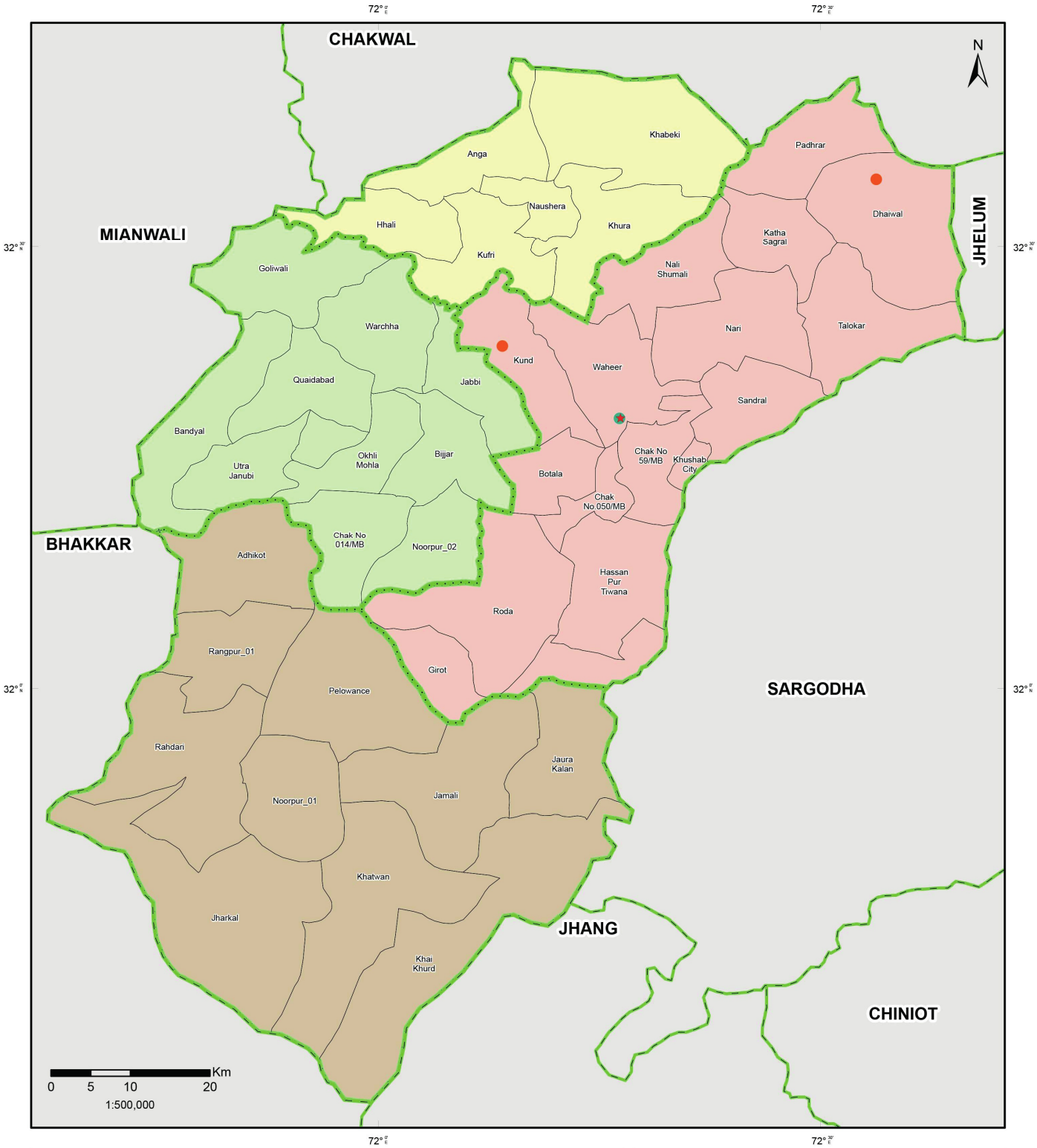
Mineral Production (2013-2014)

(Hundred Metric Tons)

Argillaceous Clay	Bauxite	Bentonite	Coal	Fireclay	Gypsum
3,966	217	61	1,942	481	1,061

Laterite	Limestone	Ochers	Rock Salt	Silica Sand
151	14,866	25	9,946	799

INDUSTRIES MAP



Legend

- Industrial Zones
- Cement Factory
- Sugar Mill
- Abc — Union Council Boundary

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur

- ABC — District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

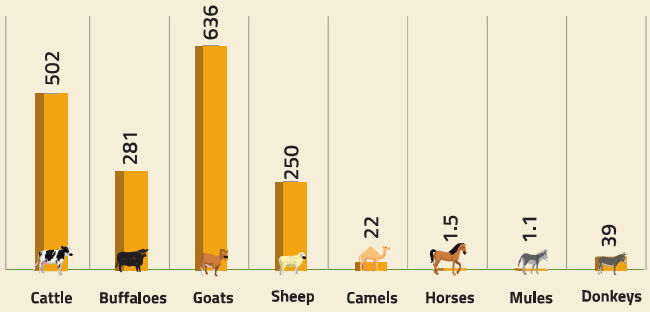
Data Source(s):
Punjab Agricultural Board, Government of Punjab
Survey of Pakistan
Pakistan Bureau of Statistics

Datum: WGS 1984
Units: Degree

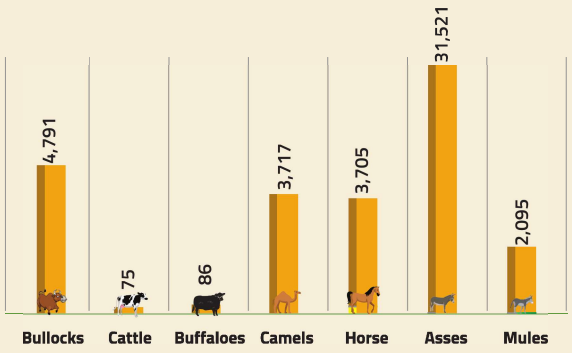
Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-001
Prepared by: Project Management Unit, NDMA
Last Updated: 7th March, 2017

16 LIVESTOCK

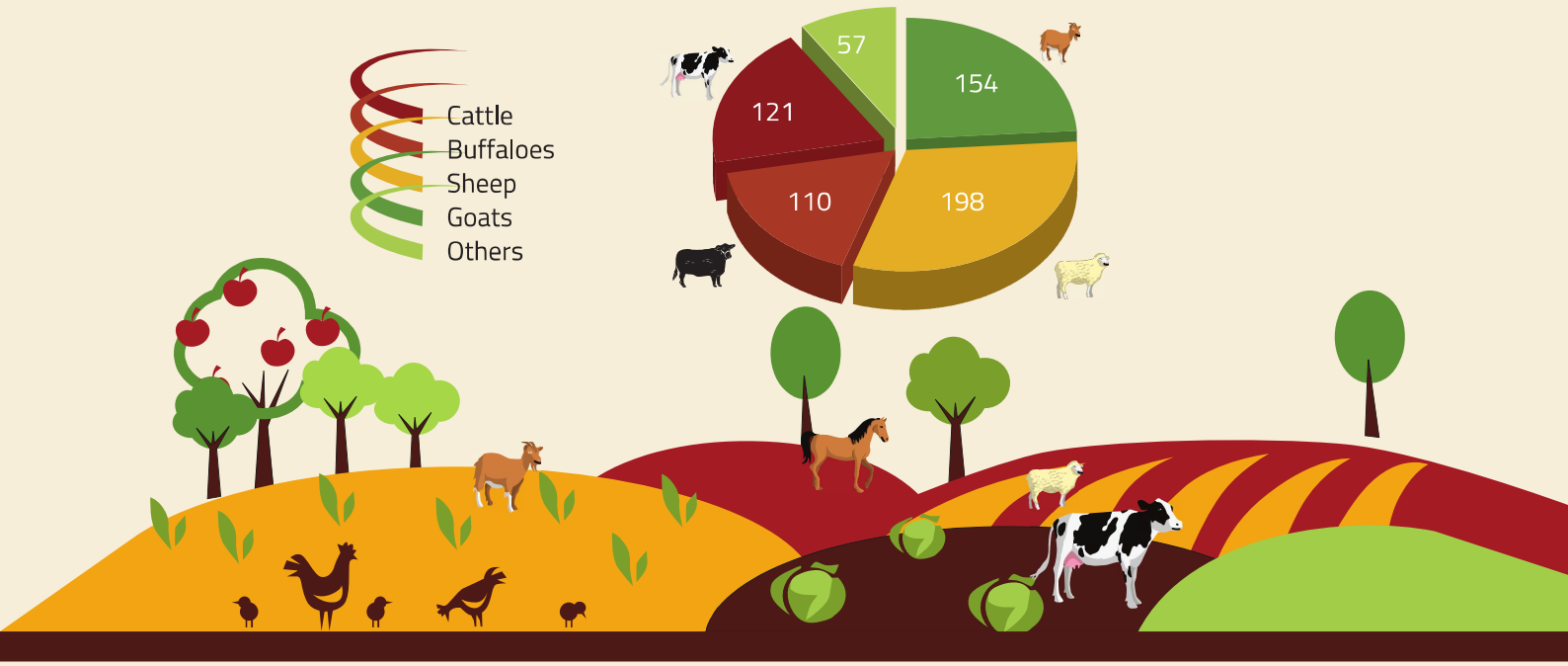
Number of Domestic Livestock
(Thousand)



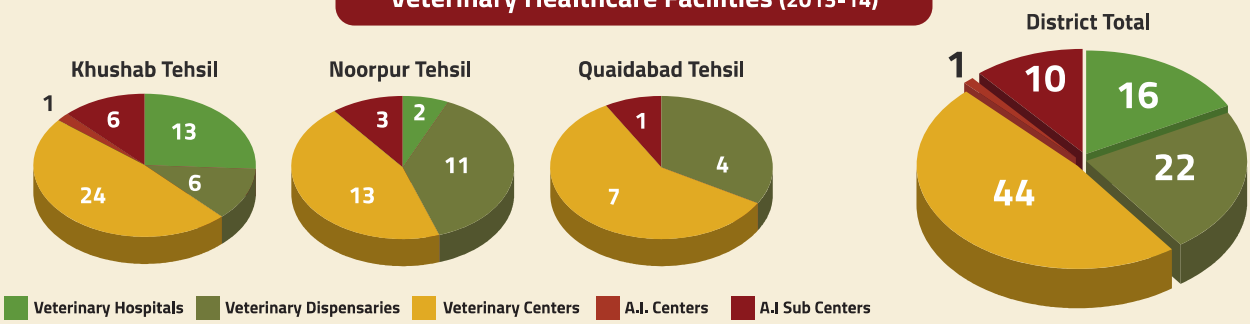
Number of Work Animals by Type (2006)
(Number)



Animals Slaughtered in Recognized & Unrecognized Slaughter Houses by Type (2013-14)
(In Hundred)



Veterinary Healthcare Facilities (2013-14)



Established Private Poultry Farms (2013-14)

	Broiler Farms	Layer Farms	Breeding Farms
Number	397	6	7
Capacity to Rear Birds per Annum (Thousand)	7,310	150	100

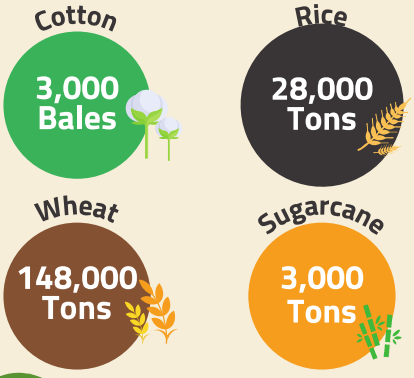
17 AGRICULTURE

Khushab district is predominantly agrarian in nature with majority of its population engaged in agriculture based activities. It receives a large proportion of rainfall during summers and is composed of well-regulated infrastructure of canals. The River Jhelum to its east feeds majority of the land of Naushera and Noorpur Tehsils. The district is also blessed with a fertile soil and a favorable climatic conditions. These features together make Khushab one the most agriculturally active regions of Pakistan.

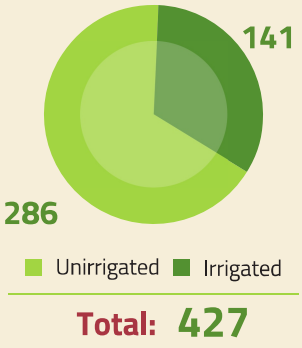
The district is endowed with variety of fruits, crops, vegetables and other resources. Some of the major crops grown in the district include Sugarcane, Gram, Wheat and Rice. Besides, Ground Nut, Jawar, Bajra, Tobacco, Moong, Mash, Masoor, Maize and Oil Seed such as Mustard are found in minor quantities in several areas of the district. Main fruits in the district include Citrus, Guava and Banana, whereas Apple, Banana, Pomegranate, Jaman, Dates and Almond are also grown in minor quantity. Main Vegetables Potato, Cauliflower and Tomato are among the major vegetables grown in the region while Carrot, Chillies, Cabbage, Onion, Matter Green, Garlic, Ladyfinger and Turnip are also grown in the district in minor quantities.

A deeper look at the agro based livelihood and the socio economical setup is given as:

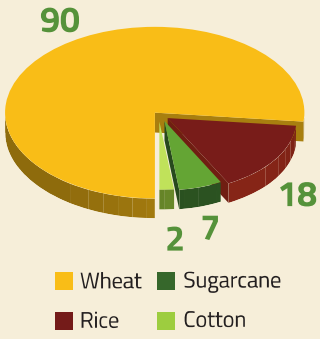
Major Crop Production
(2013-14)



Total Area Sown
(Thousand Hectares)

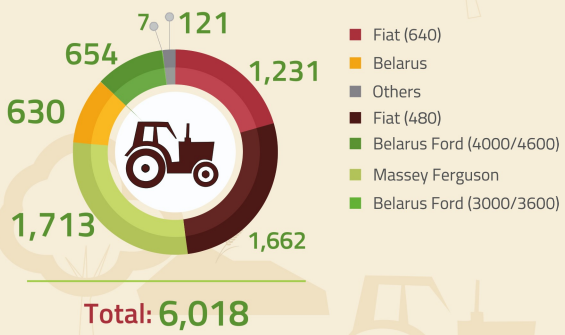


Area Sown Under Major Crops
(Thousand Hectares)

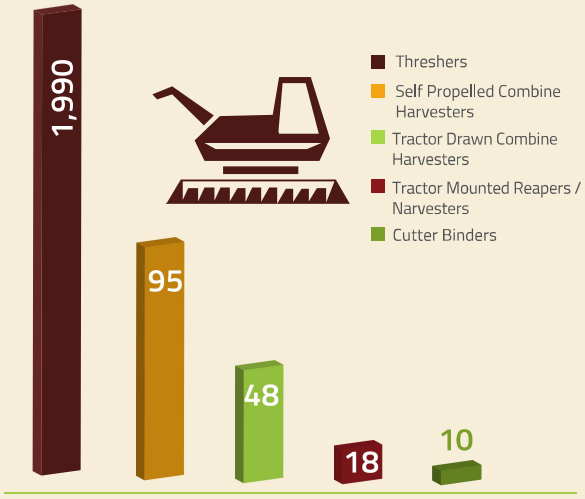




Tractors by Make (2012-13)

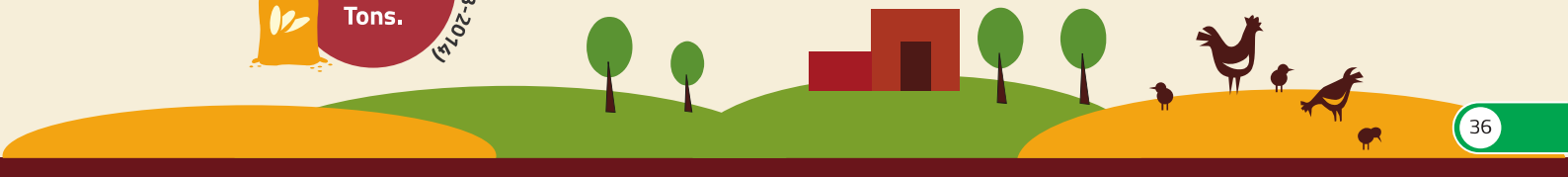


Threshers & Harvesters (2012-13)

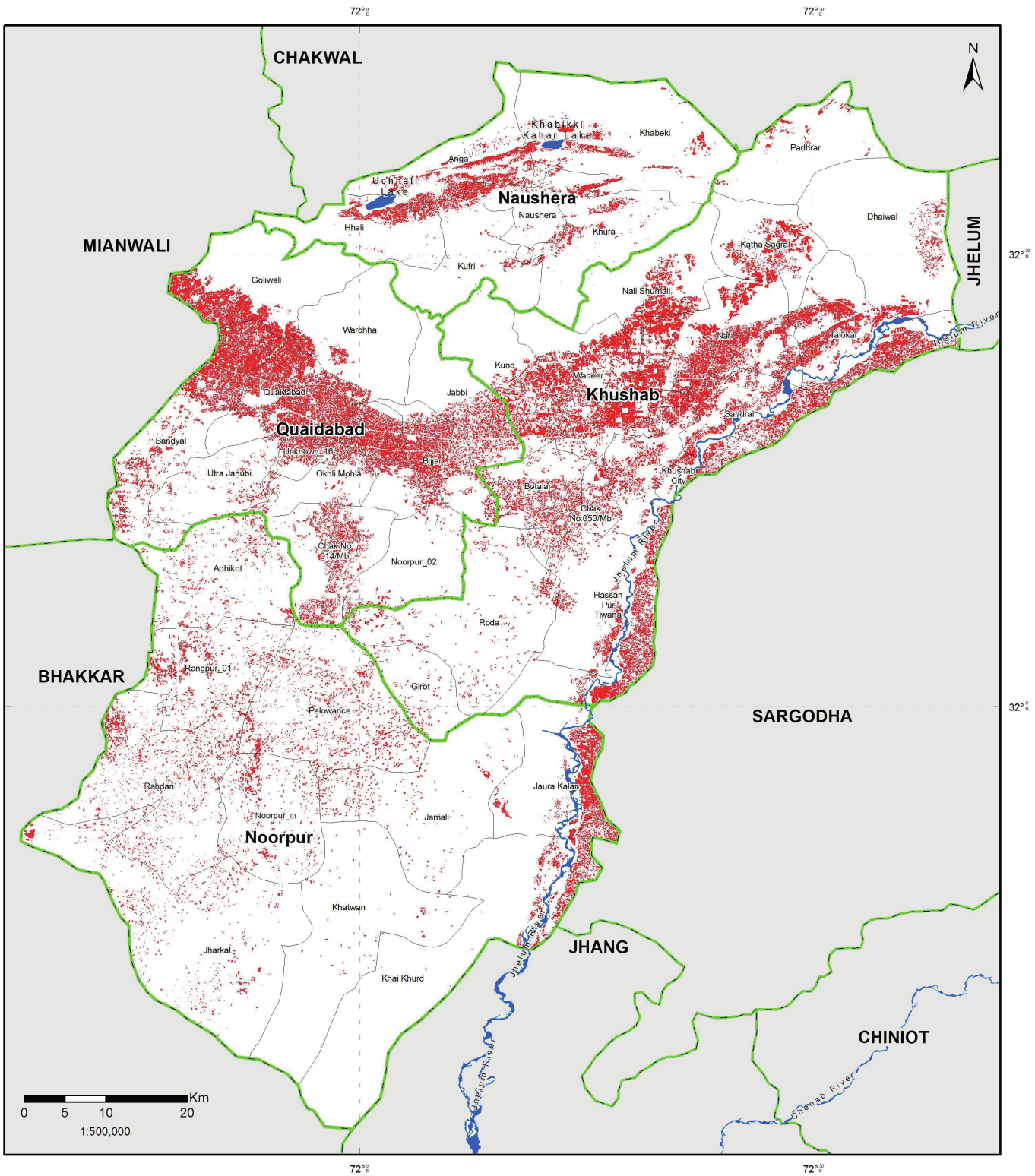


Sales of Fertilizer (2013-2014)





RABI CROP MAP (JUNE TO FEB)



Legend

- Wheat
- River and Water Body
- Abc — Union Council Boundary
- Abc — Tehsil Boundary
- ABC — District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

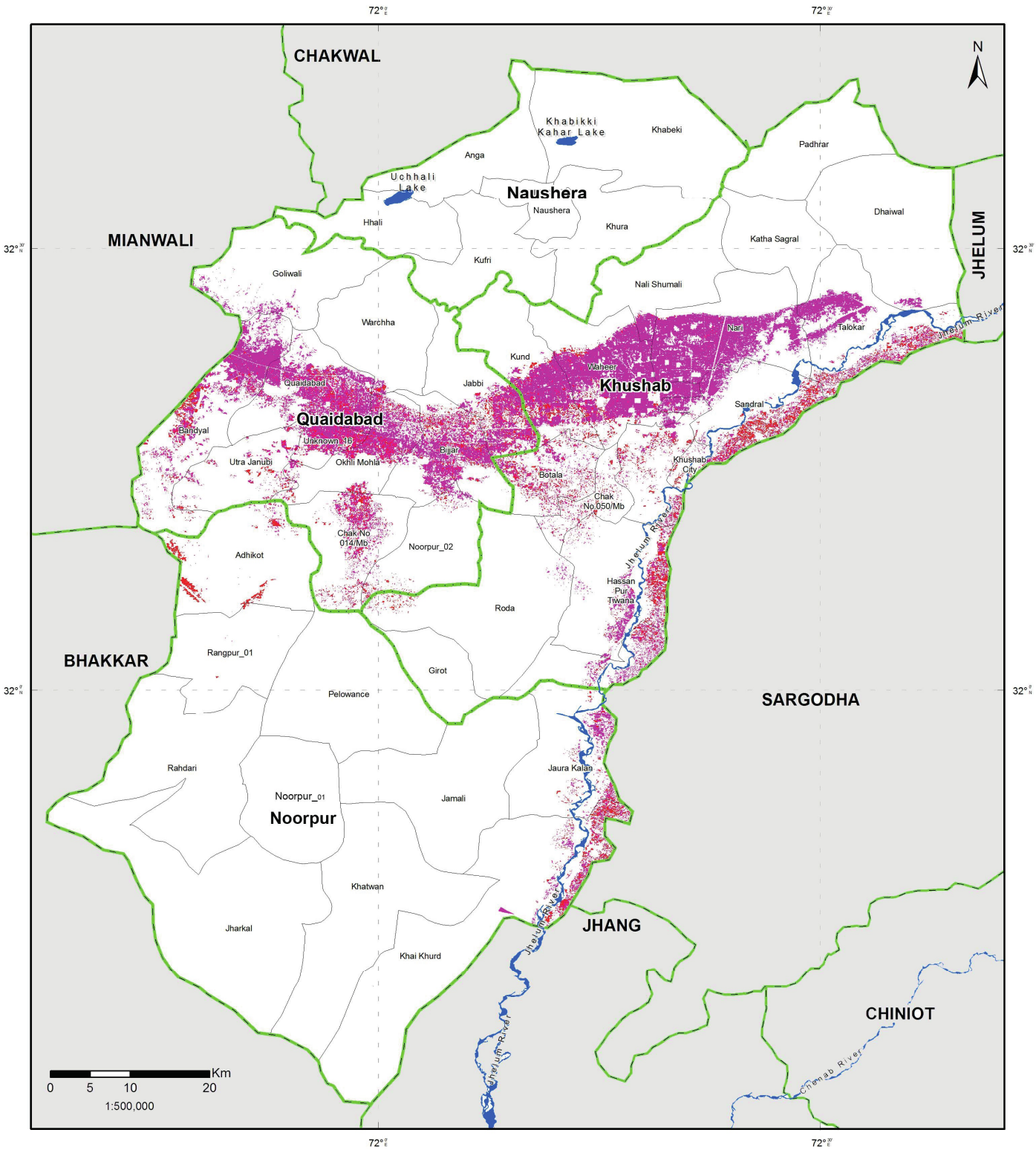
WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Crop Mask-SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-RB-012
Prepared by: Project Management Unit, NDMA
Last Updated: 11th May, 2017

KHARIF CROP MAP (AUG TO SEP)



Legend

- Rice
- Sugarcane
- Cotton
- River and Water Body
- Union Council Boundary (Abc)
- Tehsil Boundary (Abc)
- District Boundary (ABC)
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Crop Mask-SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-FEB-2016-GEN-NDMA-KH-012
Prepared by: Project Management Unit, NDMA
Last Updated: 11th May, 2017

Emergency Calls (by Type)

Road Accidents	Drowning	Fire	Blast	Building Collapse	Total Call Received
10,376	65	464	1	52	290,162

Medical	Crime Incidents	Patient Rescued	Fake Calls	Others
15,578	1,310	36,213	12	3,255

Rescue Equipment

Fire Vehicle	2	Water Bowser	1	Ambulance	4	Truck 05 Ton	0
Rescue Vehicle	1	Recovery Vehicle	0	Ground Duty Vehicles (GDV)	1	Foam Vehicle	0
Water R.Van	0	Aerial Platform	0	Ladder	0	Boat Carrier Truck	0

Flood Resources

Boat	12	Scuba	0	Life Ring	3	Oars	20
On Board Motors (Obm)	19	Torch	0	Tents	5	Mosquito Net	0
Life Jacket	104	Life Guard	4	Plastic Mat	0	Dry Suit	2
		Nylon Rope	10	Carpet	0		

Human Resource
119
Persons

Address

Opposite New Bus Stand, Main Sargodha Road, Khushab City

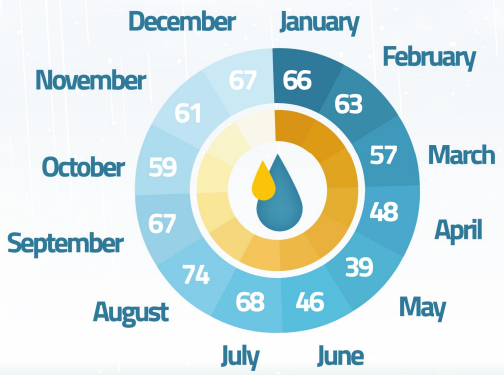
Longitude : 72.35 **Latitude :** 32.30



19 CLIMATOLOGY

District Khushab bears an extreme climatic condition. The prevailing climate in Khushab is known as a local steppe climate. There is little rainfall throughout the year. It is typically hot in summer, while cold in winter. The average temperature ranges generally from 25-42°C in summer and 4.1-28°C in winter. The hottest month is June with temperature reaches at 42°C. The coldest month is January where temperature generally falls below 5°C. However, at Soon Valley in Tehsil Naushera, temperature during winter falls below freezing point with frequent snowfalls. The wettest months are July and August with average precipitation nearly 100mm while the driest month is November with 5mm average precipitation. The average annual rainfall is around 400mm. Following graphs are based on meteorological records of last 30 years.

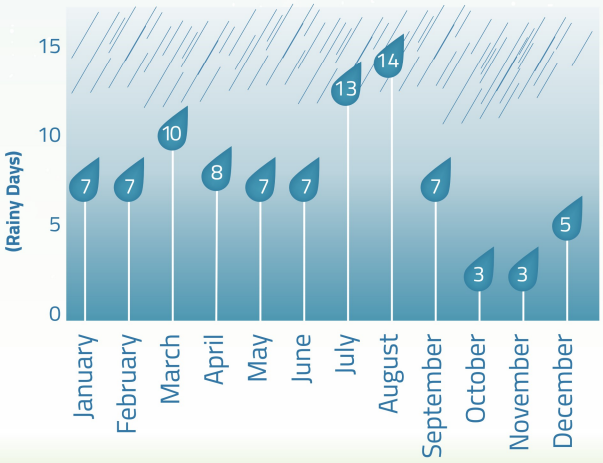
Relative Humidity (%)



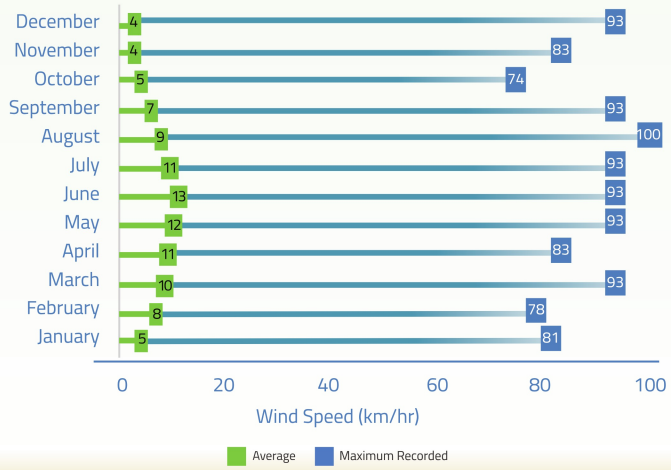
Average Precipitation (mm)

January 19	February 23	March 36
April 24	May 24	June 20
July 100	August 100	September 28
October 9	November 5	December 12

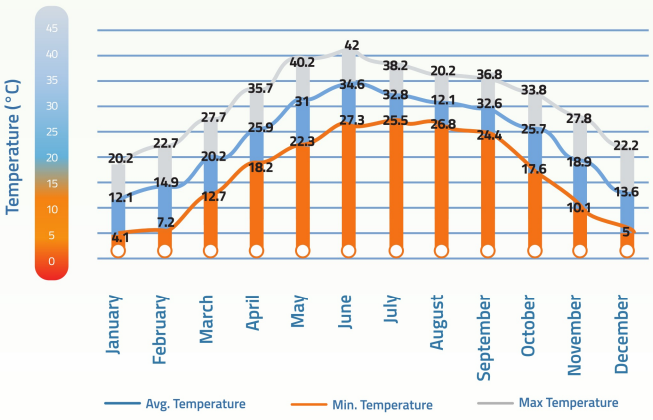
Average Rain Day (per month)



Average Wind Speed (km/hr)



Monthly Average Temperature (°C)





B HAZARD ASSESSMENT

- DROUGHT
- EARTHQUAKE
- FLOOD



20 DROUGHT HAZARD ASSESSMENT

A large part of Pakistan faces severe effects of drought for most part of the year. Long-drawn-out presence of drought is a significant challenge to agriculture, human lives, livestock, forests, water resource management, urban planning and food security. Due to changing climatic patterns, the drought phenomenon is likely to increase in terms of recurrence, extent, and intensity, for which drought hazard assessment can provide scientific basis for planning interventions for DRR and land use planning. In this study following indices are used for assessment of drought hazard.

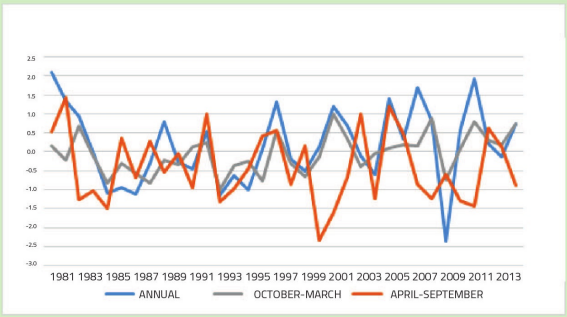
a. Standard Precipitation Index (SPI)
b. Normalized Difference Vegetation Index (NDVI)
c. Drought Severity Index (DSI)
d. Temperature Condition Index (TCI)
e. Vegetation Condition Index (VCI)
f. Vegetation Health Index (VHI)

Drought return period

A return period is the recurrence interval of a drought. It is a statistical measurement, particularly based on previous data. Strategic planning and management of water resources under climate change and drought conditions often require the assessment of return periods of drought events categorized by high severities.

Drought Occurrence (Years)	Most Severe Drought
1985, 1986, 1987,1991, 1993, 1994, 1995, 1999, 2004, 2009	2009

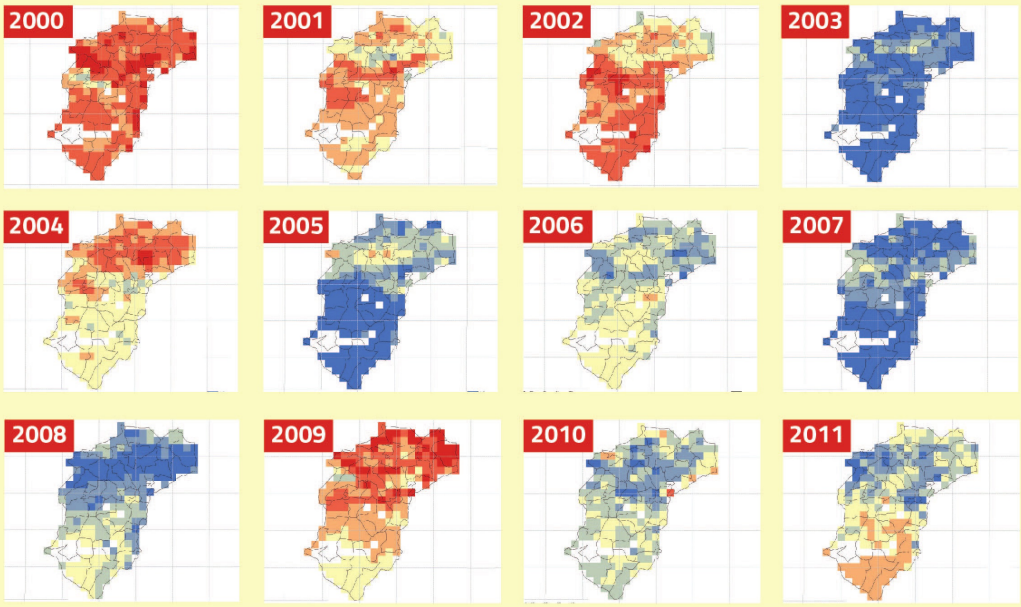
Standard Precipitation Index (SPI) 1981-2014



SPI Value	Conditions
2.0+	Extremely Wet
1.5 to 1.99	Very Wet
1.0 to 1.49	Moderately Wet
-0.99 to 0.99	Near Normal
-1.0 to -1.49	Moderately Dry
-1.5 to -1.99	Severely Dry
-2.0 and less	Extremely Dry

Description:
SPI is a tool to determine the severity of a drought at a given time scale of interest for any rainfall station with historic data. Mathematically, SPI is based on the cumulative probability of a given rainfall event occurring at a station.

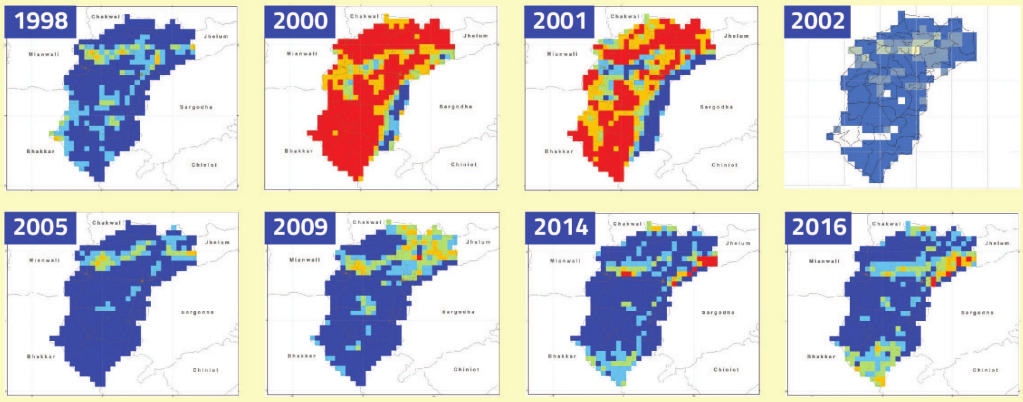
Drought Severity Index (DSI) 2000-2011



Legend:
- -1.5
- -0.5
- 0.5
- 1.5
- -1
- 0
- 1

Description:
DSI is an effective tool to estimate relative dryness of the land through using available temperature and precipitation data. It spans between the scales of -10 (dry) to +10 (wet).

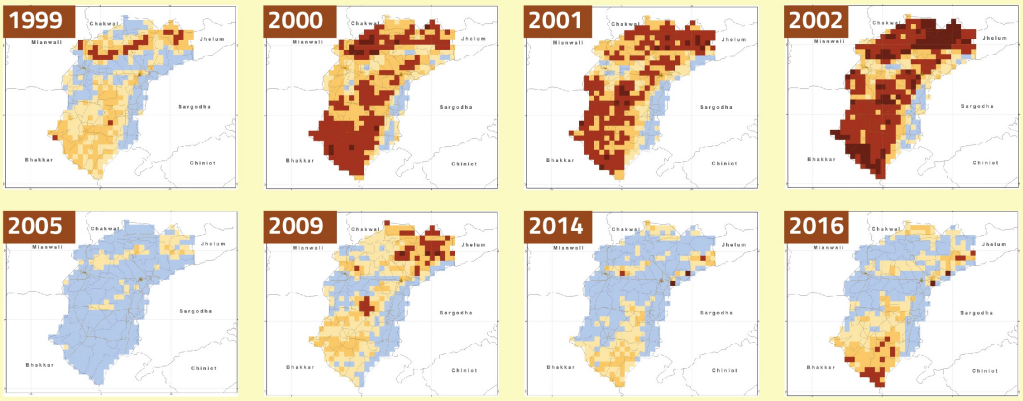
Vegetation Condition Index (VCI) 1998-2016



Legend:
- <10 (Extreme Drought)
- <20 (Severe Drought)
- <30 (Moderate Drought)
- <10 (Mild Drought)
- <10 (No Drought)

Description:
VCI is used to identify drought situations and determine the onset, especially in areas where drought episodes are localized or ill defined.

Vegetation Health Index (VHI) 1999-2016



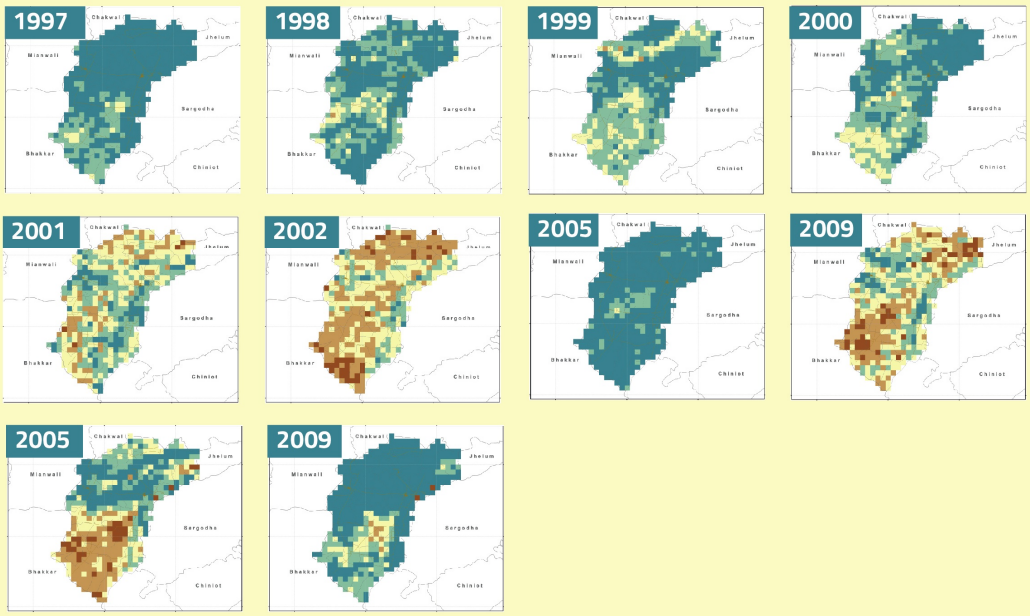
Legend:

- <10 (Extreme Drought)
- <20 (Severe Drought)
- <30 (Moderate Drought)
- <10 (Mild Drought)
- <10 (No Drought)

Description:

VHI is used to identify and classify stress to vegetation due to drought.

Temperature Condition Index (TCI) 1997-2016



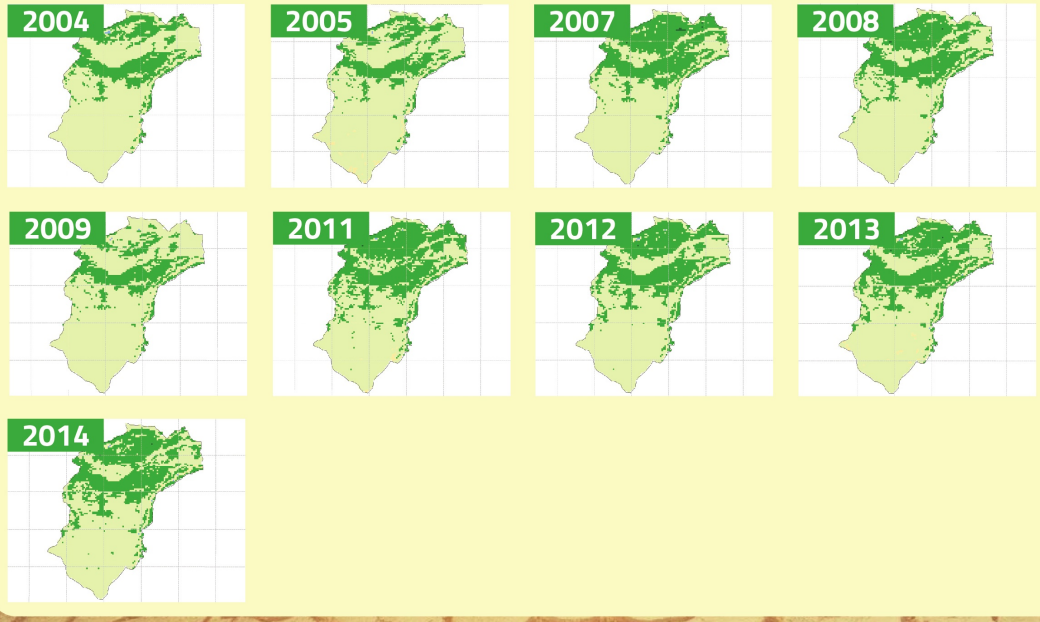
Legend:

- <10 (Extreme Drought)
- <20 (Severe Drought)
- <30 (Moderate Drought)
- <10 (Mild Drought)
- <10 (No Drought)

Description:

TCI is used to determine stress on vegetation caused by high temperatures and dryness.

Normalized Difference Vegetation Index (NDVI)



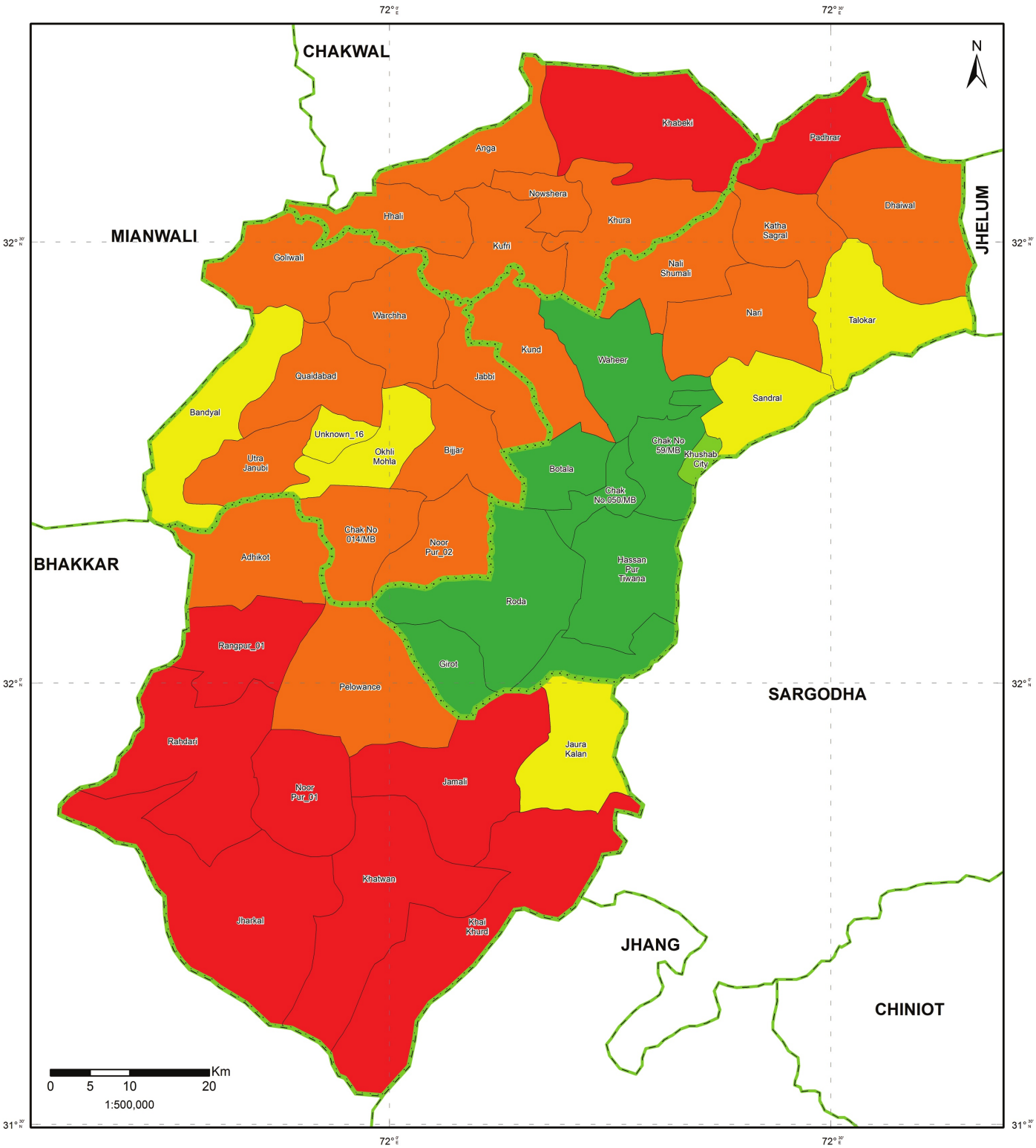
Legend:

- -0.3-0
- 0.01-0.1
- 0.11-0.3
- 0.31-0.6
- 0.61-0.9

Description:

The NDVI utilizes satellite imagery to evaluate variations in the normalized difference between the reflectance in near infrared (NIR) and visible red bands, which are responsive to changes in vegetation. Higher NDVI values reflect healthy vegetation, whereas lower NDVI values depict stress condition.

DROUGHT PRONE UNION COUNCILS



Legend

Drought Severity Index (DP)

- No Drought
- Mild Drought
- Moderate Drought
- Severe Drought
- Extreme Drought

- Abc — Union Council Boundary
- Abc — Tehsil Boundary
- ABC — District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

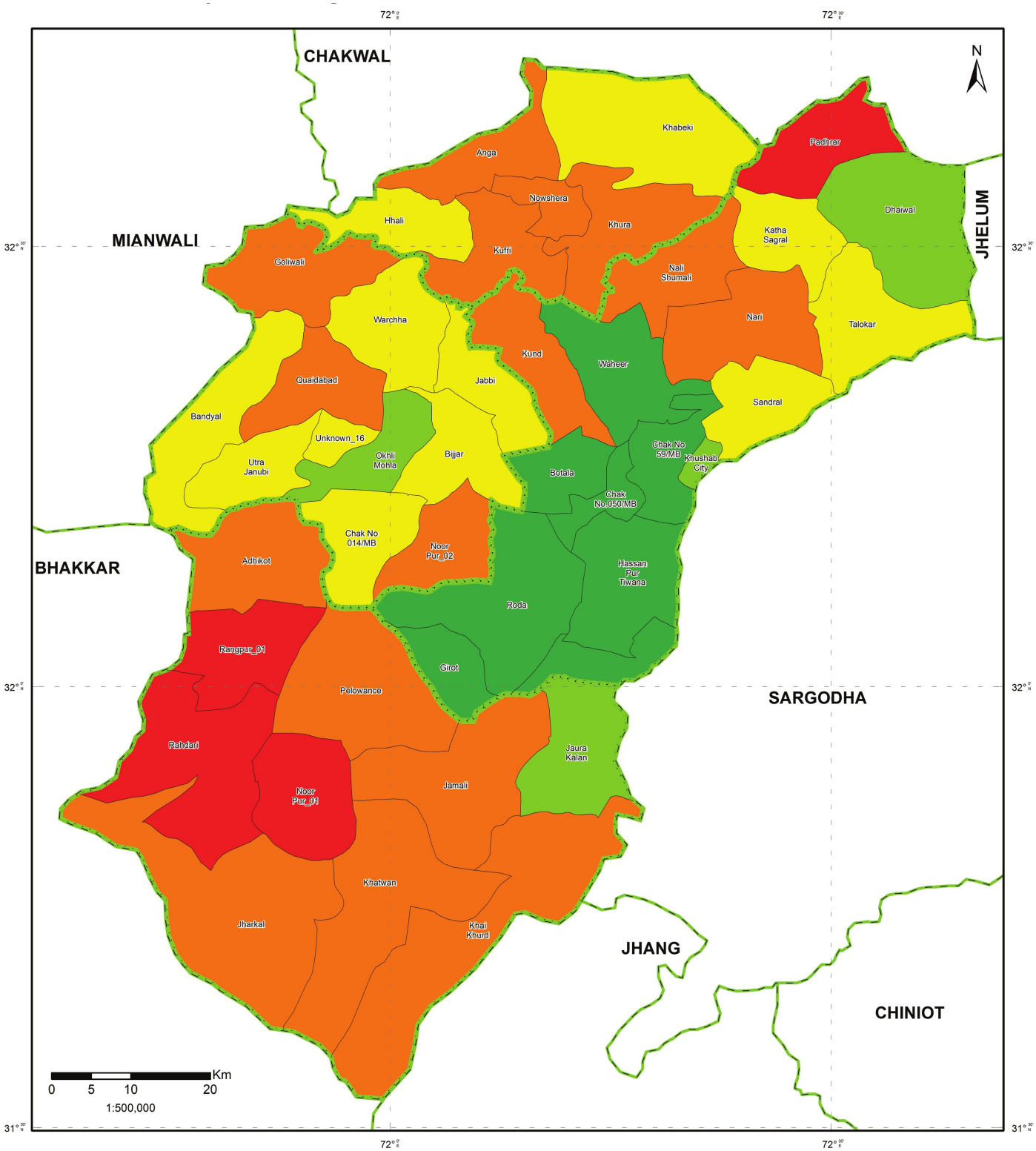
Data Source(s):

Pakistan Council of Research In Water Resources
SCARPs Monitoring Organization,WAPDA.

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-MAR-2016-HAZ-02-NDMA-001
Prepared by: Project Management Unit, NDMA
Last Updated: 7th March, 2017

FREQUENTLY DROUGHT PRONE UNION COUNCILS



Legend

Drought Severity Index (FDP)

- No Drought
- Mild Drought
- Moderate Drought
- Severe Drought
- Extreme Drought

- Abc — Union Council Boundary
- Abc — Tehsil Boundary
- ABC — District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

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Map No: MHVRA-PUN-616-MAR-2016-HAZ-02-NDMA-001
Prepared by: Project Management Unit, NDMA
Last Updated: 7th March, 2017

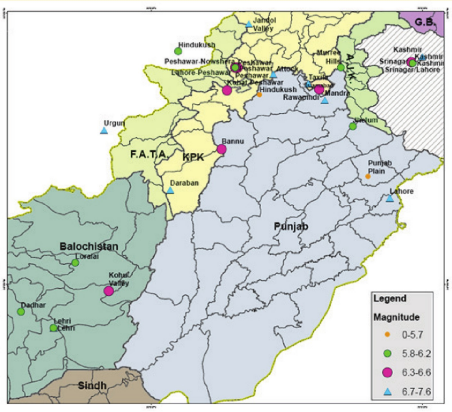
21 EARTHQUAKE HAZARD ASSESSMENT

Earthquake is defined as shaking and vibration at the surface of the earth resulting from underground movement along a fault plane due to volcanic activity, cryoseismic activity, the sudden cracking of frozen soil or rock or due to movement of plate boundaries of the Earth. Earthquake hazard at a site is characterized by either probabilistic or deterministic seismic hazard analysis. Probabilistic seismic hazard analysis involves the quantification of rate of probability of exceedance taking into consideration all possible earthquakes. Deterministic analysis evaluates the site specific seismic hazard which is influenced by maximum hazard from controlling sources. The general Probabilistic seismic hazard analysis procedure quantifies the annualized rate of exceedance of specified ground motions of various intensities, which is transformed to obtain the probability of exceedance of ground motions within the lifetime of the structure and infrastructure of interests.

District Khushab has a major fault line i.e. the Salt Range Thrust passing through Naushera, Khushab and Quaidabad tehsils. This fault line is active and belongs to the Himalayan Fold. According to the historical catalogues used in this assessment, khushab is a seismically active zone and has experienced earthquakes in the range of magnitude 4-6 on richter scale.

The main findings of the probabilistic seismic hazard assessment reveal that ground motion in District Khushab show spatial variability throughout the district when mapped at tehsil level, however, this variability diminshes when ground motions are mapped at UC levels. For the purpose of seismic design of building, Pakistan has been divided into five zones by Pakistan Engineering Council. These zones are based on Peak Ground Acceleration represented in the table placed along side.

Historical Seismic Events



For the purpose of seismic designs of buildings, Pakistan has been divided into 5 Zones. These Zones are based on Peak Ground Acceleration (PGA). Ranges are designed in Table below:

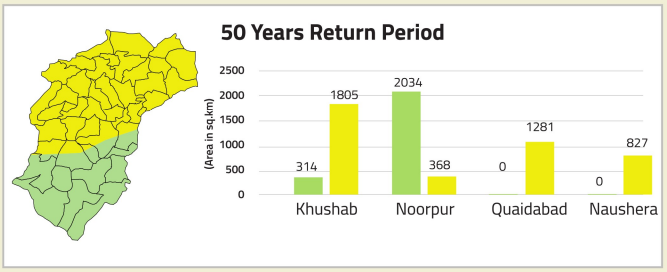
Zone	Intensity	Ground Motion (g)	PGA (g*)
1	Very Low	0.01 – 0.08	0.08
2A	Low	0.08 – 0.16	0.15
2B	Medium	0.16 – 0.24	0.20
3	High	0.24 – 0.32	0.30
4	Very High	> 0.32	0.40

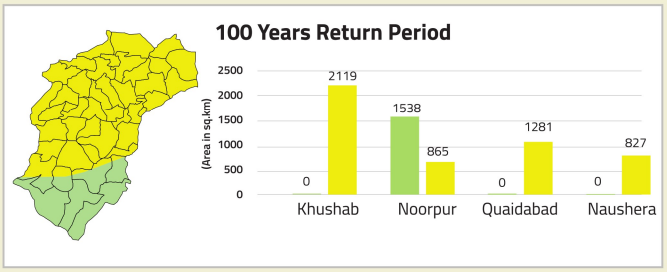
*Where g is acceleration due to gravity

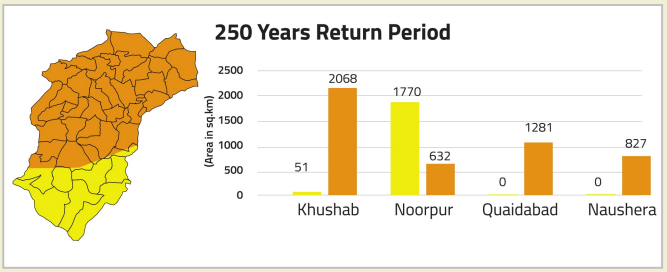
Methodology of Assessment

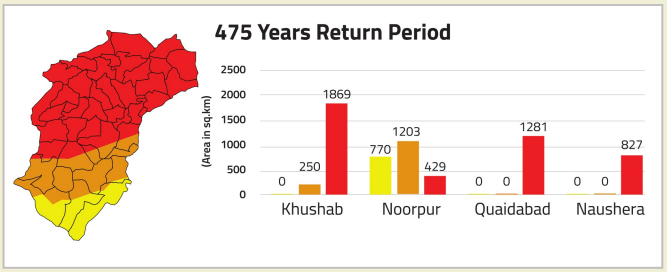
The first step for Earthquake Hazard Assessment was defining of area of interest followed by the compilation of Earthquake Catalogue from different national and international sources. The catalogues were homogenized, declustered and checked to ensure their completeness. Ground Motion Prediction Equations (GMPEs) were selected and the data was processed in a hazard computation software (CRISIS). The output of the exercise was the probabilistic seismic hazard mapping on 50, 100, 250, 475 and 2500 years return periods. The next stage was Sensitivity Analysis of tools used in the study. The next step was Seismic Response Analysis of site soil using strong ground motions records using Deepsoil software. The final phase of assessment was the incorporation of site soil conditions for seismic microzonation to map site specific ground motions.

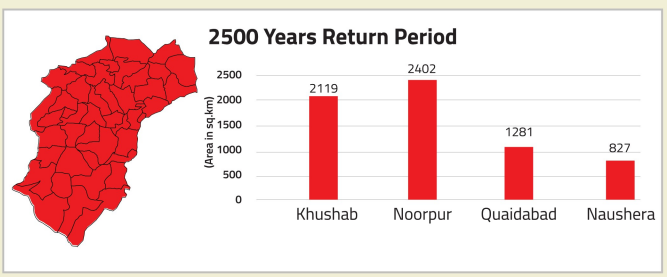
Seismic Hazard Maps Based on Return Periods (50,100,250,475 and 2500 Years)











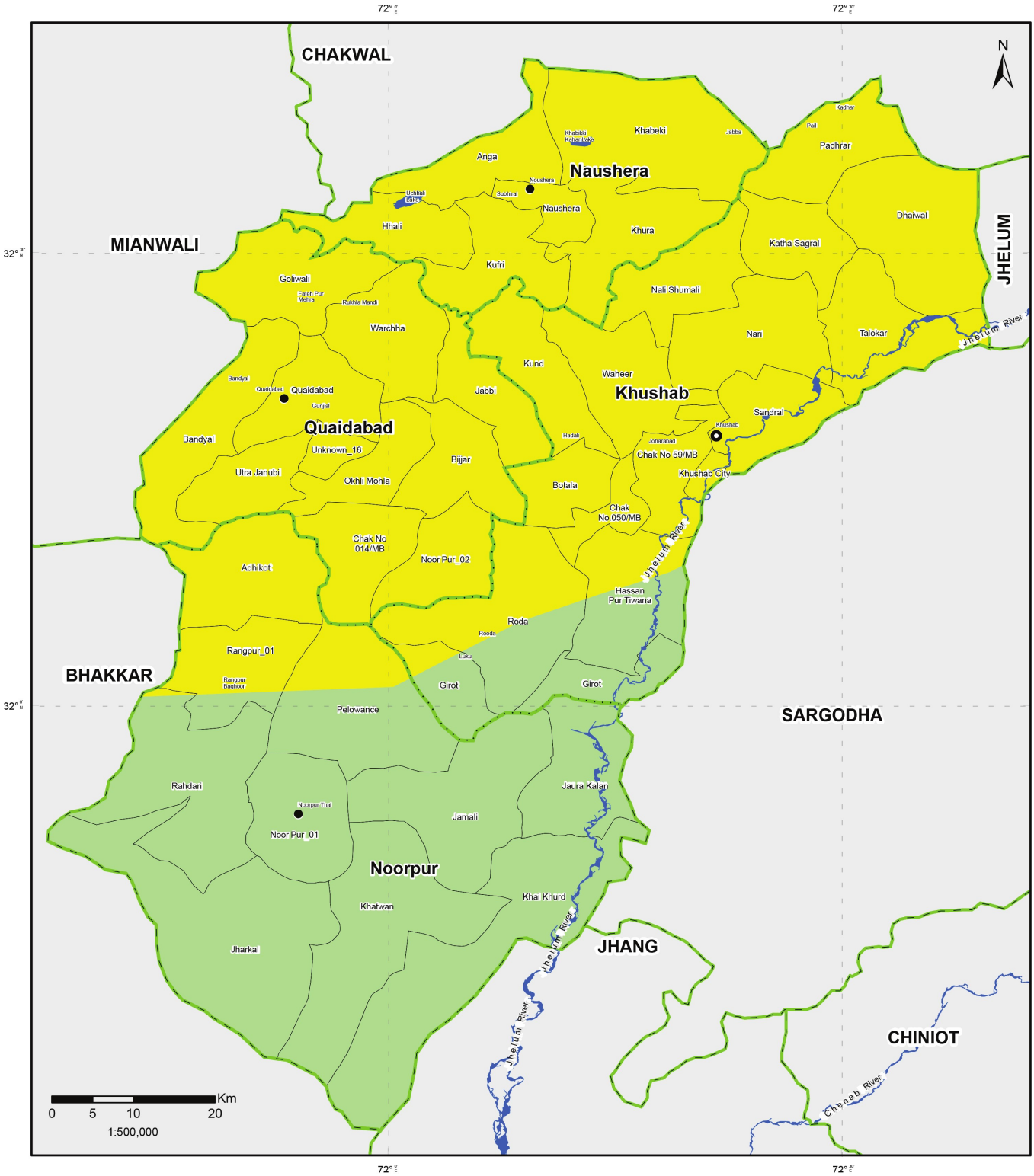
Hazard Zones (g)*

- Zone 1 (Very Low)
- Zone 2A (Low)
- Zone 2B (Medium)
- Zone 3 (High)
- Zone 4 (Very High)

Discription:

Where return period is the reccurrence interval of an earthquake. It is a statistical measurement particularly based on previous data.

EARTHQUAKE HAZARD 50 YEAR RETURN PERIOD



Legend

- District Headquarter
- Tehsil Headquarter

Hazard Zone*

1	(0.05-0.08g)	Very Low
2A	(0.08-0.16g)	Low
2B	(0.16-0.24g)	Medium
3	(0.24-0.32g)	High
4	(>0.32g)	Very High

- River and Reservoir
- Abc Union Council Boundary
- Abc Tehsil Boundary
- ABC District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

*Zones are defined as per classification of Pakistan Engineeringing Council. Whereas Unit "(g)" is gravity

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

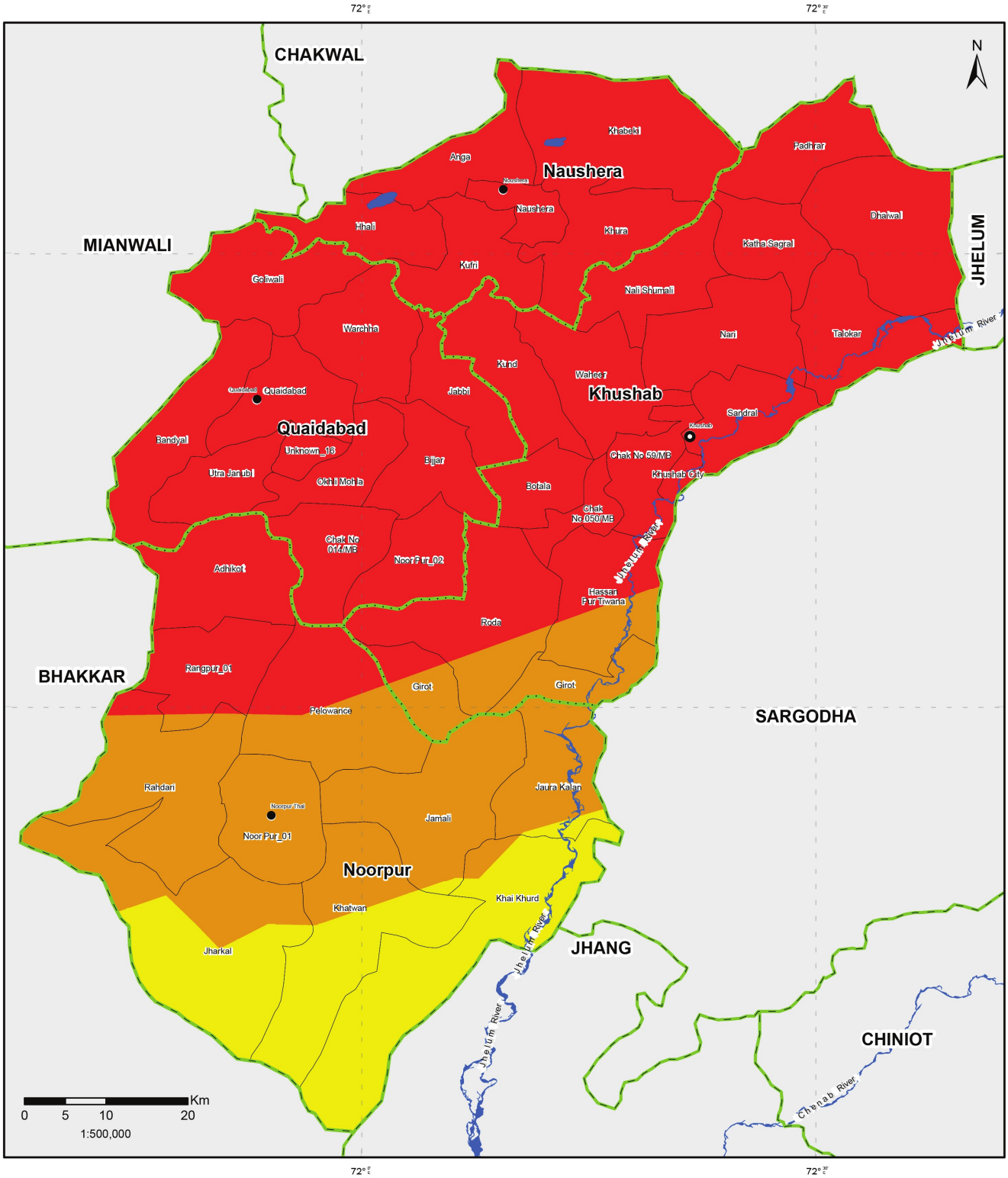
MAP INFORMATION

Data Source(s):

Pakistan Meteorological Department
Geological Survey of Pakistan

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-MAR-2016-HAZ-03-NDMA-50
Prepared by: Project Management Unit, NDMA
Last Updated: 9th March, 2017

EARTHQUAKE HAZARD 475 YEAR RETURN PERIOD



Legend

- District Headquarter
- Tehsil Headquarter

Hazard Zone (g)*

1	(0.05-0.08)	Very Low
2A	(0.08-0.16)	Low
2B	(0.16-0.24)	Medium
3	(0.24-0.32)	High
4	(>0.32)	Very High

- River and Water Body
- Abc Union Council Boundary
- Abc Tehsil Boundary
- ABC District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

*Zones are categories as per classification of Pakistan Engineeringing Council. Symbol "(g)" represent Gravitational Acceleration

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):

Pakistan Meteorological Department
Geological Survey of Pakistan

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-MAR-2016-HAZ-03-NDMA-475
Prepared by: Project Management Unit, NDMA
Last Updated: 9th March, 2017

22 FLOOD HAZARD ASSESSMENT

River Jhelum runs along the Eastern boundary of the district, covering a distance of about 161 km. It enters into the district from village Balwal, District Sargodha and flows through the Khushab and Noorpur Thal Tehsils and enters Jhang District. In past, a large number of villages were inundated by flood water during flooding in years 1992, 1995, 2010 and 2014 as a result of which considerable loss was caused. In order to mitigate flood related damages, the Government of Pakistan has built various flood protection structures, details of which are shown in map and table.

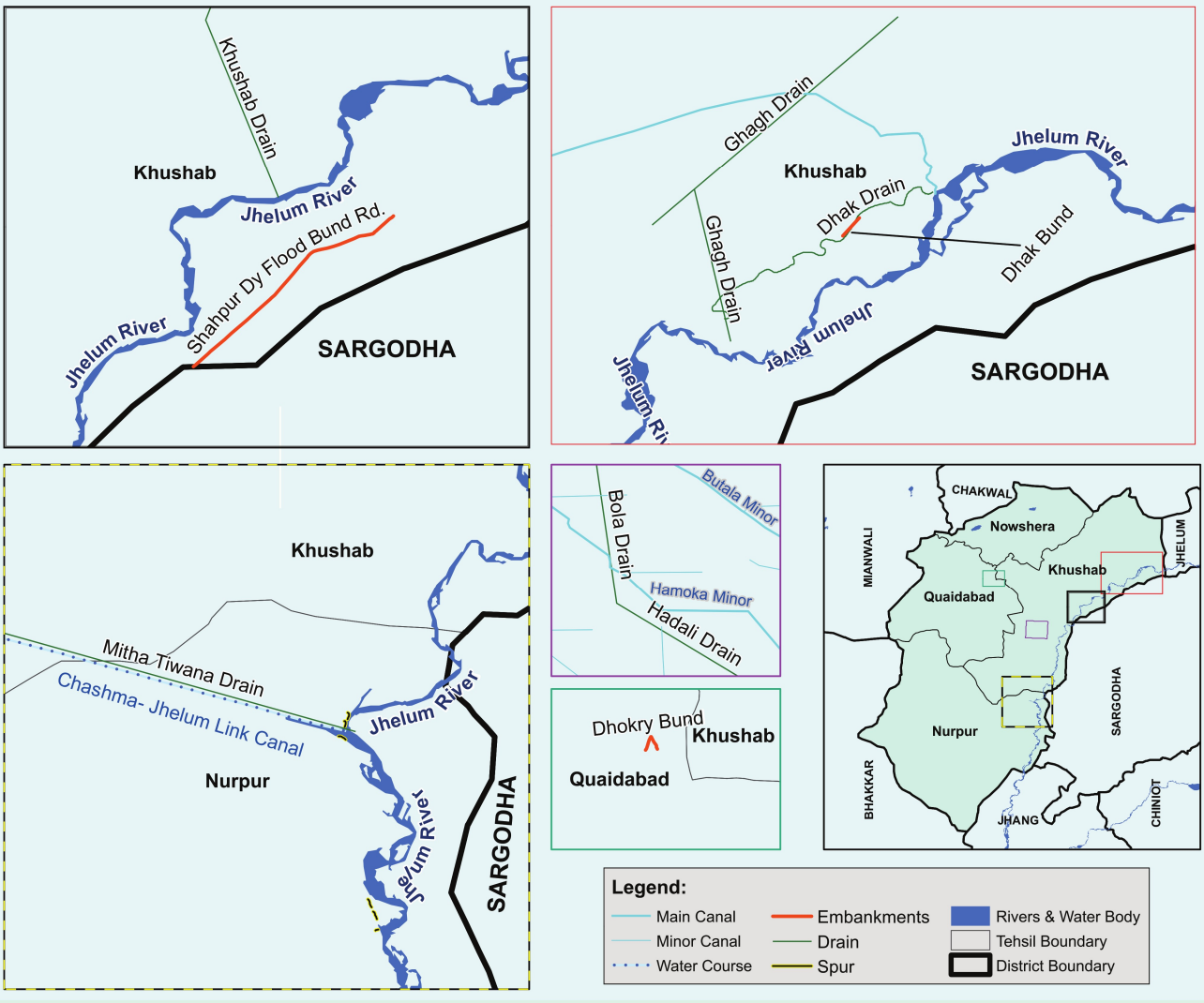
Flood Protection Structures

Drains	• Mitha Tiwana Drain • Hadali Drain • Bola Drain • Ghag Drain • Khushab Drain • Dhak Drain
Embankments	• Dhokry Bund • Dhak Bund • Shahpur Dy Flood Bund Rd.

Early Warning & Response Time for Riverine Floods (in Hours)

Flood Intensity	Mangla to Rasul	Rasul to Khushab Bridge	Total Response time
Low Supplies	16 to 20	22 to 27	38 to 47
Low Flood	15	21	36
Medium Floods	12	16	28
High Flood	10	14	24
Very High	10	11	21
Exceptionally High	6 to 7	8 to 11	14 to 18

Flood Protection Structures Maps



Assessment Methodology

The HEC-GeoRAS floodplain mapping hydraulics model has been used based on the observed peak flow data from Rasul Barrage. The Digital Elevation Model (DEM) and other important components of flood hazard and inundation extent mapping have been analyzed using ArcGIS and HEC-GeoRAS. For hazard assessment elevation and slopes were converted from DEM where geometric data was developed for describing the stream network, junctions, cross section and geometries, as well as the downstream reach lengths of the channel and overbanks for each cross section.

Return Period

Return Periods	Discharge (in Cusecs)
10 Years	17,535
50 Years	623,586
100 Years	1,247,137

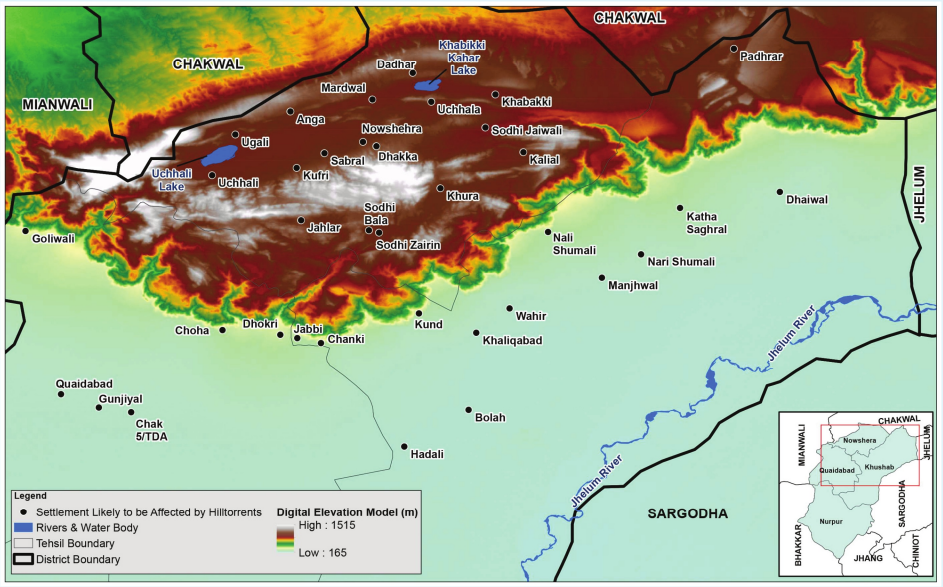
Hill Torrents Flash Floods

Flash flooding occurs on rivers which flow over impermeable terrain or rivers around steep valleys. Triggering factor for it usually is localized precipitation, sudden flow from an upstream catchment or in case of urban areas, intense rain coupled with encroachment in sewerage channels. Severity from such floods is extreme due to increased downstream flow velocity.

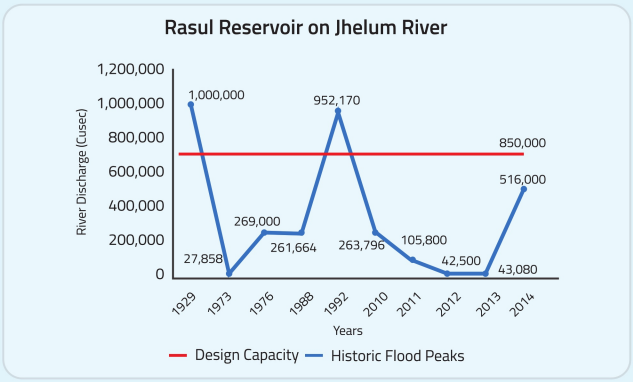
Flood Warning Indicators for Hill Torrents

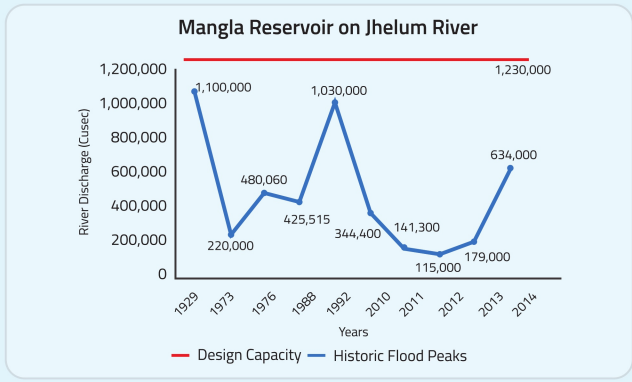
Alert Levels	Rain In Hill Torrents Catchments
Medium	4 hours continuous
High	8 hours continuous
Very High	12 hours continuous
Exceptionally High	2-3 days continuous
Catastrophic	Over one week continuous

Villages Vulnerable To Hill Torrents Flash Floods



Major Flood Events & Historic Flood Peaks





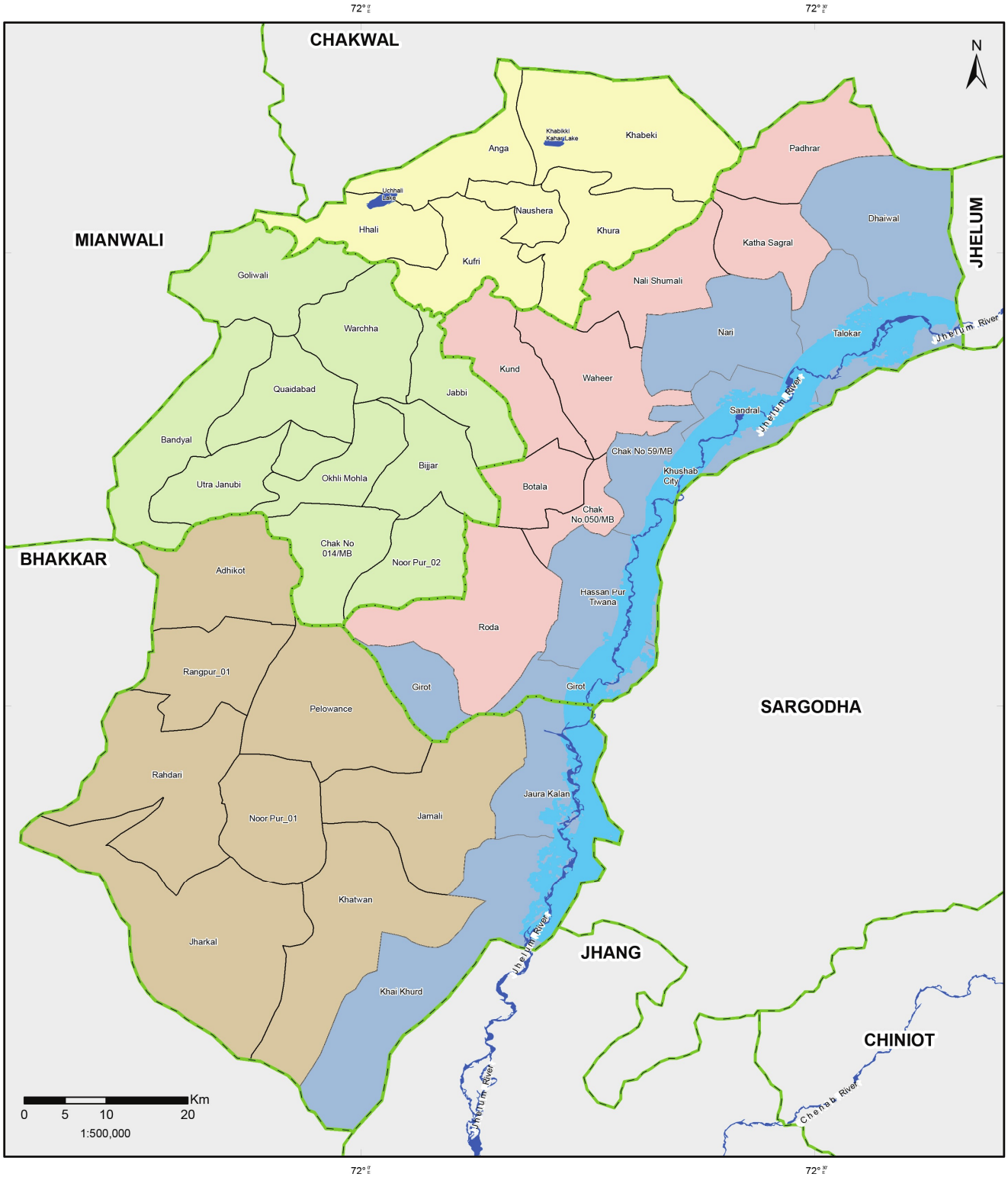
Damages & Losses (2014 Floods)

		Housing							Crops
		By Building Topologies		By Damag Extent		By Locality			
	UNION COUNCILS	Kaccha	Pacca	Partially Damaged	Completely Damaged	Urban	Rural	Total	Crops Damage (in Acres)
KHUSHAB	Khushab	2	162	114	50	164	0	164	535
	Sandral	32	88	78	42	0	120	120	3,651.45
	Hassan Pur Tiwana	13	23	14	22	0	36	36	1,035.85
	59/MB	0	2	1	1	0	2	2	0
	Dhak	1	2	2	1	0	3	3	0
	Tilokar	0	1	0	1	0	1	1	2,781
	Girot	3	2	0	5	0	5	5	2,295.7
NOORPUR	Jaurn Kalan	51	13	21	60	0	81	81	81
	Khai Khurd	9	0	7	2	0	9	9	9
		111	293	237	184	164	257	421	10,389

*Partially damaged means "less than 40% damage" implies that the structure can be put to use with minor improvement work.

*Fully damaged means "40% and above damage" implies that the structure / facility needs to be demolished and re-constructed.

FLOOD HAZARD 10 YEAR RETURN PERIOD



Legend

- Flood 10 Year Return Period
- Flood Exposed UCs
- River and Reservoir
- Union Council Boundary
- District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

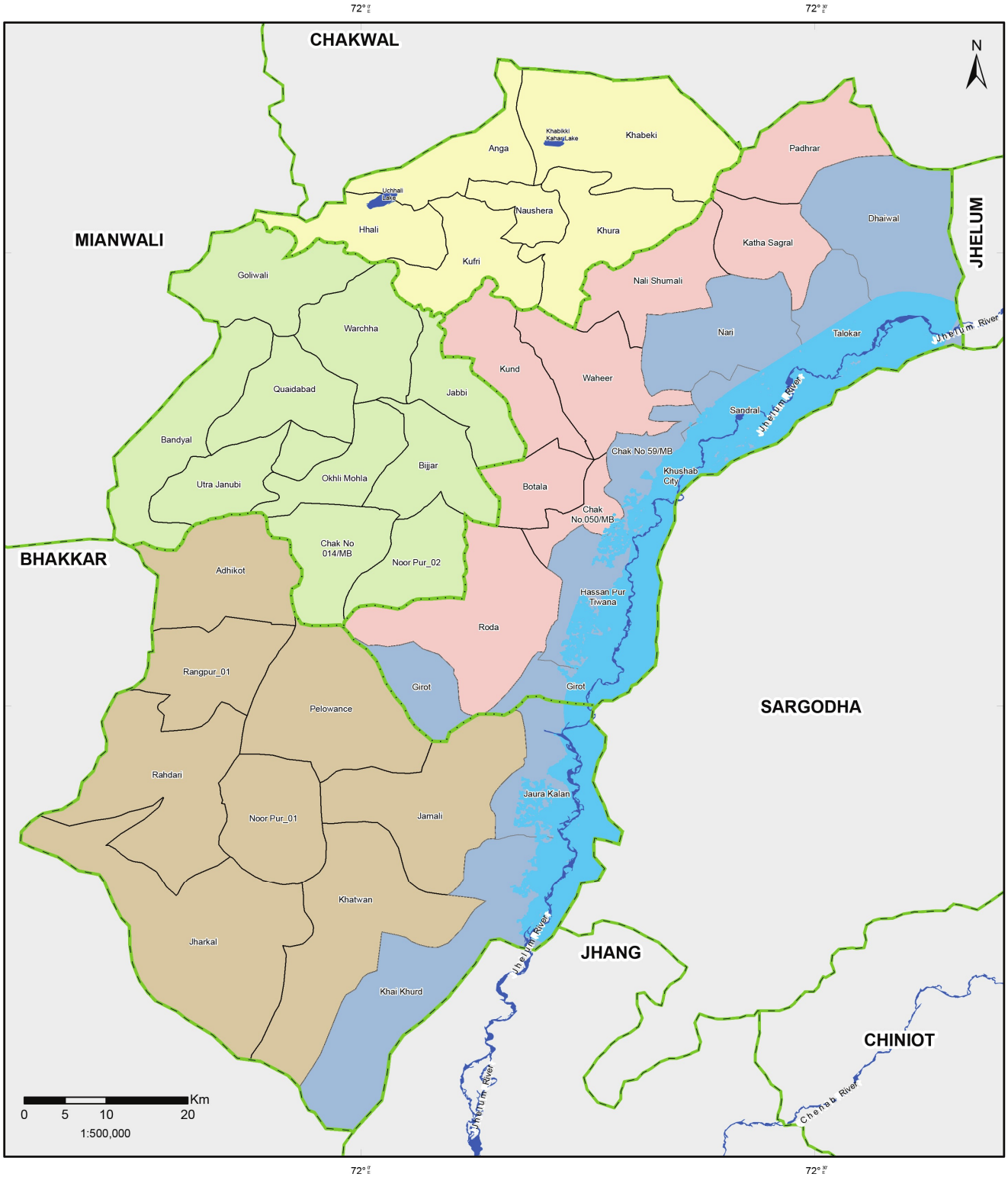
MAP INFORMATION

Data Source(s):
NDMA,
SUPARCO

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-MAR-2016-HAZ-04-NDMA-002
Prepared by: Project Management Unit, NDMA
Last Updated: 7th March, 2017

FLOOD HAZARD 50 YEAR RETURN PERIOD



Legend

- Flood 50 Year Return Period
- Flood Exposed UCs
- River and Reservoir
- Abc — Union Council Boundary
- ABC — District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

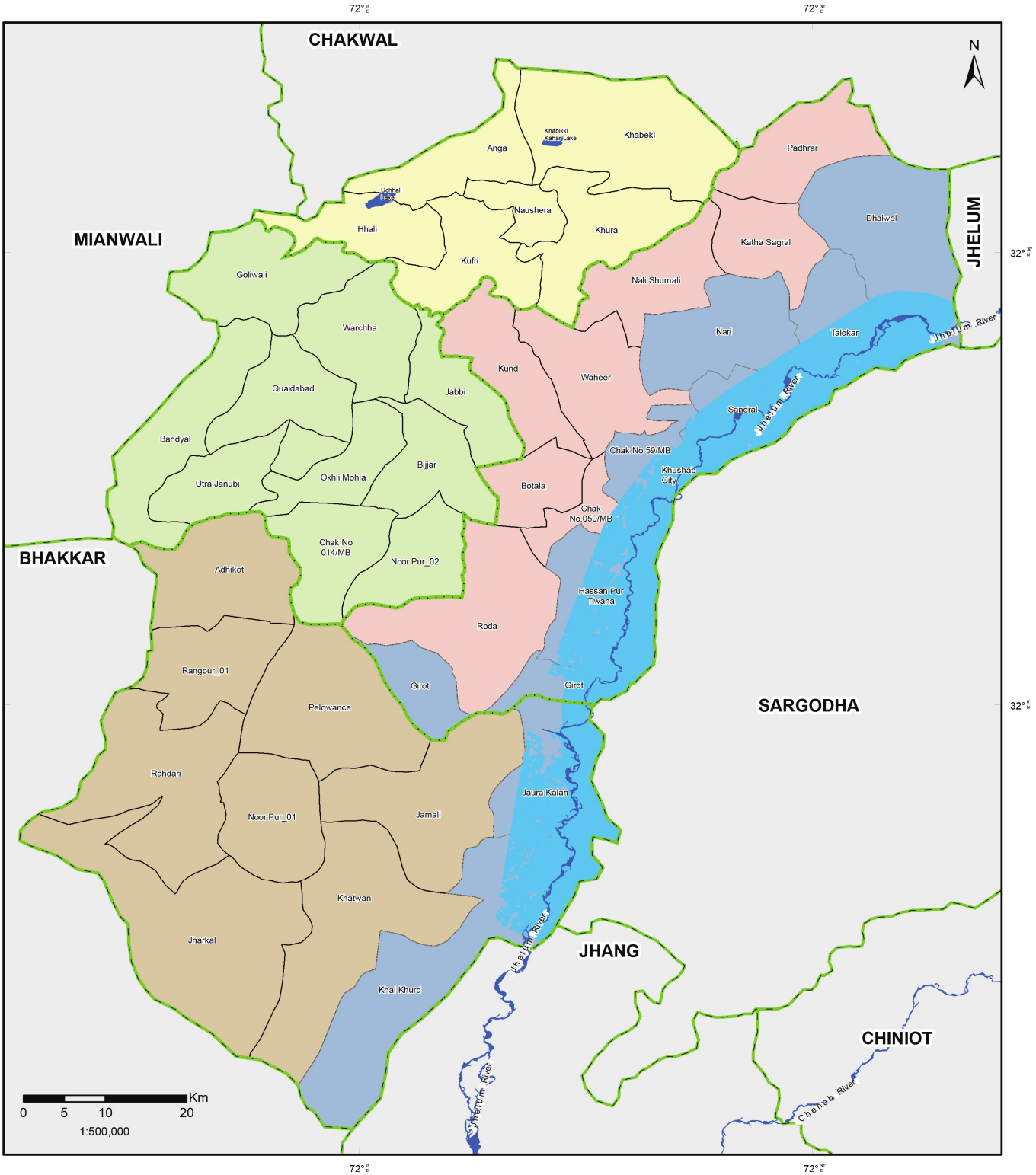
MAP INFORMATION

Data Source(s):
NDMA,
SUPARCO

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-MAR-2016-HAZ-04-NDMA-003
Prepared by: Project Management Unit, NDMA
Last Updated: 7th March, 2017

FLOOD HAZARD 100 YEAR RETURN PERIOD



Legend

- Flood 100 Year Return Period
- Flood Exposed UCs
- River and Reservoir
- Union Council Boundary (Abc)
- District Boundary (ABC)
- Provinvial Boundary
- Line of Control
- International Boundary

Tehsil Boundary

- Naushera
- Khushab
- Quaidabad
- Noorpur

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
NDMA,
SUPARCO

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-MAR-2016-HAZ-04-NDMA-004
Prepared by: Project Management Unit, NDMA
Last Updated: 7th March, 2017

C | EXPOSURE ASSESSMENT

- DROUGHT
- EARTHQUAKE
- FLOOD



23 ELEMENTS EXPOSED TO DROUGHT HAZARD

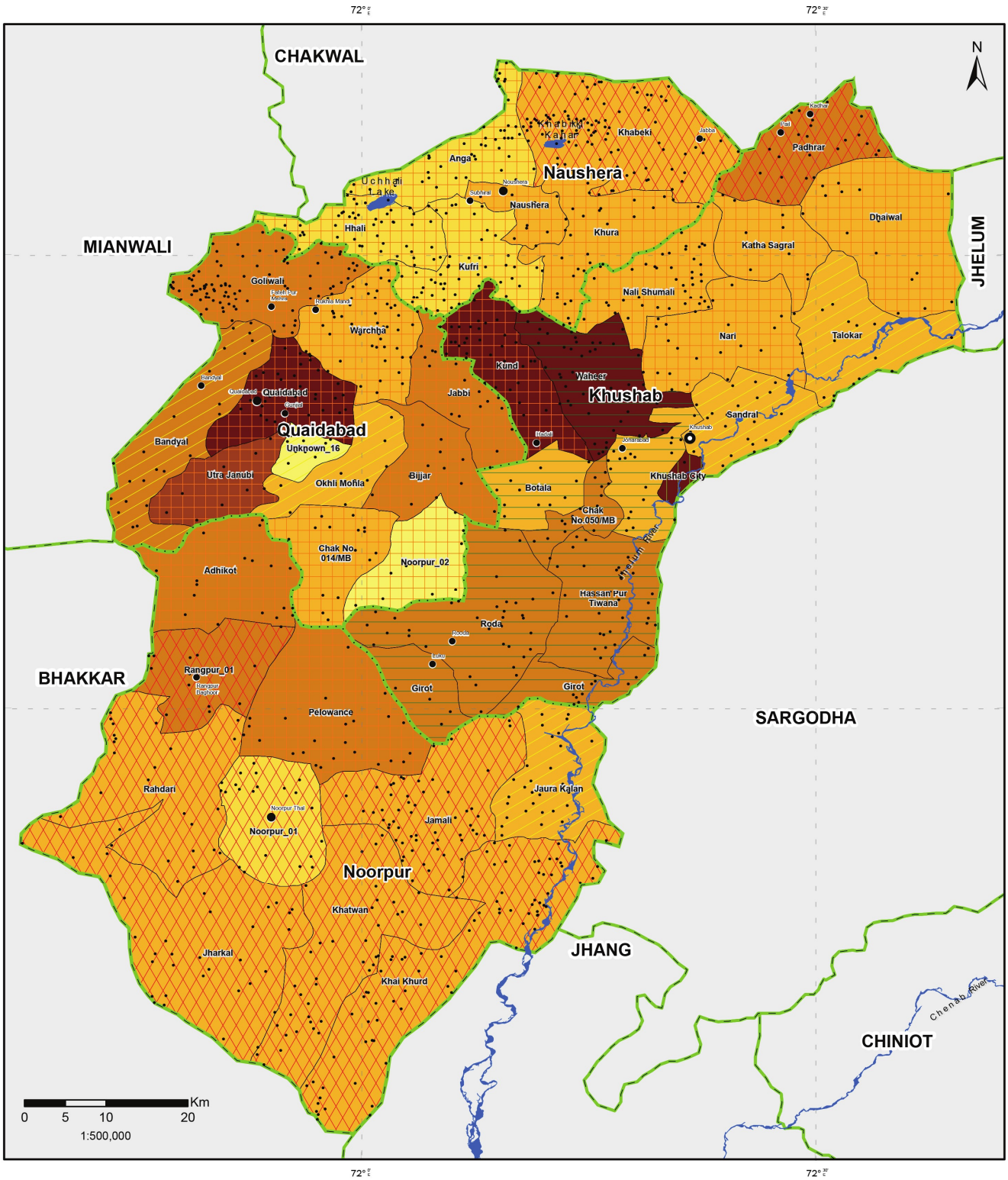
	UNION COUNCILS	DEMOGRAPHICS				LAND USE & LAND COVER TYPE (AREA IN HA)					AGRICULTURE CROPS (AREA IN HA)			DROUGHT PRONE	FREQUENTLY DROUGHT PRONE
											KHARIF CROP		RABI CROP		
		POPULATION	MALE	FEMALE	SETTLEMENTS	CROP IRRIGATED	CROP IN FLOOD PLAIN	CROP RAINFED	CROP MARGINAL	ORCHARDS	RICE	SUGARCANE	WHEAT		
KHUSHAB	BOTALA	24,489	12,280	12,209	12	6,531	0	0	37	0	665	637	1,459	NO	NO
	CHAK NO 59/MB	20,555	10,231	10,324	21	5,525	299	0	0	35	740	508	1,804	NO	NO
	CHAK NO.050/MB	28,152	14,568	13,584	15	4,020	0	0	0	0	124	189	954	NO	NO
	DHAIWAL	21,302	10,510	10,793	15	335	0	14,034	599	0	137	0	794	SE	MI
	GIROT	29,710	14,895	14,815	19	3,840	1,219	0	0	0	528	256	1,624	NO	NO
	HASSAN PUR TIWANA	26,608	13,046	13,562	29	5,505	2,296	0	0	0	968	793	2,014	NO	NO
	KATHA SAGRAL	21,304	11,023	10,280	10	17	0	7,603	0	0	7	0	1,468	SE	MO
	KHUSHAB CITY	145,447	73,486	71,961	2	129	458	0	0	0	36	95	310	MI	MI
	KUND	78,023	38,768	39,255	38	5,791	0	1,860	51	0	2,700	629	2,079	SE	SE
	NALI SHUMALI	21,128	10,904	10,224	43	470	0	7,351	0	0	502	9	1,710	SE	SE
	NARI	20,172	9,696	10,475	23	10,142	0	4,604	1,100	0	7,249	33	5,605	SE	SE
	PADHRAR	25,810	12,690	13,120	26	0	0	3,825	0	0	0	0	284	EX	EX
	RODA	29,649	15,021	14,628	36	5,540	0	0	33	0	61	106	841	NO	NO
	SANDRAL	20,156	10,026	10,130	23	7,392	882	0	91	12	1,165	1,159	3,255	MO	MO
	TALOKAR	20,632	10,041	10,591	15	7,586	726	2,092	1,099	77	2,322	774	4,237	MO	MO
	WAHEER	96,893	49,184	47,709	42	11,087	0	2,096	0	25	7,235	514	5,187	NO	NO
NOORPUR	JAMALI	22,000	11,171	10,829	60	1,054	0	0	0	0	0	0	495	EX	SE
	JAURA KALAN	21,572	10,530	11,041	29	2,083	2,116	0	0	0	512	248	1,863	MO	MI
	JHARKAL	22,521	11,381	11,139	35	926	0	0	0	0	0	0	960	EX	SE
	KHAI KHURD	22,740	11,337	11,403	79	2,989	2,137	0	0	287	669	869	1,677	EX	SE
	KHATWAN	21,273	11,073	10,200	39	368	0	0	0	0	0	0	101	EX	SE
	NOOR PUR_01	17,795	9,036	8,759	22	524	0	0	0	0	0	0	790	EX	EX
	PELOWANCE	26,996	13,778	13,217	24	5,563	0	0	0	0	2	1	1,881	SE	SE
	RAHDARI	23,450	11,921	11,529	25	0	0	0	0	0	0	0	1,719	EX	EX
	RANGPUR_01	29,135	14,669	14,466	13	2,213	0	0	0	0	1	23	1,247	EX	EX
NAUSHERA	HHALI	19,377	9,284	10,093	45	0	0	2,794	0	0	0	0	851	SE	MO
	KHABEKI	20,867	9,879	10,988	102	0	0	5,878	0	0	0	0	1,247	EX	MO
	KHURA	21,162	10,357	10,805	29	0	0	3,689	0	0	0	0	902	SE	SE
	KUFRI	19,445	9,071	10,374	50	0	0	3,122	0	0	0	0	462	SE	SE
	NAUSHERA	22,632	10,443	12,189	14	0	0	2,226	0	0	0	0	631	SE	SE
QUAIDABAD	BIJJAR	28,115	13,792	14,323	13	7,412	0	635	0	0	2,662	813	3,061	SE	MO
	CHAK NO 014/MB	22,397	11,600	10,797	18	5,765	0	0	0	6	802	604	1,783	SE	MO
	GOLIWALI	28,975	14,249	14,726	97	5,802	0	110	0	0	312	18	2,849	SE	SE
	JABBI	25,171	12,002	13,169	18	4,910	0	3,944	19	0	1,703	663	1,413	SE	MO
	NOOR PUR_02	7,924	3,989	3,935	8	2,431	0	0	0	0	150	125	349	SE	SE
	OKHLI MOHLA	21,269	10,338	10,931	10	5,072	0	311	0	0	2,088	619	2,401	MO	MI
	QUAIDABAD	97,880	49,177	48,703	37	9,423	0	0	0	0	3,820	794	5,347	SE	SE
	UNKNOWN_16	0	0	0	11	2,442	0	0	0	0	1,366	379	1,107	MO	MO
	UTRA JANUBI	36,921	18,741	18,180	11	2,249	0	0	0	0	308	279	505	SE	MO
	WARCHHA	23,058	10,982	12,076	51	2,512	0	3,584	0	0	97	49	615	SE	MO
		1,309,457	652,969	656,483	1,297	141,491	10,133	84,582	3,029	857	42,184	12,527	75,411		

LEGEND: NO NO DROUGHT | MI MILD DROUGHT | MO MODERATE DROUGHT | SE SEVERE DROUGHT | EX EXTREME DROUGHT

Elements at Risk According to Drought Severity

ELEMENTS AT RISK	DROUGHT PRONE					FREQUENTLY DROUGHT PRONE				
	EX	SE	MO	MI	NO	EX	SE	MO	MI	NO
Population	205,591	591,457	110,906	145,447	256,056	96,190	482,346	265,275	209,590	256,056
Settlements	401	607	113	2	174	86	639	342	56	174
Crop Irrigated	4,109	66,666	24,575	129	42,047	2,736	48,804	40,285	7,619	42,047
Crop in Flood Plain	495	0	3,724	458	3,814	0	2,137	1,608	2,573	3,814
Crop Rainfed	960	61,063	11,720	0	2,096	3,825	28,469	35,848	14,345	2,096
Crop Marginal	5,640	1,770	1,189	0	70	0	1,152	1,208	599	70
Orchards	101	6	505	0	59	0	287	511	0	59
Rice	790	20,510	10,646	36	10,322	1	15,464	13,624	2,773	10,322
Sugarcane	1,719	4,543	3,994	95	3,003	23	3,005	5,534	962	3,003
Wheat	1,271	35,124	17,574	310	13,883	4,041	27,868	24,252	5,368	13,883

SETTLEMENTS, VILLAGES, MAJOR TOWNS AND POPULATION EXPOSED TO DROUGHT



Legend

- District Headquarter
- Tehsil Headquarter
- Major Towns
- Settlements / Villages

Union Council wise Population Distribution 2015

- < 10000
- 10001 - 20000
- 20001 - 25000
- 25001 - 30000
- 30001 - 40000
- > 40000

Drought Prone Union Council

- No Drought
- Mild Drought
- Moderate
- Severe
- Extreme
- River and Water Body
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

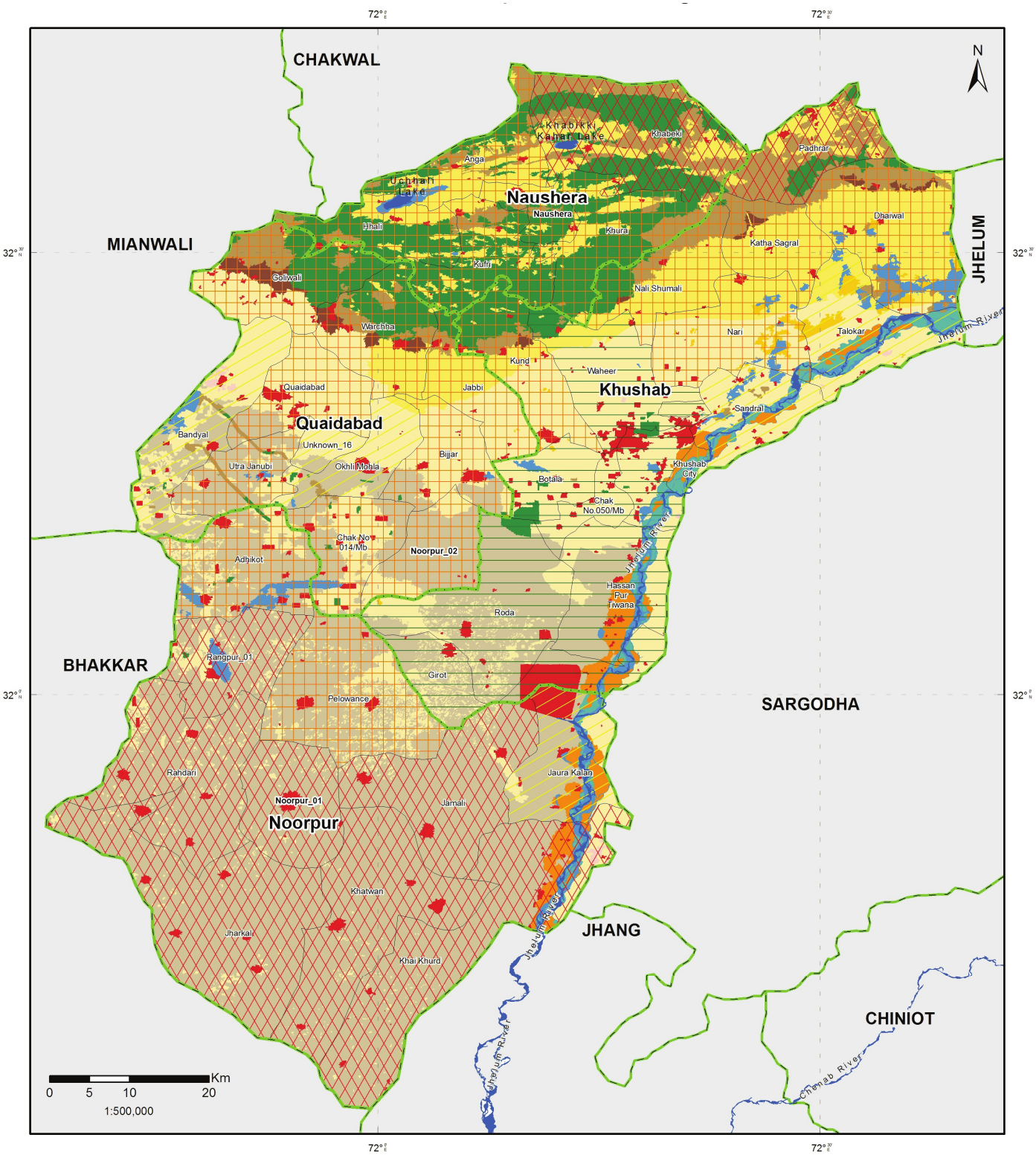
MAP INFORMATION

Data Source(s):

Pakistan Meteorological Department
Survey of Pakistan

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-02-NDMA-DP-C(POP-SET)
Prepared by: Project Management Unit, NDMA
Last Updated: 9th March, 2017

LAND USE & LAND COVER EXPOSED TO DROUGHT



Legend

- Bare Areas
- Bare Areas with Sparse Natural Vegetation
- Built-up
- Crop in Flood Plain
- Crop Marginal and Irrigated Saline
- Crop Rainfed
- Crop Irrigated
- Forest - Natural Trees and Mangroves
- Natural Vegetation in Wet Areas
- Orchards
- Range Lands - Natural Shrubs and Herbs
- Snow and Glaciers
- Wet Areas
- River and Water Body
- Union Council Boundary
- Tehsil Boundary
- District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Drought Prone Union Council

- No Drought
- Mild
- Moderate
- Severe
- Extreme

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

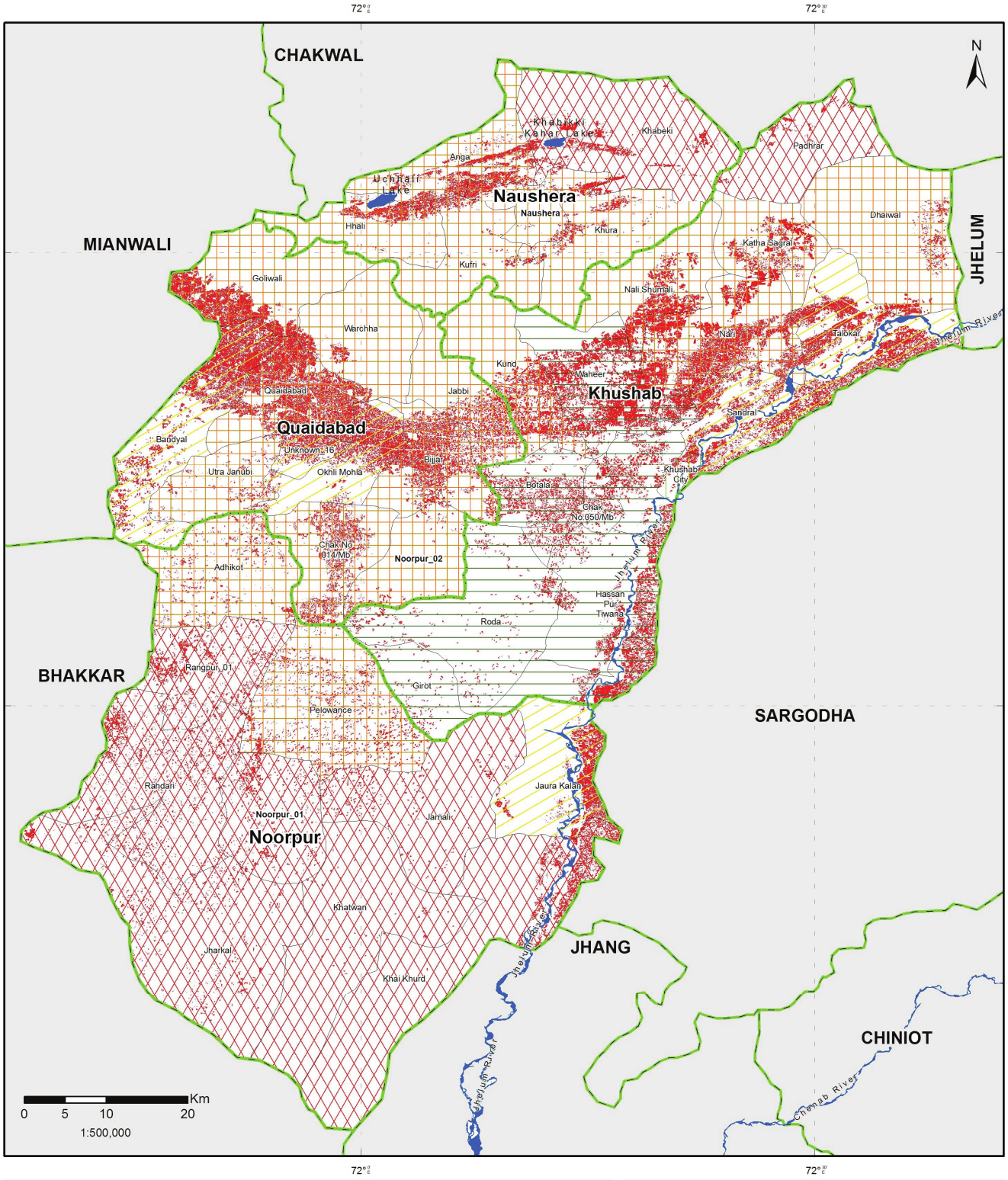
WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Landcover-SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-02-NDMA-DP-LULC
Prepared by: Project Management Unit, NDMA
Last Updated: 10th May, 2017

CROP EXPOSED TO DROUGHT (RABI SEASON)



Legend

- Wheat
- River and Water Body
- Union Council Boundary (Abc)
- Tehsil Boundary (Abc)
- District Boundary (ABC)
- Provincial Boundary
- Line of Control
- International Boundary

Drought Prone Union Council

- No Drought
- Mild
- Moderate
- Severe
- Extreme

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

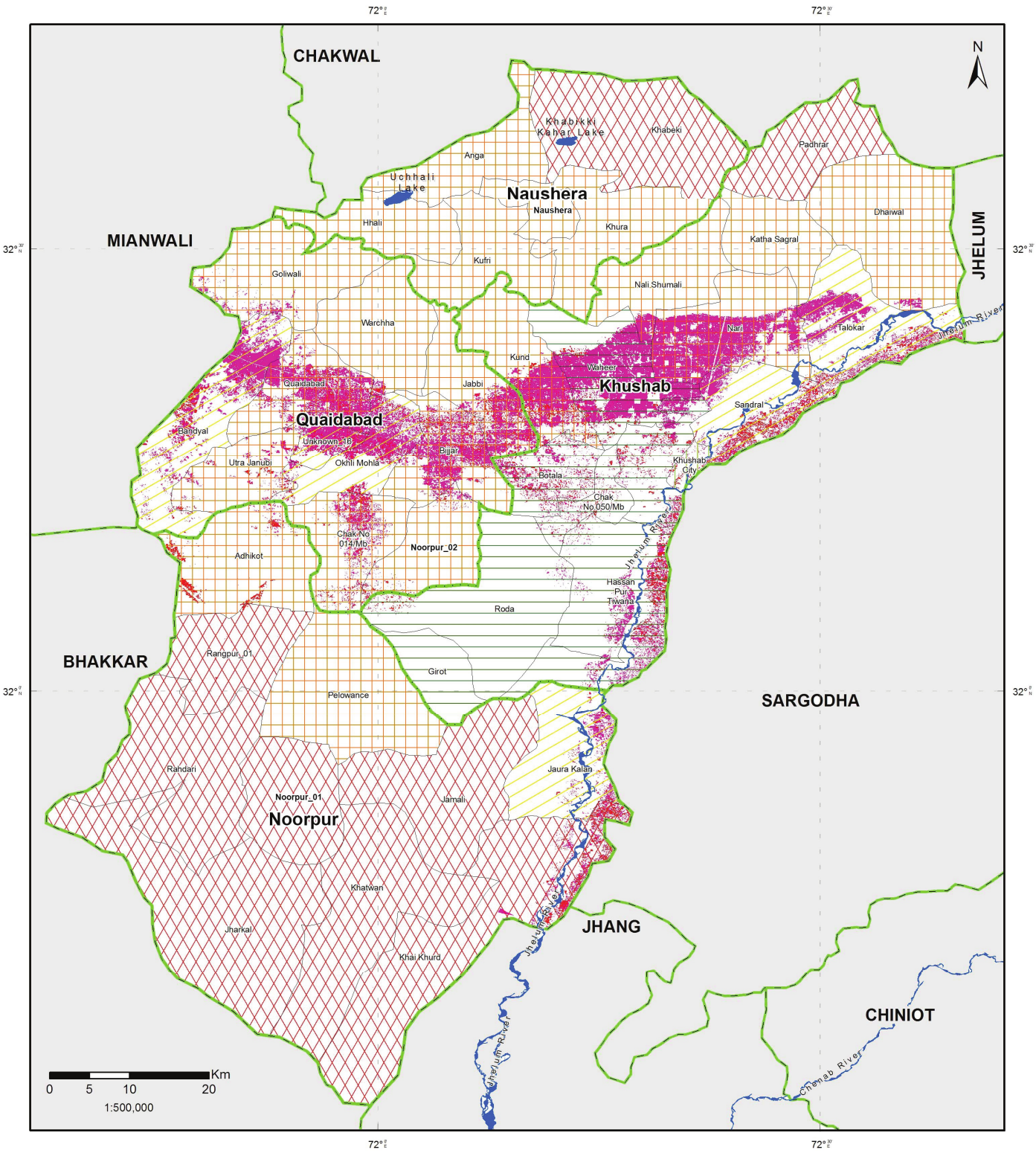
WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Crop Mask-SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-02-NDMA-DP-RB-CROPS
Prepared by: Project Management Unit, NDMA
Last Updated: 11th May, 2017

CROP EXPOSED TO DROUGHT (KHARIF SEASON)



Legend

- Rice
- Sugarcane
- Cotton
- River and Water Body
- Union Council Boundary
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Drought Prone Union Council

- No Drought
- Mild
- Moderate
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Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-02-NDMA-DP-KH-CROPS
Prepared by: Project Management Unit, NDMA
Last Updated: 11th May, 2017

ELEMENTS EXPOSED TO EARTHQUAKE HAZARD







UNION COUNCILS		DEMOGRAPHICS					HOUSING & SETTLEMENTS																											TELECOMMUNICATION TOWERS					INDUSTRIAL UNITS					HEALTH FACILITIES				
		POPULATION					SETTLEMENTS					BUILDINGS (All Types)					PACCA BULDINGS					SEMI PACCA BUILDINGS					KACHA BUILDINGS																						
		Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4
KHUSHAB	BOTALA	0	0	0	0	19,952	0	0	0	0	12	0	0	0	0	3,950	0	0	0	0	2,194	0	0	0	0	300	0	0	0	0	1,456	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1
	CHAK NO 59/MB	0	0	0	0	27,277	0	0	0	0	22	0	0	0	0	3,315	0	0	0	0	2,525	0	0	0	0	94	0	0	0	0	696	0	0	0	0	37	0	0	0	0	0	0	0	0	0	4
	CHAK NO.050/MB	0	0	0	0	28,115	0	0	0	0	15	0	0	0	0	4,541	0	0	0	0	3,335	0	0	0	0	73	0	0	0	0	1,133	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0
	DHAIWAL	0	0	0	0	24,489	0	0	0	0	15	0	0	0	0	3,436	0	0	0	0	3,092	0	0	0	0	94	0	0	0	0	249	0	0	0	0	3	0	0	0	0	1	0	0	0	0	2
	GIROT	0	0	0	0	22,397	0	0	18	0	2	0	0	0	3,988	804	0	0	0	2,969	599	0	0	0	208	42	0	0	0	811	163	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
	HASSAN PUR TIWANA	0	0	0	0	20,555	0	0	0	14	15	0	0	0	1,902	2,390	0	0	0	923	1,159	0	0	0	121	153	0	0	0	857	1,078	0	0	0	8	0	0	0	0	0	0	0	0	2	1
	KATHA SAGRAL	0	0	0	0	21,302	0	0	0	0	10	0	0	0	0	3,436	0	0	0	0	2,680	0	0	0	0	198	0	0	0	0	558	0	0	0	0	11	0	0	0	0	0	0	0	0	0	1
	KHUSHAB CITY	0	0	0	11,787	14,821	0	0	0	0	2	0	0	0	0	22,726	0	0	0	0	19,684	0	0	0	0	1,082	0	0	0	0	1,961	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KUND	0	0	0	0	25,171	0	0	0	0	39	0	0	0	0	12,295	0	0	0	0	8,585	0	0	0	0	821	0	0	0	0	2,889	0	0	0	0	11	0	0	0	0	1	0	0	0	0	2
	NALI SHUMALI	0	462	0	21,538	0	0	0	0	0	43	0	0	0	0	3,408	0	0	0	0	2,598	0	0	0	0	24	0	0	0	0	786	0	0	0	0	5	0	0	0	0	0	0	0	0	0	1
	NARI	0	1,877	0	19,695	0	0	0	0	0	23	0	0	0	0	3,253	0	0	0	0	2,805	0	0	0	0	63	0	0	0	0	386	0	0	0	0	10	0	0	0	0	0	0	0	0	0	1
	PADHRAR	0	0	0	0	21,304	0	0	0	0	28	0	0	0	0	4,163	0	0	0	0	3,081	0	0	0	0	281	0	0	0	0	800	0	0	0	0	12	0	0	0	0	0	0	0	0	0	4
	RODA	0	0	0	0	20,867	0	0	0	8	29	0	0	0	1,093	3,689	0	0	0	858	2,896	0	0	0	23	76	0	0	0	212	717	0	0	0	0	10	0	0	0	0	0	0	0	0	0	1
	SANDRAL	0	21,785	0	932	0	0	0	0	0	24	0	0	0	0	3,251	0	0	0	0	2,850	0	0	0	0	27	0	0	0	0	374	0	0	0	0	12	0	0	0	0	0	0	0	0	0	1
	TALOKAR	0	14,253	0	7,020	0	0	0	0	0	15	0	0	0	0	3,328	0	0	0	0	2,842	0	0	0	0	126	0	0	0	0	360	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0
	WAHEER	0	0	0	0	21,162	0	0	0	0	42	0	0	0	0	15,241	0	0	0	0	13,025	0	0	0	0	869	0	0	0	0	1,348	0	0	0	0	14	0	0	0	0	2	0	0	0	0	3
	TEHSIL TOTAL:	0	38,377	0	60,973	267,412	0	0	18	22	336	0	0	0	6,983	93,226	0	0	0	4,750	73,950	0	0	0	352	4,323	0	0	0	1,880	14,954	0	0	0	8	143	0	0	0	0	4	0	0	0	2	22
NOORPUR	ADHIKOT	0	0	0	0	145,447	0	0	0	0	17	0	0	0	0	4,840	0	0	0	0	3,104	0	0	0	0	112	0	0	0	0	1,624	0	0	0	0	8	0	0	0	0	0	0	0	0	0	2
	JAMALI	0	0	0	0	19,445	0	0	0	59	0	0	0	0	75	3,532	0	0	0	29	1,345	0	0	0	2	75	0	0	0	45	2,110	0	0	0	0	6	0	0	0	0	0	0	0	0	2	0
	JAURA KALAN	0	0	0	0	78,023	0	0	1	29	0	0	0	0	309	3,227	0	0	0	166	1,735	0	0	0	19	197	0	0	0	124	1,295	0	0	0	0	5	0	0	0	0	0	0	0	0	1	0
	JHARKAL	0	0	0	0	21,128	0	0	0	13	0	0	0	0	2,005	1,687	0	0	0	921	774	0	0	0	2	19	0	0	0	1,062	893	0	0	0	2	2	0	0	0	0	0	0	0	0	1	0
	KHAI KHURD	0	0	0	0	20,172	0	0	22	4	0	0	0	0	3,574	154	0	0	0	921	40	0	0	0	50	2	0	0	0	2,602	112	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
	KHATWAN	0	0	0	17,795	0	0	0	75	7	0	0	0	0	2,341	1,146	0	0	0	493	241	0	0	0	62	30	0	0	0	1,787	875	0	0	0	4	0	0	0	0	0	0	0	0	1	0	0
	NOOR PUR_01	0	0	0	0	7,924	0	0	32	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	3	0
	PELOWANCE	0	0	0	0	22,632	0	0	0	22	2	0	0	0	2,542	1,883	0	0	0	952	706	0	0	0	44	32	0	0	0	1,546	1,145	0	0	0	3	3	0	0	0	0	0	0	0	0	1	0
	RAHDARI	0	0	0	0	21,269	0	0	0	24	1	0	0	0	3,599	245	0	0	0	2,057	140	0	0	0	76	50	0	0	0	1,466	100	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0
	RANGPUR_01	0	0	0	0	25,810	0	0	0	0	14	0	0	0	305	4,471	0	0	0	208	3,048	0	0	0	35	513	0	0	0	62	910	0	0	0	0	7	0	0	0	0	0	0	0	0	0	1
	TEHSIL TOTAL:	0	0	0	17,795	361,850	0	0	130	181	34	0	0	8,304	16,192	11,439	0	0	2,530	7,352	6,998	0	0	135	478	707	0	0	5,620	8,359	3,779	0	0	7	23	18	0	0	0	0	0	0	0	2	8	3
NAUSHERA	ANGA	0	0	0	0	29,523	0	0	0	0	46	0	0	0	0	3,218	0	0	0	0	2,352	0	0	0	0	190	0	0	0	0	676	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	HHALI	0	0	0	0	28,152	0	0	0	0	45	0	0	0	0	3,125	0	0	0	0	2,139	0	0	0	0	196	0	0	0	0	790	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	KHABEKI	0	0	0	24,719	4,991	0	0	0	0	103	0	0	0	0	3,366	0	0	0	0	2,064	0	0	0	0	93	0	0	0	0	1,209	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
	KHURA	0	0	0	0	28,975	0	0	0	0	29	0	0	0	0	3,413	0	0	0	0	2,012	0	0	0	0	286	0	0	0	0	1,115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	KUFRI	0	0	0	0	19,377	0	0	0	0	51	0	0	0	0	3,136	0	0	0	0	2,512	0	0	0	0	73	0	0	0	0	552	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	Naushera	0	6,351	0	16,170	0	0	0	0	0	15	0	0	0	0	3,576	0	0	0	0	2,550	0	0	0	0	616	0	0	0	0	409	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
	TEHSIL TOTAL:	0	6,351	0	40,889	111,018	0	0	0	0	289	0	0	0	0	19,834	0	0	0	0	13,629	0	0	0	0	1,454	0	0	0	0	4,751	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15
QUAIDABAD	BANDYAL	0	0	0	15,496	11,608	0	0	0	0	26	0	0	0	0	4,399	0	0	0	0	2,590	0	0	0	0	84	0	0	0	0	1,725	0	0	0	0	6	0	0	0	0	0	0	0	0	0	2
	BIJJAR	0	0	0	0	97,880	0	0	0	0	13	0	0	0	0	4,535	0	0	0	0	2,770	0	0	0	0	72	0	0	0	0	1,693	0	0	0	0	11	0	0	0	0	0	0	0	0	0	2
	CHAK NO 014/MB	0	0	0	22,043	1,501	0	0	0	0	18	0	0	0	0	3,612	0	0	0	0	1,998	0	0	0	0	75	0	0	0	0	1,539	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0
	GOLIWALI	0	0	0	0	0	0	0	0	0	98	0	0	0	0	4,673	0	0	0	0	2,762	0	0	0	0	94	0	0	0	0	1,817	0	0	0	0	6	0	0	0	0	0	0	0	0	0	1
	JABBI	0	0	0	6,790	22,859	0	0	0	0	18	0	0	0	0	4,060	0	0	0	0	2,930	0	0	0	0	32	0	0	0	0	1,097	0	0	0	0	3	0	0	0	0	0	0	0	0	0	1
	NOOR PUR_02	0	0	0	0	20,156	0	0	0	0	8	0	0	0	0	1,101	0	0	0	0	687	0	0	0	0	10	0	0	0	0	404	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OKHLI MOHLA	0	0	0	0	20,632	0	0	0	0	10	0	0	0	0	3,431	0	0	0	0	2,146	0	0	0	0	124	0	0	0	0	1,161	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0
	QUAIDABAD	0	0	0	0	0	0	0	0	0	39	0	0	0	0	15,509	0	0	0	0	10,992	0	0	0	0	1,183	0	0	0	0	3,334	0	0	0	0	17	0	0	0	0	0	0	0	0	0	2
	UNKNOWN_16	0	0	0	36,921	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	UTRA JANUBI	0	0	0	96,893	0	0	0	0	0	11	0	0	0	0	5,955	0	0	0	0	3,822	0	0	0	0	200	0	0	0	0	1,933	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	WARCHHA	0	0	0	0	23,058	0	0	0	0	52	0	0	0	0	3,719	0	0	0	0	3,182	0	0	0	0	242	0	0	0	0	295	0	0	0	0	9	0	0	0	0	0	0	0	0	0	1
	TEHSIL TOTAL:	0	0	0	44,328	331,508	0	0	0	0	304	0	0	0	0	50,994	0	0	0	0	33,879	0	0	0	0	2,116	0	0	0	0	14,998	0	0	0	0	57	0	0	0	0	0	0	0	0	0	10
	DISTRICT TOTAL:	0	44,728	0	163,985	1,081,301	0	0	148	203	963	0	0	8,304	23,175	175,493	0	0	2,530	12,102	128,456	0	0	135	830	8,600	0	0	5,620	10,239	38,482	0	0	7	31	218	0	0	0	0	4	0	0	2	10	50





UNION COUNCILS		TRANSPORTATION & INFRASTRUCTURE																				EDUCATION FACILITIES																				CRITICAL INFRASTRUCTURE									
		MOTORWAY & HIGHWAY (km)					SECONDARY ROADS (METALLED) (km)					UNMETALLED ROAD/CART TRACK/PACK TRACK					RAILWAY TRACK (km)					SCHOOLS					NUMBER OF STUDENTS										NUMBER OF TEACHERS					SNGPL (GAS PIPELINE) (km)					OTHER				
																											BOYS					GIRLS																	
		Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4	Zone 1	Zone 2A	Zone 2B	Zone 3	Zone 4
KHUSHAB	BOTALA	0	0	0	0	0	0	0	0	0	18	0	0	0	0	40	0	0	0	0	0	0	0	0	0	12	0	0	0	0	1,466	0	0	0	0	1,662	0	0	0	0	91	0	0	0	0	0	0	0	0	0
	CHAK NO 59/MB	0	0	0	0	11	0	0	0	0	33	0	0	0	0	9	0	0	0	0	11	0	0	0	0	81	0	0	0	0	7,591	0	0	0	0	8,378	0	0	0	0	606	0	0	0	0	3	0	0	0	0
	CHAK NO.050/MB	0	0	0	0	0	0	0	0	0	17	0	0	0	0	26	0	0	0	0	0	0	0	0	0	17	0	0	0	0	1,824	0	0	0	0	2,252	0	0	0	0	143	0	0	0	0	0	0	0	0	0
	DHAIWAL	0	0	0	0	0	0	0	0	0	24	0	0	0	0	48	0	0	0	0	7	0	0	0	0	8	0	0	0	0	1,178	0	0	0	0	528	0	0	0	0	63	0	0	0	0	11	0	0	0	1
	GIROT	0	0	0	0	0	0	0	0	27	4	0	0	0	54	17	0	0	0	0	0	0	0	0	11	4	0	0	0	445	358	0	0	0	311	213	0	0	0	32	19	0	0	0	0	0	0	0	0
	HASSAN PUR TIWANA	0	0	0	0	0	0	0	0	16	32	0	0	0	27	31	0	0	0	0	0	0	0	0	14	29	0	0	0	1,302	1,458	0	0	0	911	2,164	0	0	0	75	135	0	0	0	0	0	0	0	0
	KATHA SAGRAL	0	0	0	12	0	0	0	0	0	27	0	0	0	0	31	0	0	0	0	0	0	0	0	0	9	0	0	0	0	1,880	0	0	0	0	517	0	0	0	0	88	0	0	0	0	3	0	0	0	0
	KHUSHAB CITY	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KUND	0	0	0	0	6	0	0	0	0	17	0	0	0	0	33	0	0	0	0	6	0	0	0	0	23	0	0	0	0	2,273	0	0	0	0	1,479	0	0	0	0	120	0	0	0	0	7	0	0	0	0
	NALI SHUMALI	0	0	0	0	0	0	0	0	0	20	0	0	0	0	21	0	0	0	0	0	0	0	0	0	16	0	0	0	0	1,128	0	0	0	0	731	0	0	0	0	69	0	0	0	0	0	0	0	0	0
	NARI	0	0	0	0	12	0	0	0	0	52	0	0	0	0	34	0	0	0	0	7	0	0	0	0	25	0	0	0	0	2,441	0	0	0	0	1,472	0	0	0	0	144	0	0	0	0	0	0	0	0	0
	PADHRAR	0	0	0	0	15	0	0	0	0	21	0	0	0	0	6	0	0	0	0	0	0	0	0	0	19	0	0	0	0	1,577	0	0	0	0	926	0	0	0	0	90	0	0	0	0	0	0	0	0	0
	RODA	0	0	0	0	0	0	0	0	10	40	0	0	0	49	111	0	0	0	0	0	0	0	0	11	27	0	0	0	472	2,037	0	0	0	280	1,296	0	0	0	26	110	0	0	0	0	0	0	0	0	0
	SANDRAL	0	0	0	0	4	0	0	0	0	22	0	0	0	0	5	0	0	0	0	11	0	0	0	0	19	0	0	0	0	2,393	0	0	0	0	1,073	0	0	0	0	135	0	0	0	0	11	0	0	0	0
	TALOKAR	0	0	0	0	0	0	0	0	0	28	0	0	0	0	4	0	0	0	0	9	0	0	0	0	10	0	0	0	0	772	0	0	0	0	1,021	0	0	0	0	66	0	0	0	0	5	0	0	0	0
	WAHEER	0	0	0	0	3	0	0	0	0	70	0	0	0	0	26	0	0	0	0	3	0	0	0	0	34	0	0	0	0	3,580	0	0	0	0	2,462	0	0	0	0	229	0	0	0	0	12	0	0	0	1
	TEHSIL TOTAL:	0	0	0	0	64	0	0	0	53	423	0	0	0	130	442	0	0	0	0	55	0	0	0	36	333	0	0	0	2,219	31,956	0	0	0	1,502	26,174	0	0	0	133	2,108	0	0	0	0	53	0	0	0	2
NOORPUR	ADHIKOT	0	0	0	0	0	0	0	0	0	46	0	0	0	0	137	0	0	0	0	0	0	0	0	0	29	0	0	0	0	3,538	0	0	0	0	1,603	0	0	0	0	164	0	0	0	0	4	0	0	0	0
	JAMALI	0	0	0	0	0	0	0	0	56	0	0	0	0	120	0	0	0	0	0	0	0	0	0	8	0	0	0	0	1,124	0	0	0	0	576	0	0	0	0	73	0	0	0	0	0	0	0	0	0
	JAURA KALAN	0	0	0	0	0	0	0	1	33	0	0	0	0	35	0	0	0	0	0	0	0	0	0	21	0	0	0	0	1,695	0	0	0	0	1,230	0	0	0	0	89	0	0	0	0	0	0	0	0	0
	JHARKAL	0	0	0	0	0	0	0	23	40	0	0	0	123	115	0	0	0	0	0	0	0	0	1	5	0	0	0	0	371	0	0	0	121	314	0	0	0	4	28	0	0	0	0	0	0	0	0	0
	KHAI KHURD	0	0	0	0	0	0	0	31	0	0	0	0	189	12	0	0	0	0	0	0	0	0	15	1	0	0	0	1,317	13	0	0	0	738	11	0	0	0	69	1	0	0	0	0	0	0	0	0	0
	KHATWAN	0	0	0	0	0	0	0	19	8	0	0	0	134	62	0	0	0	0	0	0	0	0	3	0	0	0	0	901	0	0	0	0	248	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0
	NOOR PUR_01	0	0	0	0	0	0	0	0	47	0	0	0	0	67	0	0	0	0	0	0	0	0	0	66	0	0	0	0	6,676	0	0	0	0	4,016	0	0	0	0	364	0	0	0	0	0	0	0	0	0
	PELOWANCE	0	0	0	0	0	0	0	28	17	0	0	0	87	72	0	0	0	0	0	0	0	0	0	25	17	0	0	0	1,865	798	0	0	0	665	426	0	0	0	92	45	0	0	0	0	0	0	0	0
	RAHDARI	0	0	0	0	0	0	0	44	10	0	0	0	132	10	0	0	0	0	0	0	0	0	0	33	2	0	0	0	1,859	315	0	0	0	2,049	251	0	0	0	132	9	0	0	0	0	0	0	0	0
	RANGPUR_01	0	0	0	0	0	0	0	3	39	0	0	0	4	85	0	0	0	0	0	0	0	0	0	0	21	0	0	0	0	2,168	0	0	0	0	1,174	0	0	0	0	95	0	0	0	0	0	0	0	0	0
	TEHSIL TOTAL:	0	0	0	0	0	0	0	74	260	112	0	0	446	635	303	0	0	0	0	0	0	0	19	159	69	0	0	2,218	13,603	6,819	0	0	1,107	8,861	3,454	0	0	104	779	313	0	0	0	0	4	0	0	0	0
NAUSHERA	ANGA	0	0	0	0	0	0	0	0	0	28	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HHALI	0	0	0	0	0	0	0	0	0	18	0	0	0	0	20	0	0	0	0	0	0	0	0	0	33	0	0	0	0	1,161	0	0	0	0	1,254	0	0	0	0	90	0	0	0	0	0	0	0	0	0
	KHABEKI	0	0	0	0	0	0	0	0	0	63	0	0	0	0	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KHURA	0	0	0	0	0	0	0	0	0	46	0	0	0	0	17	0	0	0	0	0	0	0	0	0	6	0	0	0	0	148	0	0	0	0	117	0	0	0	0	9	0	0	0	0	0	0	0	0	0
	KUFRI	0	0	0	0	0	0	0	0	0	38	0	0	0	0	20	0	0	0	0	0	0	0	0	0	5	0	0	0	0	191	0	0	0	0	111	0	0	0	0	8	0	0	0	0	0	0	0	0	0
	Naushera	0	0	0	0	0	0	0	0	0	17	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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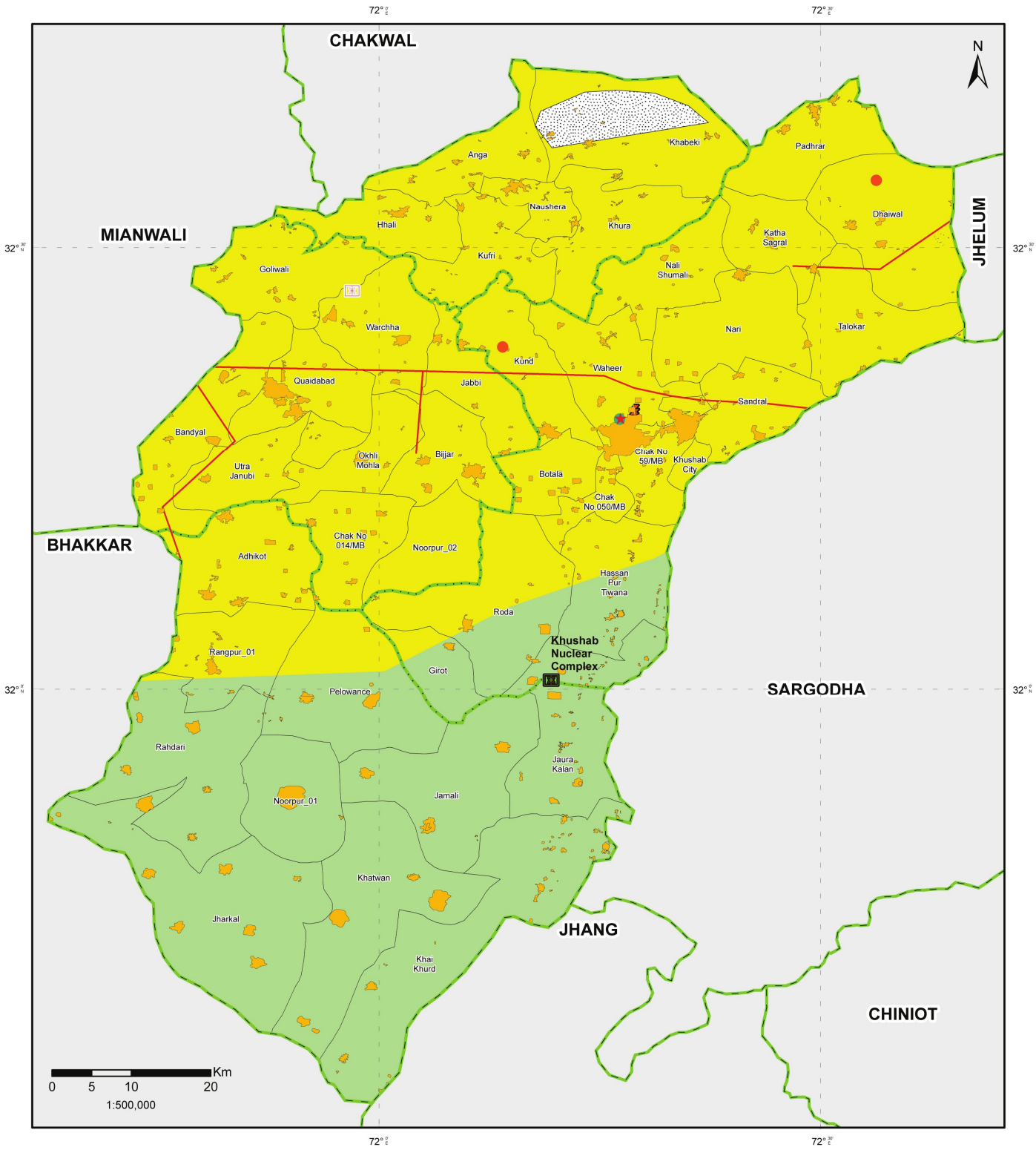
QUAIDABAD	BANDYAL	0	0	0	0	6	0	0	0	0	39	0	0	0	0	67	0	0	0	0	5	0	0	0	0	28	0	0	0	0	2,631	0	0	0	0	1,508	0	0	0	0	142	0	0	0	0	18	0	0	0	0
	BIJJAR	0	0	0	0	7	0	0	0	0	31	0	0	0	0	44	0	0	0	0	7	0	0	0	0	15	0	0	0	0	2,512	0	0	0	0	1,819	0	0	0	0	132	0	0	0	0	2	0	0	0	0
	CHAK NO 014/MB	0	0	0	0	0	0	0	0	0	32	0	0	0	0	86	0	0	0	0	0	0	0	0	0	28	0	0	0	0	2,343	0	0	0	0	1,745	0	0	0	0	136	0	0	0	0	0	0	0	0	0
	GOLIWALI	0	0	0	0	0	0	0	0	0	28	0	0	0	0	29	0	0	0	0	0	0	0	0	0	20	0	0	0	0	2,153	0	0	0	0	817	0	0	0	0	84	0	0	0	0	0	0	0	0	0
	JABBI	0	0	0	0	6	0	0	0	0	23	0	0	0	0	39	0	0	0	0	6	0	0	0	0	17	0	0	0	0	797	0	0	0	0	659	0	0	0	0	62	0	0	0	0	8	0	0	0	0
	NOOR PUR_02	0	0	0	0	0	0	0	0	0	16	0	0	0	0	64	0	0	0	0	0	0	0	0	0	7	0	0	0	0	306	0	0	0	0	186	0	0	0	0	13	0	0	0	0	0	0	0	0	0
	OKHLI MOHLA	0	0	0	0	5	0	0	0	0	5	0	0	0	0	61	0	0	0	0	5	0	0	0	0	14	0	0	0	0	1,036	0	0	0	0	652	0	0	0	0	55	0	0	0	0	5	0	0	0	0
	QUAIDABAD	0	0	0	0	12	0	0	0	0	19	0	0	0	0	47	0	0	0	0	21	0	0	0	0	30	0	0	0	0	4,048	0	0	0	0	3,297	0	0	0	0	237	0	0	0	0	12	0	0	0	1
	UNKNOWN_16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	6	0	0	0	0	346	0	0	0	0	182	0	0	0	0	12	0	0	0	0	0	0	0	0	0
	UTRA JANUBI	0	0	0	0	0	0	0	0	0	25	0	0	0	0	60	0	0	0	0	0	0	0	0	0	9	0	0	0	0	699	0	0	0	0	139	0	0	0	0	29	0	0	0	0	9	0	0	0	0
	WARCHHA	0	0	0	0	0	0	0	0	0	23	0	0	0	0	39	0	0	0	0	5	0	0	0	0	25	0	0	0	0	1,532	0	0	0	0	675	0	0	0	0	97	0	0	0	0	10	0	0	0	0
	TEHSIL TOTAL:	0	0	0	0	35	0	0	0	0	240	0	0	0	0	570	0	0	0	0	48	0	0	0	0	199	0	0	0	0	18,403	0	0	0	0	11,679	0	0	0	0	999	0	0	0	0	64	0	0	0	1
	DISTRICT TOTAL:	0	0	0	0	99	0	0	74	313	986	0	0	446	765	1,427	0	0	0	0	103	0	0	19	195	645	0	0	2,218	15,822	58,678	0	0	1,107	10,363	42,789	0	0	104	912	3,527	0	0	0	0	120	0	0	0	3

BUILT UP, MAJOR INDUSTRIES & CRITICAL INFRASTRUCTURE EXPOSED TO EARTHQUAKE 50 YEAR RETURN PERIOD



Legend

- Industrial Zone
- Cement Factory
- Sugar Mill
- Nuclear Complex (Existing)
- Nuclear Power Station (Proposed/UnderConstructi...
- Grid Station
- Sui Northern Gas Pipeline
- Coal Field
- Builtup Area
- Union Council Boundary
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Hazard Zone (g)*

2A	(0.08-0.16)	Low
2B	(0.16-0.24)	Medium

*Zones are categories as per classification of Pakistan Engineeringing Council. Symbol "(g)" represent Gravitational Acceleration

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

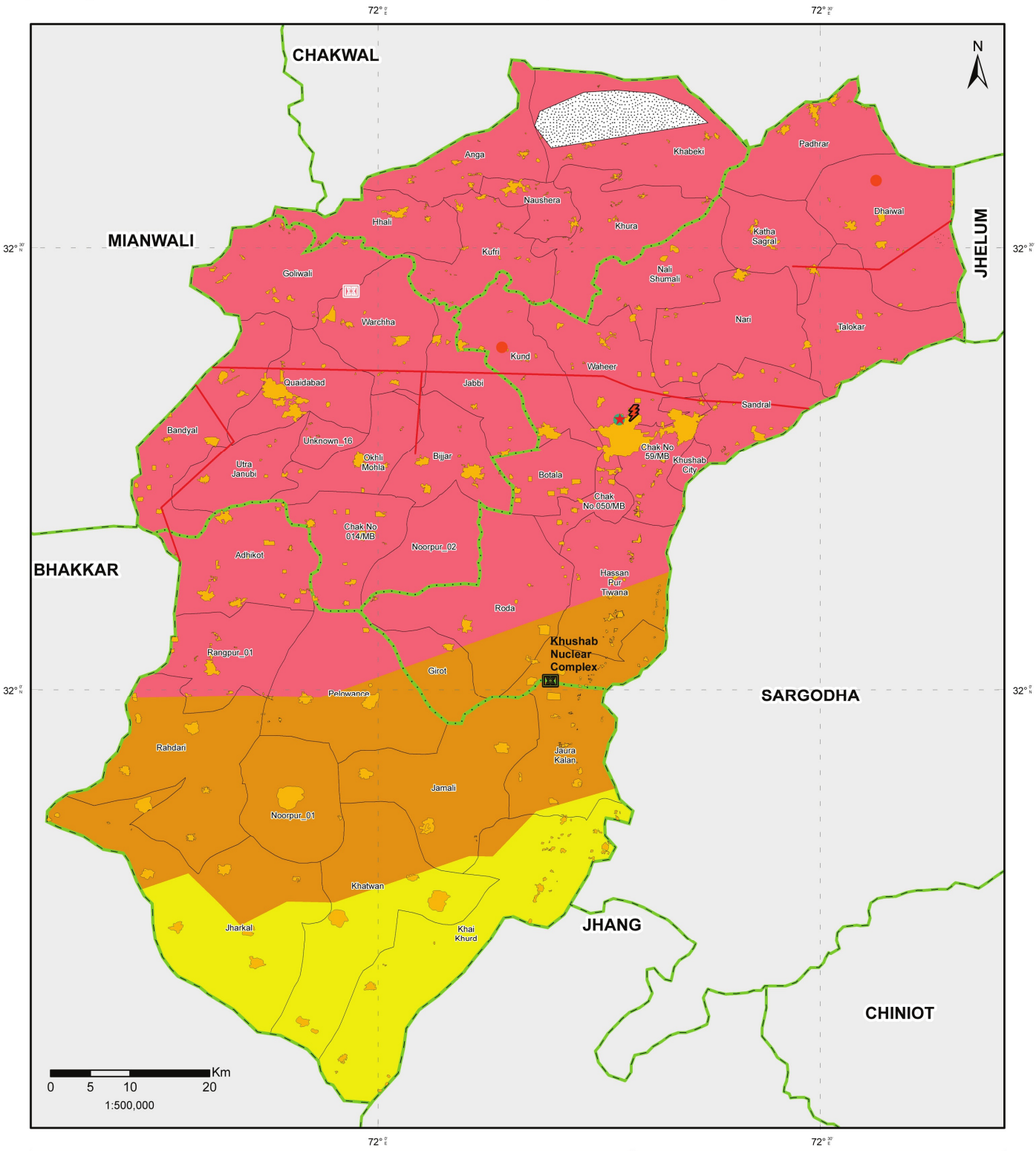
MAP INFORMATION

Data Source(s):
Punjab Agricultural Board, Government of Punjab
Directorate General of Petroleum Concessions

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-APR-2016-EXP-03-NDMA-50-C(BU-MI-CI)
Prepared by: Project Management Unit, NDMA
Last Updated: 13th March, 2017

BUILT UP, MAJOR INDUSTRIES & CRITICAL INFRASTRUCTURE EXPOSED TO EARTHQUAKE 475 YEAR RETURN PERIOD



Legend

- Industrial Zone
- Cement Factory
- Sugar Mill
- Nuclear Complex (Existing)
- Nuclear Power Station (Proposed/UnderConstruction)
- Grid Station
- Sui Northern Gas Pipeline
- Coal Field
- Builtup Area
- Union Council Boundary
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Hazard Zone (g)*

2B	(0.16-0.24)	Medium
3	(0.24-0.32)	High
4	(>0.32)	Very High

*Zones are categories as per classification of Pakistan Engineeringing Council. Symbol "(g)" represent Gravitational Acceleration

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

United Nations World Food Programme

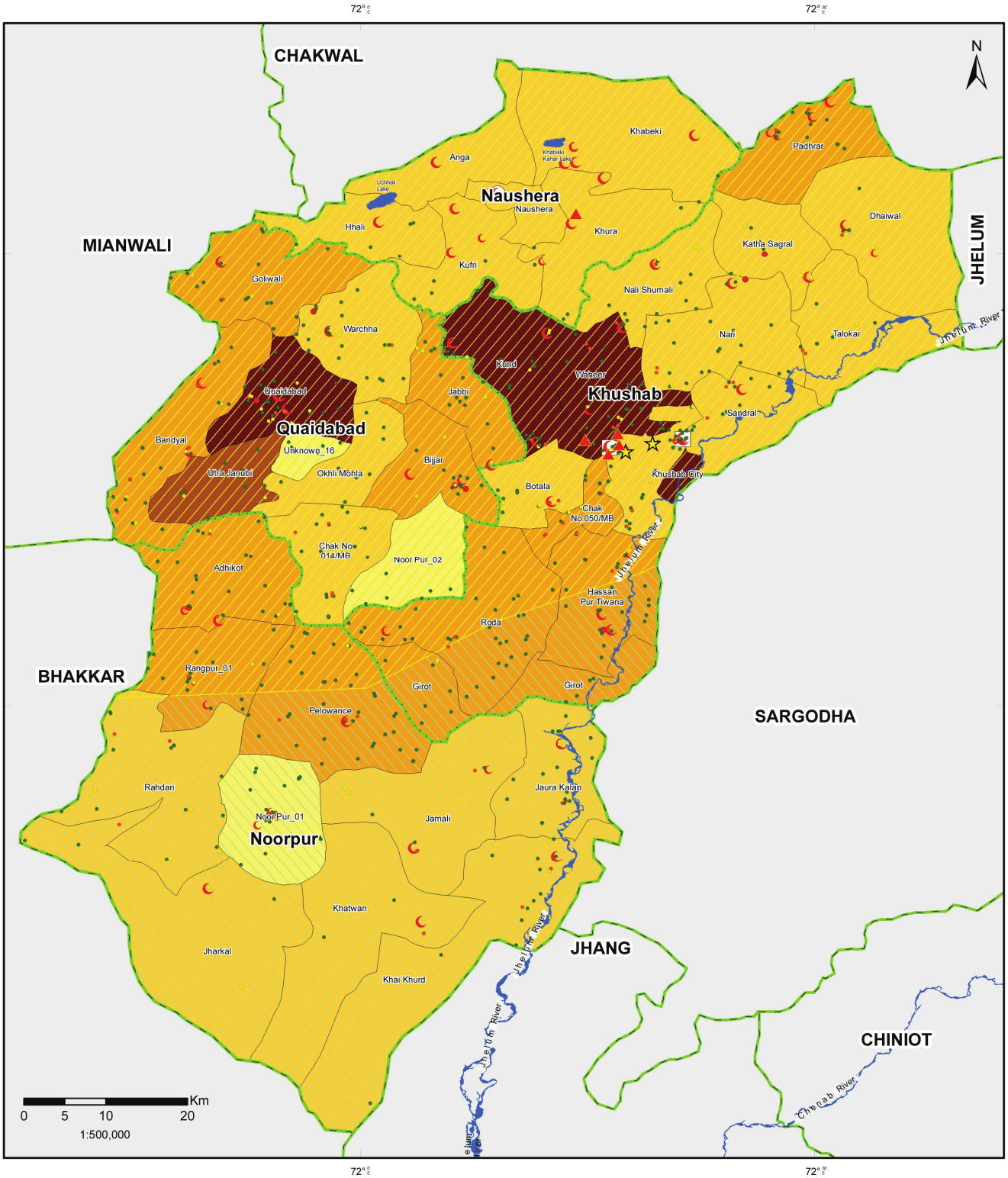
MAP INFORMATION

Data Source(s):
Punjab Agricultural Board, Government of Punjab
Directorate General of Petroleum Concessions

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-APR-2016-EXP-03-NDMA-475-C(BU-MI-CI)
Prepared by: Project Management Unit, NDMA
Last Updated: 13th March, 2017

SCHOOLS, HEALTH AND BUILDING EXPOSED TO EARTHQUAKE 50 YEAR RETURN PERIOD



Legend

- District Headquarters Hospital
- Tehsil Headquarters Hospital
- Civil Hospital & Tuberculosis Clinic
- Basic Health Unit
- Rural Health Centre
- Mental/Child Health/ Dispensary
- University
- College
- Higher Secondary School
- High School
- Middle School
- Primary School

Building Distribution

- Abc < 3000
- Abc 3000 - 4000
- Abc 4000 - 5000
- Abc 5000 - 6000
- Abc > 6000

Return Period 50 Years

- Low (Zone 2A)
- Moderate (Zone 2B)
- River and Water Body
- Abc Tehsil Boundary
- ABC District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

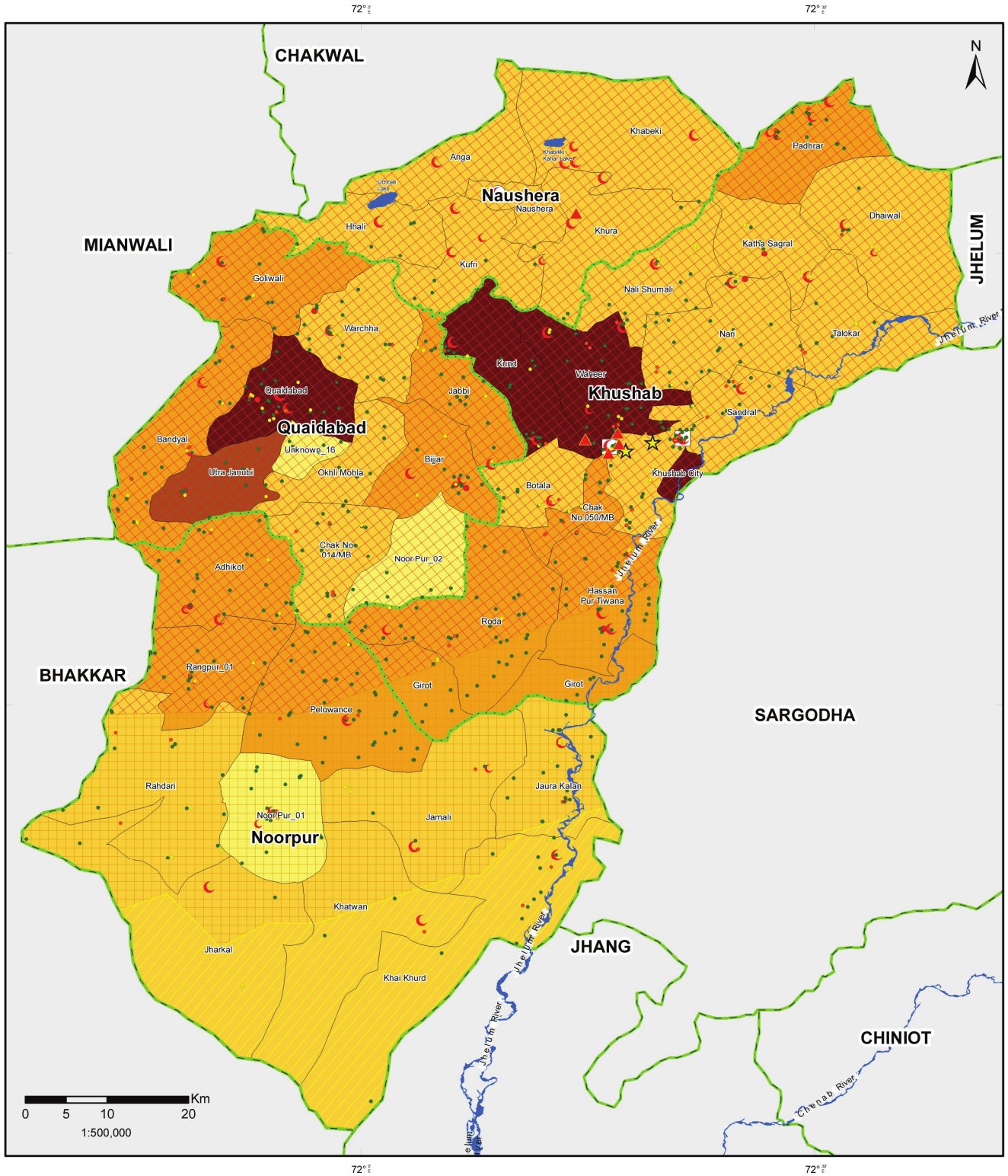
Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Pakistan Bureau of Statistics
School Education Department
World Health Organization
Health Department Punjab
Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-03-NDMA-50-C(HF-EF-BD)
Prepared by: Project Management Unit, NDMA
Last Updated: 4th May, 2017

SCHOOLS, HEALTH AND BUILDING EXPOSED TO EARTHQUAKE 475 YEAR RETURN PERIOD



Legend

- District Headquarters Hospital
- Tehsil Headquarters Hospital
- Civil Hospital & Tuberculosis Clinic
- Basic Health Unit
- Rural Health Centre
- Mental/Child Health/ Dispensary
- University
- College
- Higher Secondary School
- High School
- Middle School
- Primary School

Building Distribution

- < 3000
- 3000 - 4000
- 4000 - 5000
- 5000 - 6000
- > 6000

Return Period 475 Years

- Moderate (Zone 2B)
- High (Zone 3)
- Very High (Zone 4)
- River and Water Body
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

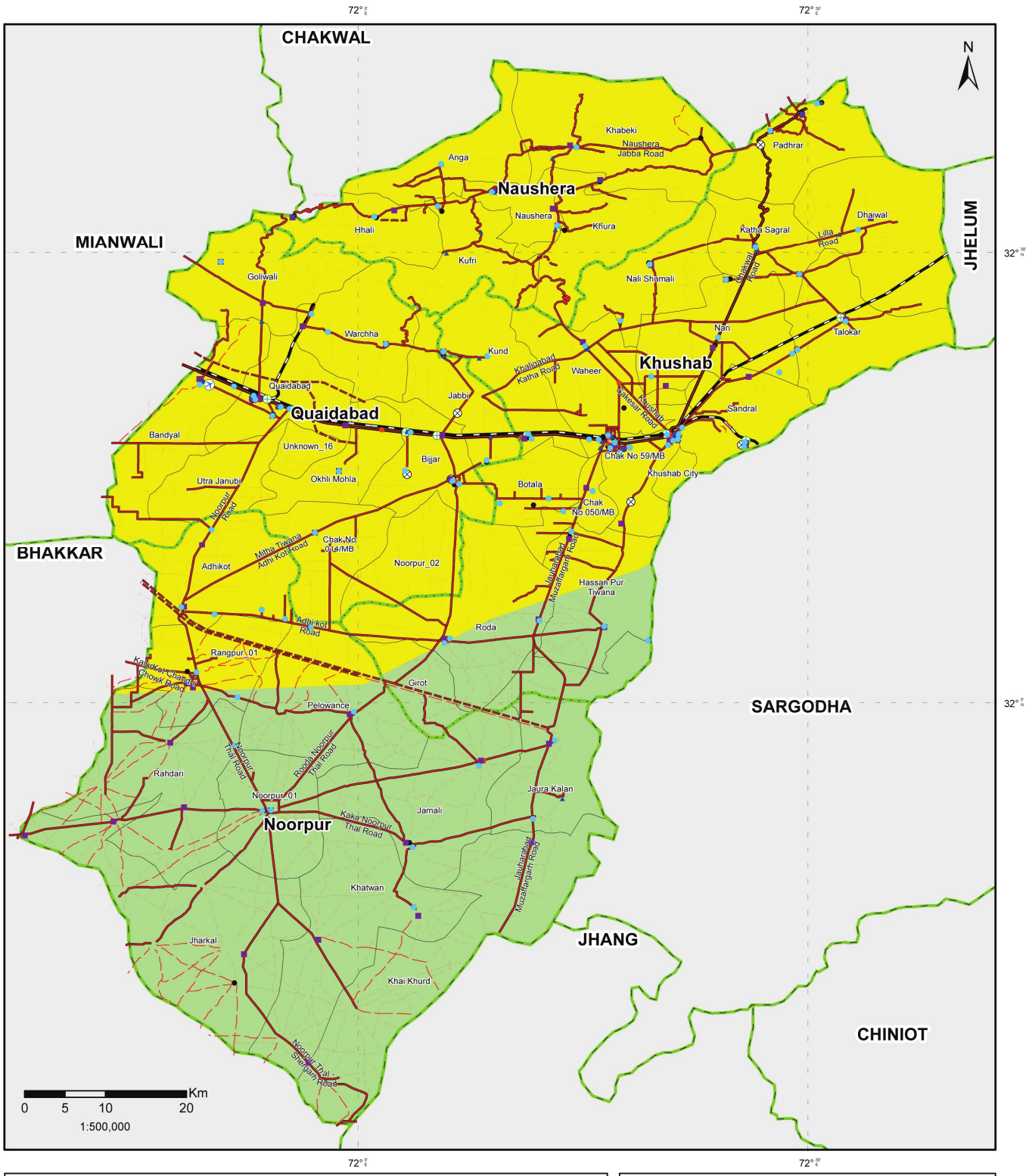
Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Pakistan Bureau of Statistics
School Education Department
World Health Organization
Health Department Punjab
Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-03-NDMA-475-C(HF-EF-BD)
Prepared by: Project Management Unit, NDMA
Last Updated: 4th May, 2017

COMMUNICATION TOWERS AND TRANSPORTATION NETWORK EXPOSED TO EARTHQUAKE 50 YEAR RETURN PERIOD



Legend

- Mobilink
- Telenor
- Ufone
- Warid
- Zong
- Airport
- Air Field/Landing Strips
- Railway Station
- Bus Station
- Bridge
- Motorway
- Trunk/Highway
- Metalled Road
- Unmetalled Road
- Cart Track
- Pack Track
- Broad Gauge Railway Track
- Other Gauge Railway Track
- Union Council Boundary
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Return Period 50 Years

- Low (Zone 2A)
- Moderate (Zone 2B)

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

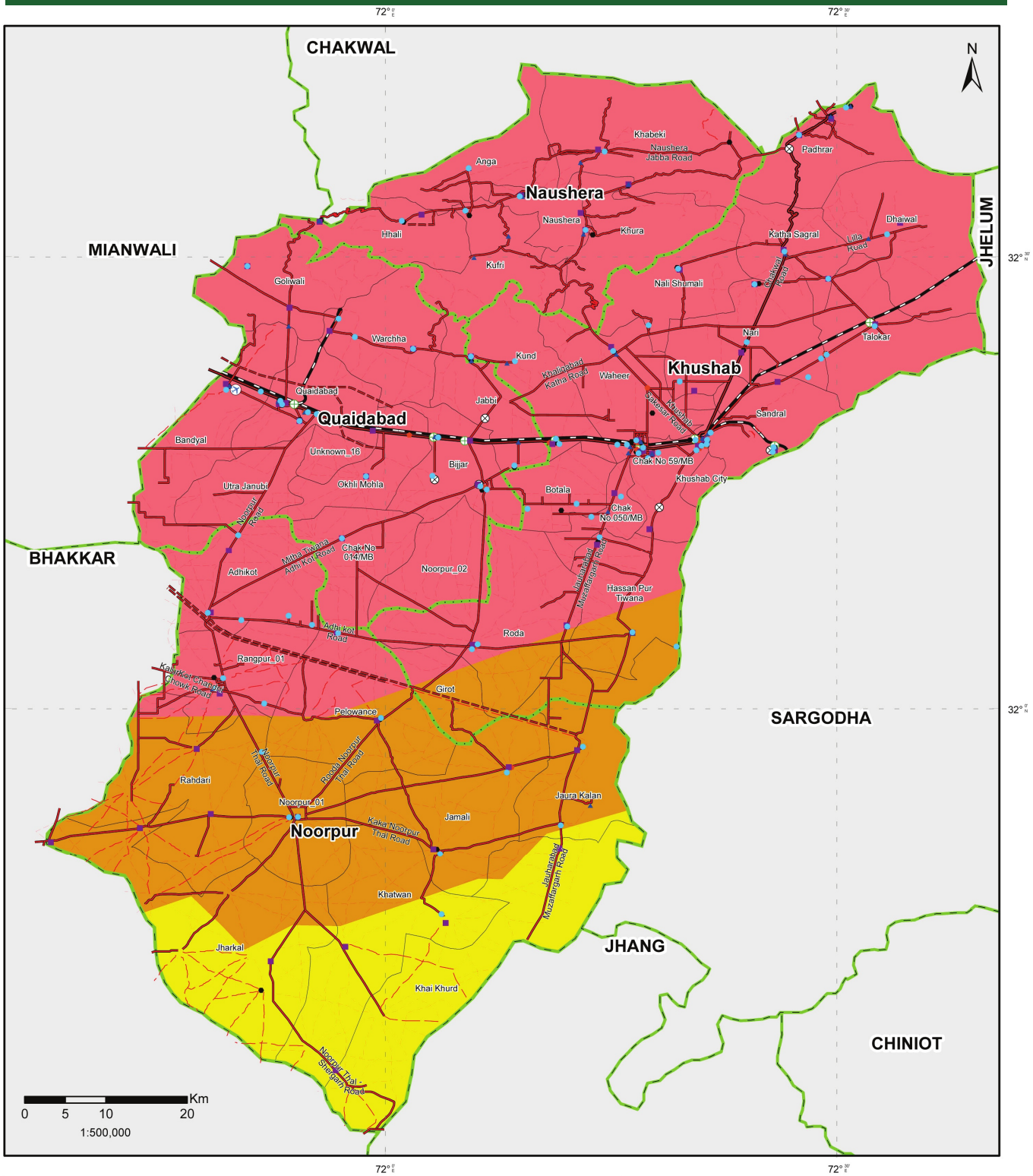
MAP INFORMATION

Data Source(s):
Survey of Pakistan
Pakistan Telecommunication Authority

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-APR-2016-EXP-03-NDMA-50-C(TR-CT)
Prepared by: Project Management Unit, NDMA
Last Updated: 8th May, 2017

COMMUNICATION TOWERS AND TRANSPORTATION NETWORK EXPOSED TO EARTHQUAKE 475 YEAR RETURN PERIOD



Legend

- Mobilink
- Telenor
- Ufone
- Warid
- Zong
- Airport
- Air Field/Landing Strips
- Railway Station
- Bus Station
- Bridge
- Motorway
- Trunk/Highway
- Metalled Road
- Unmetalled Road
- Cart Track
- Pack Track
- Broad Gauge Railway Track
- Other Gauge Railway Track
- Union Council Boundary
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Return Period 475 Years

- Moderate (Zone 2B)
- High (Zone 3)
- Very High (Zone 4)

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

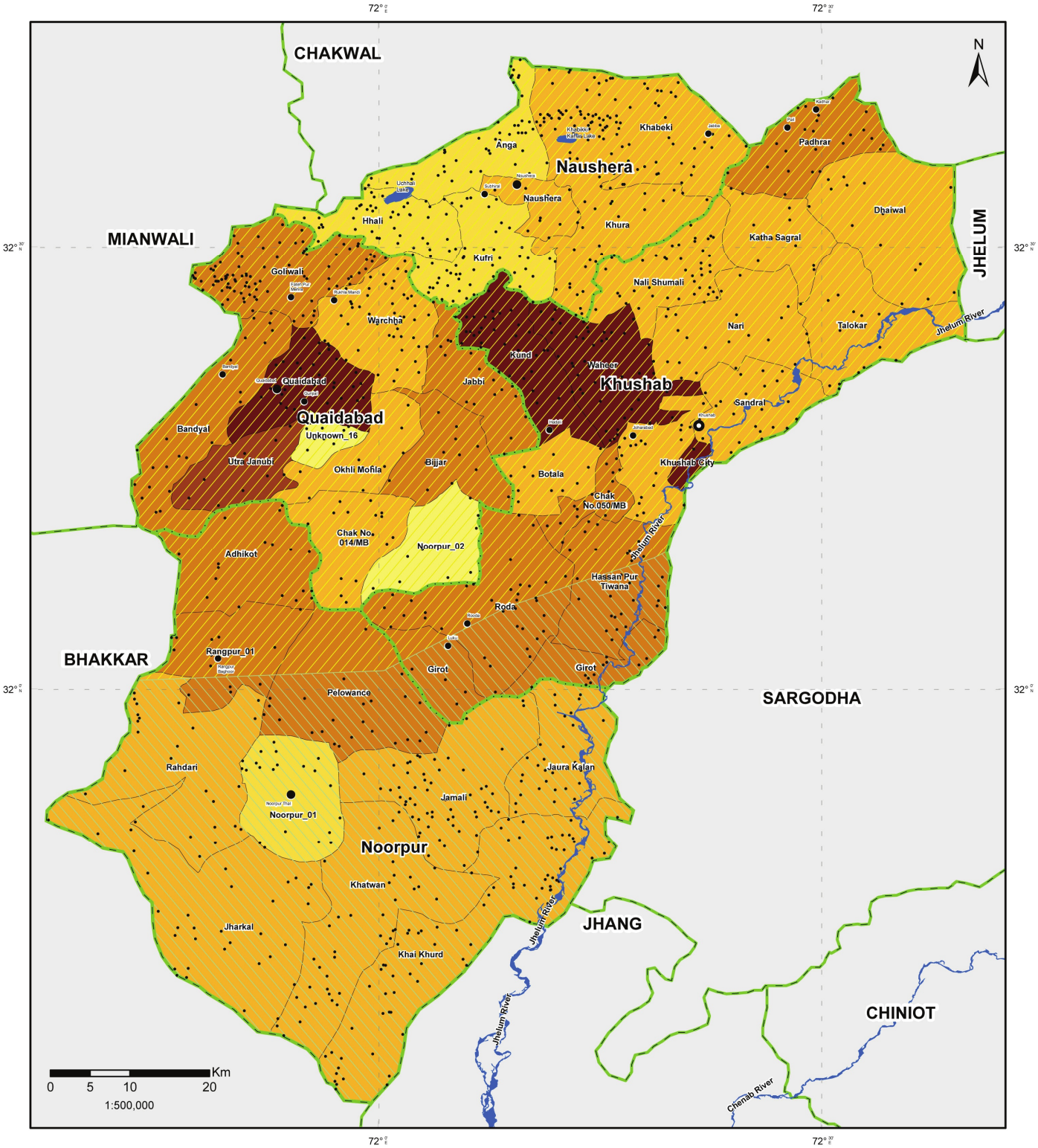
MAP INFORMATION

Data Source(s):
Survey of Pakistan
Pakistan Telecommunication Authority

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-APR-2016-EXP-03-NDMA-475-C(TR-CT)
Prepared by: Project Management Unit, NDMA
Last Updated: 8th May, 2017

SETTLEMENTS, VILLAGES, MAJOR TOWNS AND POPULATION EXPOSED TO EARTHQUAKE RETURN PERIOD 50 YEARS



Legend

- District Headquarter
- Tehsil Headquarter
- Major Towns
- Settlements / Villages

Population Distribution

- < 10000
- 10001 - 20000
- 20001 - 25000
- 25001 - 30000
- 30001 - 40000
- > 40000

Earthquake Hazard

- Low (Zone 2A)
- Moderate (Zone 2B)
- River and Water Body
- Tehsil Boundary
- District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

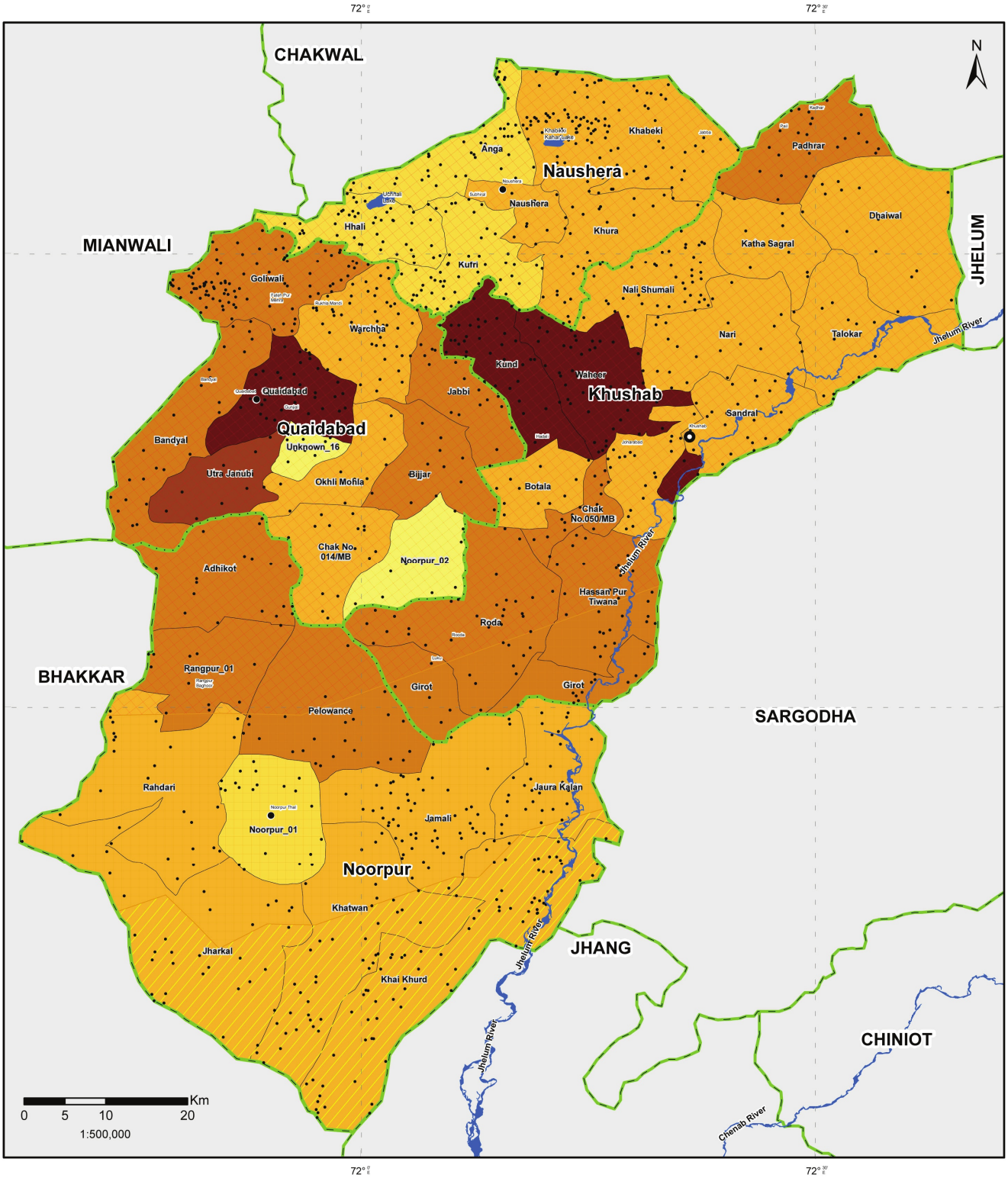
WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Pakistan Bureau of Statistics
Survey of Pakistan

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-03-NDMA-50-C(POP-SET)
Prepared by: Project Management Unit, NDMA
Last Updated: 9th March, 2017

SETTLEMENTS, VILLAGES, MAJOR TOWNS AND POPULATION EXPOSED TO EARTHQUAKE RETURN PERIOD 475 YEARS



Legend

Population Distribution

- Abc < 10000
- Abc 10001 - 20000
- Abc 20001 - 25000
- Abc 25001 - 30000
- Abc 30001 - 40000
- Abc > 40000

Earthquake Hazard

- Moderate (Zone 2B)
- High (Zone 3)
- Very High (Zone 4)

- District Headquarter
- Tehsil Headquarter
- Settlements / Villages
- River and Water Body
- Abc Tehsil Boundary
- ABC District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Pakistan Bureau of Statistics
Survey of Pakistan

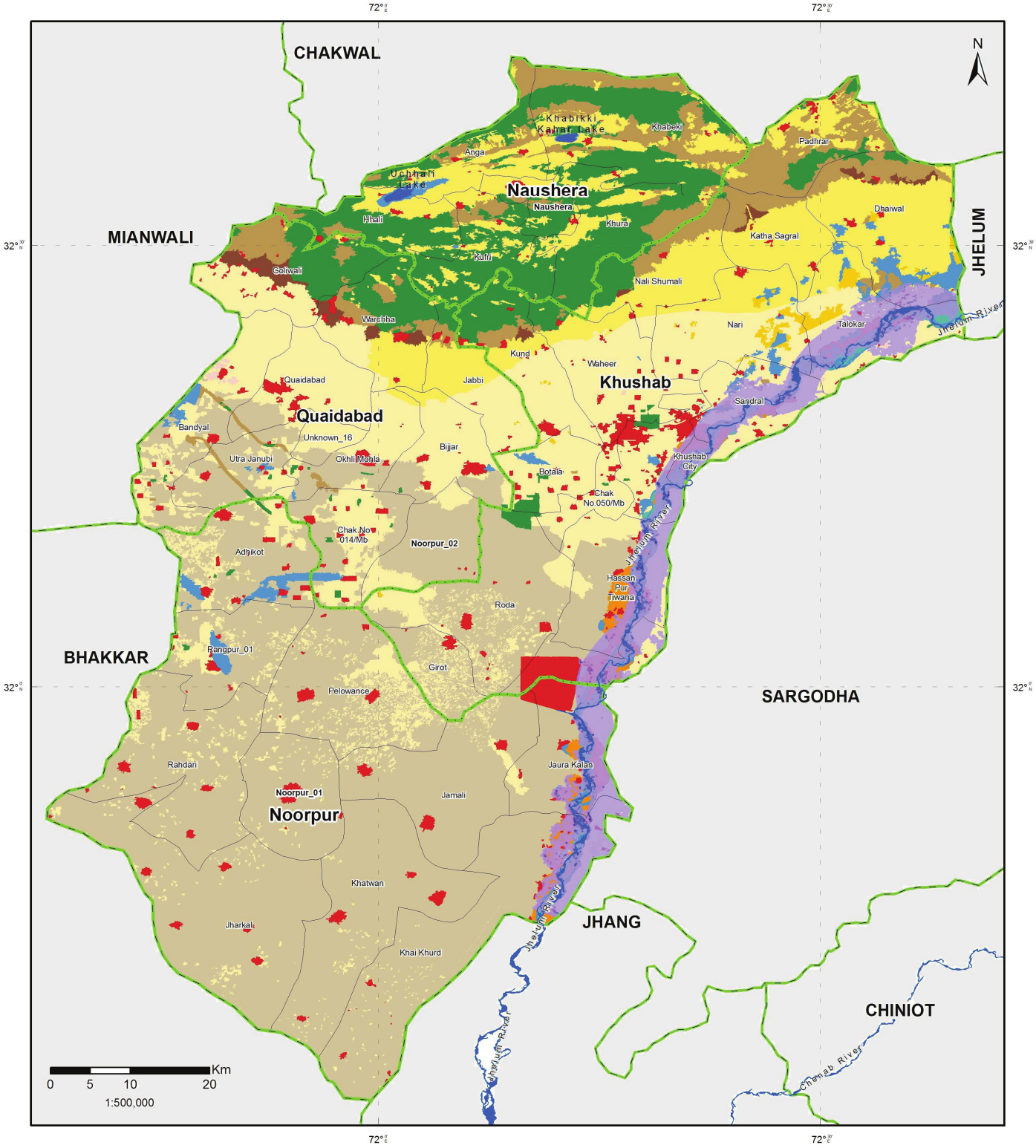
Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-03-NDMA-475-C(POP-SET)
Prepared by: Project Management Unit, NDMA
Last Updated: 9th March, 2017

25 ELEMENTS EXPOSED TO FLOOD HAZARD

	UNION COUNCILS	DEMOGRAPHICS			HOUSING & SETTLEMENTS					TELECOMMUNICATION TOWERS	TRANSPORTATION INFRASTRUCTURE (IN CM)					HEALTH FACILITIES	EDUCATION FACILITIES				CRITICAL INFRASTRUCTURE		LAND USE & LAND COVER TYPE (AREA IN CM)						MAJOR CROPS (AREA IN HECTARES)	
		POPULATION	MALE	FEMALE	SETTLEMENTS	BUILDINGS (ALL TYPES)	PACCA BUILDING	SEMI PACCA BUILDING	KACHA BUILDING		INDUSTRIAL UNITS	MOTORWAY /HIGHWAY/ GRAND TRUNK ROAD	SECONDARY ROADS (METALLED)	UNMETALLED ROAD/CART TRACK/PACK TRACK	RAILWAY TRACK		SCHOOLS	NUMBER OF STUDENTS BOYS	NUMBER OF STUDENTS GIRLS	NUMBER OF TEACHER	SNGPL* (GAS PIPELINE)	OTHERS	CROP IRRIGATED	CROP IN FLOOD PLAIN	CROP RAINFED	CROP MARGINAL & SALINE	ORCHARDS	BUILT UP	RICE	SUGARCANE
KHUSHAB	BOTALA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CHAK NO 59/MB	20,555	10,231	10,324	21	3,315	2,525	94	696	37	0	11	33	9	11	4	81	7,591	8,378	606	0	0	5,525	299	0	0	35	1,671	740	508
	CHAK NO.050/MB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	DHAIWAL	21,302	10,510	10,793	15	3,436	3,092	94	249	3	1	0	24	48	7	2	8	1,178	528	63	11	1	335	0	14,034	599	0	285	137	0
	GIROT	29,710	14,895	14,815	19	4,792	3,568	250	974	0	0	0	31	71	0	0	15	803	524	51	0	0	3,840	1,219	0	0	0	2,124	528	256
	HASSAN PUR TIWANA	26,608	13,046	13,562	29	4,292	2,082	274	1,935	9	0	0	49	58	0	3	43	2,760	3,075	210	0	0	5,505	2,296	0	0	0	420	968	793
	KATHA SAGRAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KHUSHAB CITY	145,447	73,486	71,961	25	22,726	19,684	1,082	1,961	0	0	0	0	0	0	0	0	0	0	0	0	0	129	458	0	0	0	0	36	95
	KUND	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NALI SHUMALI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NARI	20,172	9,696	10,475	29	3,253	2,805	63	386	10	0	12	52	34	7	1	25	2,441	1,472	144	0	0	10,142	0	4,604	1,100	0	292	7,249	33
	PADHRAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RODA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SANDRAL	20,156	10,026	10,130	23	3,251	2,850	27	374	12	0	4	22	5	11	1	19	2,393	1,073	135	11	0	7,392	882	0	91	12	372	1,165	1,159
	TALOKAR	20,632	10,041	10,591	15	3,328	2,842	126	360	6	0	0	28	4	9	0	10	772	1,041	66	5	0	7,586	726	2,092	1,099	77	122	2,322	774
	WAHEER	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TEHSIL TOTAL:	304,582	151,931	152,651	176	48,393	39,448	2,010	6,935	77	1	28	238	229	45	11	201	17,938	16,091	1,275	27	1	40,453	5,880	20,730	2,889	124	5,286	13,145	3,617
NOORPUR	ADHIKOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	JAMALI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	JAURA KALAN	21,572	10,530	11,041	29	3,536	1,901	216	1,419	5	0	0	34	39	0	1	21	1,695	1,230	89	0	0	2,083	2,116	0	0	0	1,834	512	248
	JHARKAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KHAI KHURD	22,740	11,337	11,403	79	3,728	961	52	2,714	1	0	0	31	201	0	1	16	1,330	749	70	0	0	2,989	2,137	0	0	287	429	669	869
	KHATWAN	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NOOR PUR_01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	PELOWANCE	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RAHDARI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	RANGPUR_01	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TEHSIL TOTAL:	44,312	21,867	22,444	108	7,264	2,862	268	4,133	6	0	0	65	240	0	2	37	3,025	1,979	159	0	0	5,072	4,253	0	0	287	2,264	1,181	1,116
NAUSHERA	ANGA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	HHALI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KHABEKI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KHURA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	KUFRI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Naushera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TEHSIL TOTAL:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
QUAIDABAD	BANDYAL	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	BIJJAR	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	CHAK NO 014/MB	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	GOLIWALI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	JABBI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	NOOR PUR_02	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	OKHLI MOHLA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	QUAIDABAD	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	UNKNOWN_16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	UTRA JANUBI	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	WARCHHA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	TEHSIL TOTAL:	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	DISTRICT TOTAL:	348,894	173,798	175,095	284	55,657	42,310	2,278	11,068	83	1	28	303	469	45	13	238	20,963	18,070	1,434	27	1	45,526	10,133	20,730	2,889	411	7,550	14,327	4,734

* Sui Northern Gas Pipelines Limited (SNGPL), Pakistan

LAND USE & LAND COVER EXPOSED TO FLOOD RETURN PERIOD 10 YEAR



Legend

- Bare Areas
- Bare Areas with Sparse Natural Vegetation
- Built-up
- Crop in Flood Plain
- Crop Marginal and Irrigated Saline
- Crop Rainfed
- Crop Irrigated
- Forest - Natural Trees and Mangroves
- Natural Vegetation in Wet Areas
- Orchards
- Range Lands - Natural Shrubs and Herbs
- Snow and Glaciers
- Wet Areas
- River and Water Body
- Union Council Boundary (Abc)
- Tehsil Boundary (Abc)
- District Boundary (ABC)
- Provinvial Boundary
- Line of Control
- International Boundary

Return Period 10 Years

- No Flood
- Low
- Medium
- High
- Very High

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

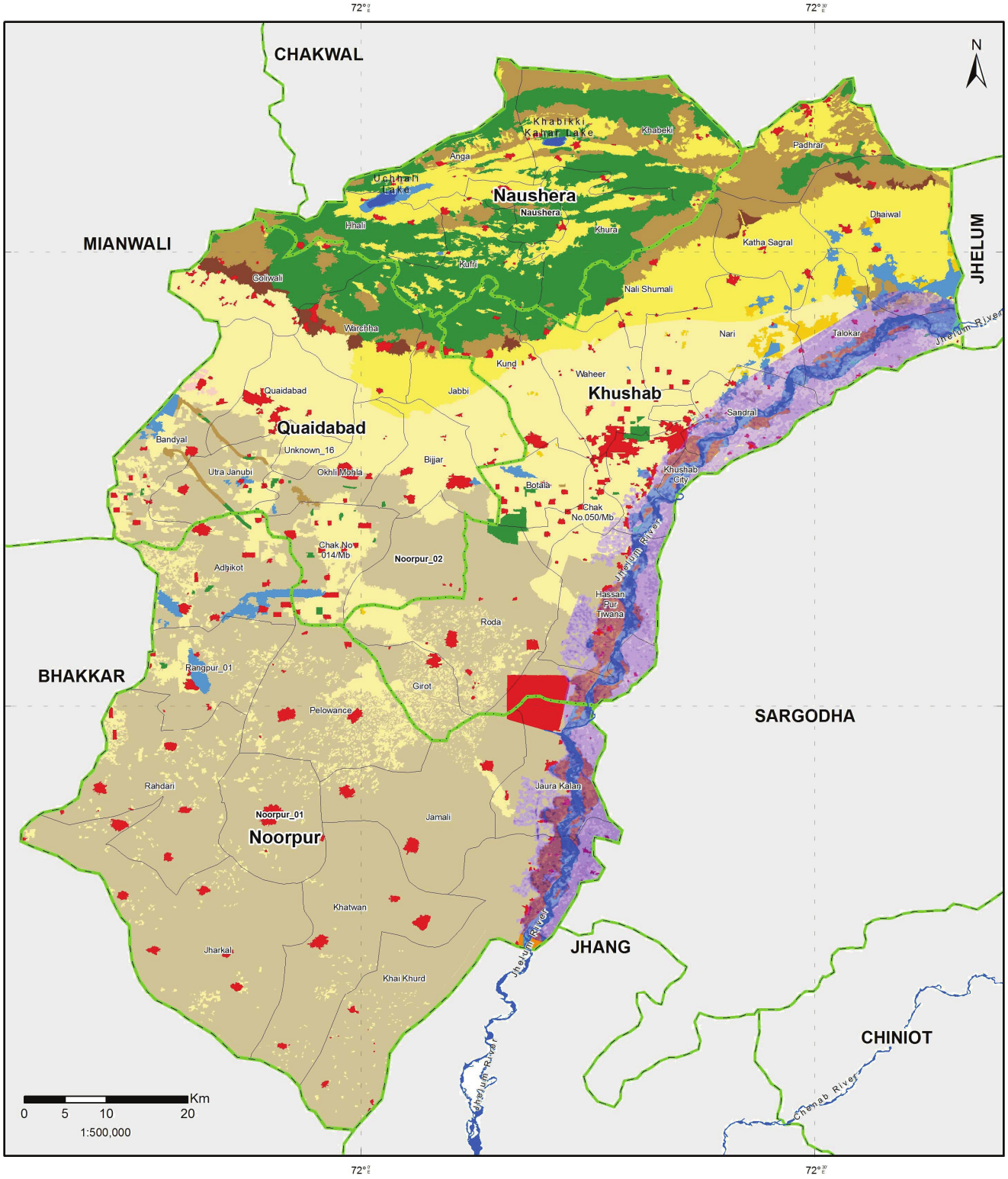
WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Landcover-SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-10-LULC
Prepared by: Project Management Unit, NDMA
Last Updated: 10th May, 2017

LAND USE & LAND COVER EXPOSED TO FLOOD RETURN PERIOD 50 YEAR



Legend

- Bare Areas
- Bare Areas with Sparse Natural Vegetation
- Built-up
- Crop in Flood Plain
- Crop Marginal and Irrigated Saline
- Crop Rainfed
- Crop Irrigated
- Forest - Natural Trees and Mangroves
- Natural Vegetation in Wet Areas
- Orchards
- Range Lands - Natural Shrubs and Herbs
- Snow and Glaciers
- Wet Areas
- River and Water Body
- Union Council Boundary (Abc)
- Tehsil Boundary (Abc)
- District Boundary (ABC)
- Provinvial Boundary
- Line of Control
- International Boundary

Return Period 50 Years

- No Flood
- Low
- Medium
- High
- Very High

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

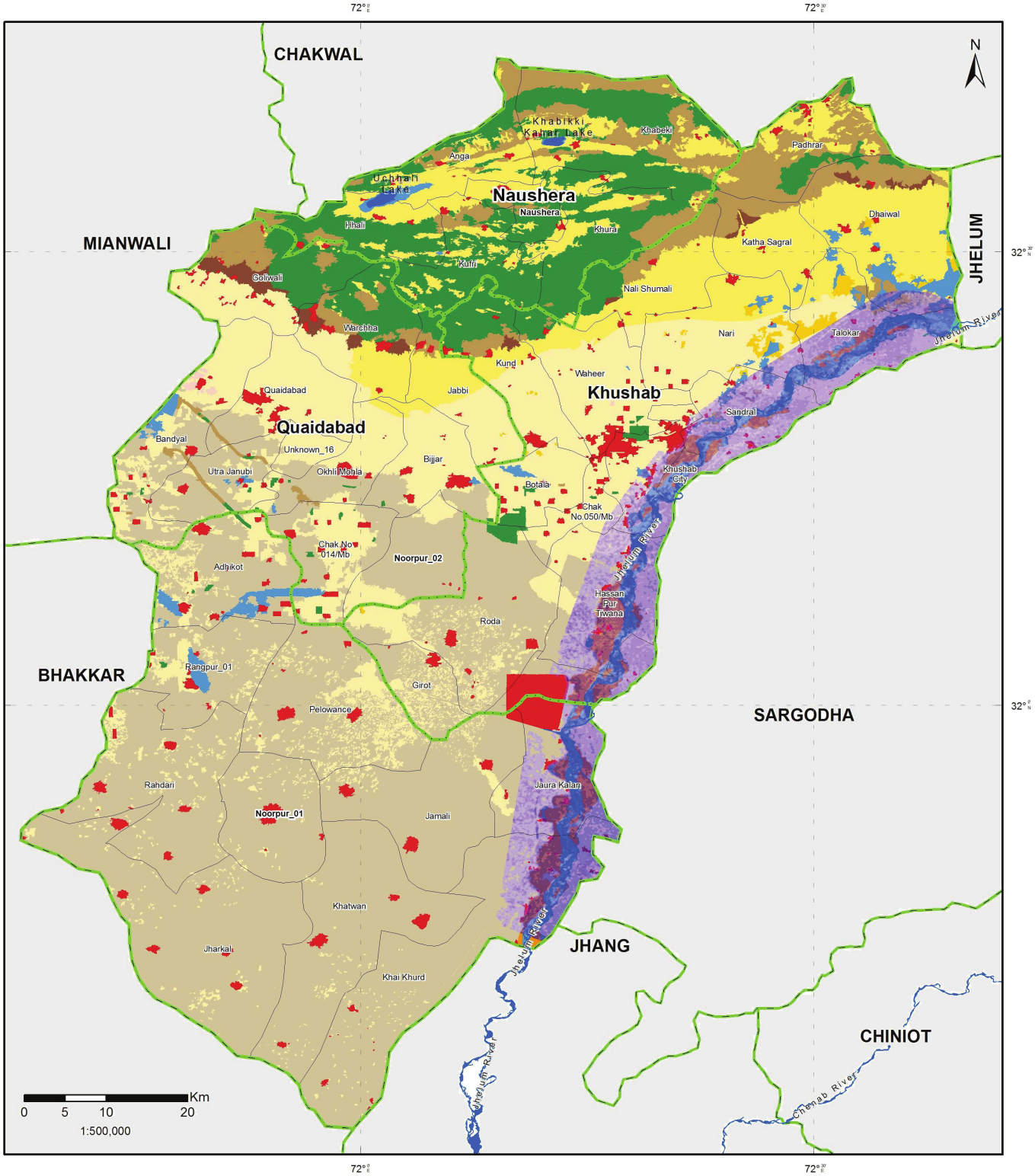
WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Landcover-SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-50-LULC
Prepared by: Project Management Unit, NDMA
Last Updated: 10th May, 2017

LAND USE & LAND COVER EXPOSED TO FLOOD RETURN PERIOD 100 YEAR



Legend

- Bare Areas
- Bare Areas with Sparse Natural Vegetation
- Built-up
- Crop in Flood Plain
- Crop Marginal and Irrigated Saline
- Crop Rainfed
- Crop Irrigated
- Forest - Natural Trees and Mangroves
- Natural Vegetation in Wet Areas
- Orchards
- Range Lands - Natural Shrubs and Herbs
- Snow and Glaciers
- Wet Areas
- River and Water Body
- Union Council Boundary (Abc)
- Tehsil Boundary (Abc)
- District Boundary (ABC)
- Provinvial Boundary
- Line of Control
- International Boundary

Return Period 100 Years

- No Flood
- Low
- Medium
- High
- Very High

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

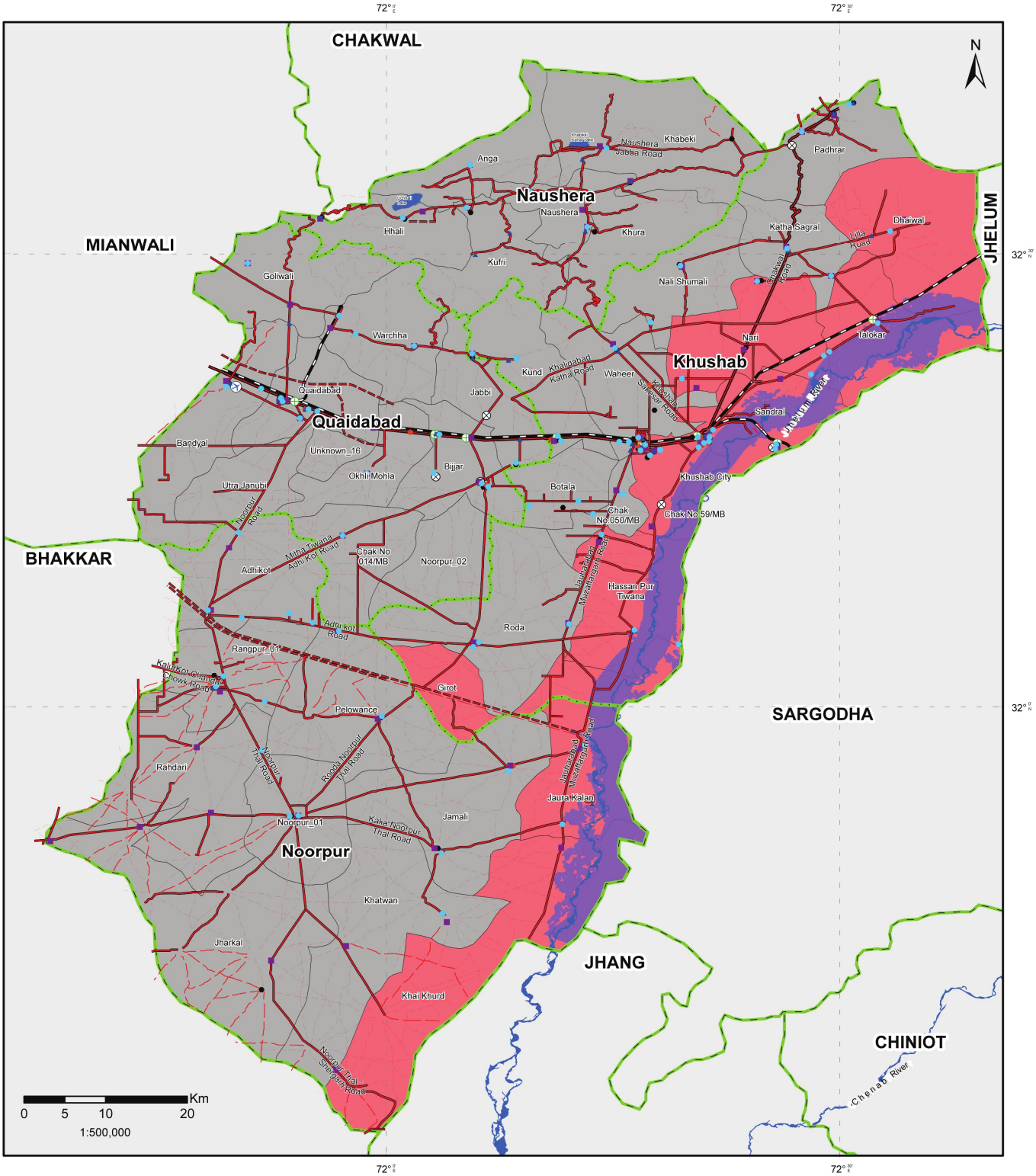
WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Landcover-SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-100-LULC
Prepared by: Project Management Unit, NDMA
Last Updated: 10th May, 2017

COMMUNICATION TOWERS AND TRANSPORTATION NETWORK EXPOSED TO FLOOD 10 YEAR RETURN PERIOD



Legend

- Mobilink
- Telenor
- Ufone
- Warid
- Zong
- Airport
- Air Field/Landing Strips
- Railway Station
- Bus Station
- Bridge
- Motorway
- Trunk/Highway
- Metalled Road
- Unmetalled Road
- Cart Track
- Pack Track
- Broad Gauge Railway Track
- Other Gauge Railway Track
- River and Reservoir
- Exposed UCs
- Unexposed UCs
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

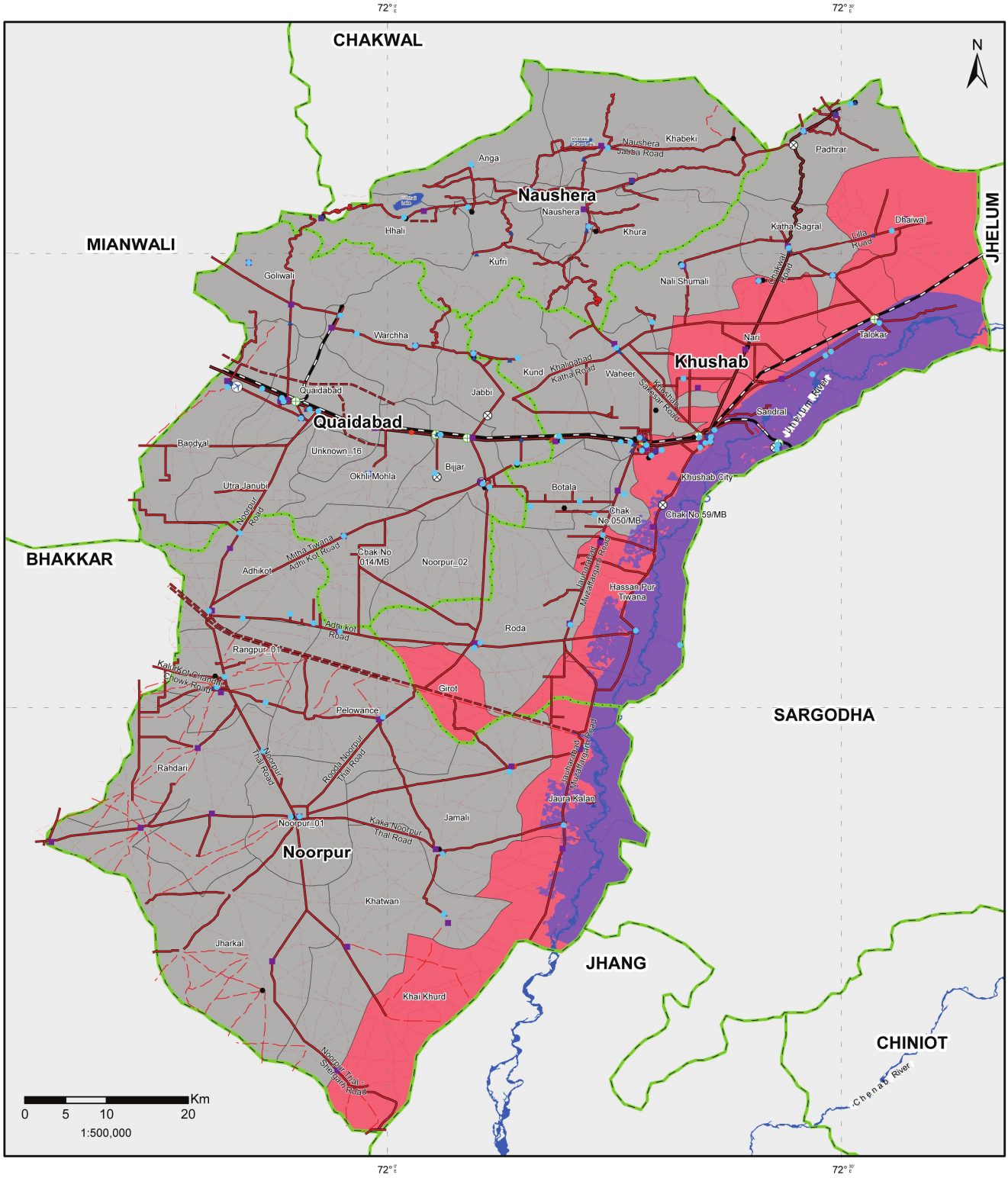
MAP INFORMATION

Data Source(s):
Survey of Pakistan
Pakistan Telecommunication Authority

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-10-C(TR-CT)
Prepared by: Project Management Unit, NDMA
Last Updated: 8th May, 2017

COMMUNICATION TOWERS AND TRANSPORTATION NETWORK EXPOSED TO FLOOD 50 YEAR RETURN PERIOD



Legend

- Mobilink
- Telenor
- Ufone
- Warid
- Zong
- Airport
- Air Field/Landing Strips
- Railway Station
- Bus Station
- Bridge
- Motorway
- Trunk/Highway
- Metalled Road
- Unmetalled Road
- Cart Track
- Pack Track
- Broad Gauge Railway Track
- Other Gauge Railway Track
- River and Reservoir
- Exposed UCs
- Unexposed UCs
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

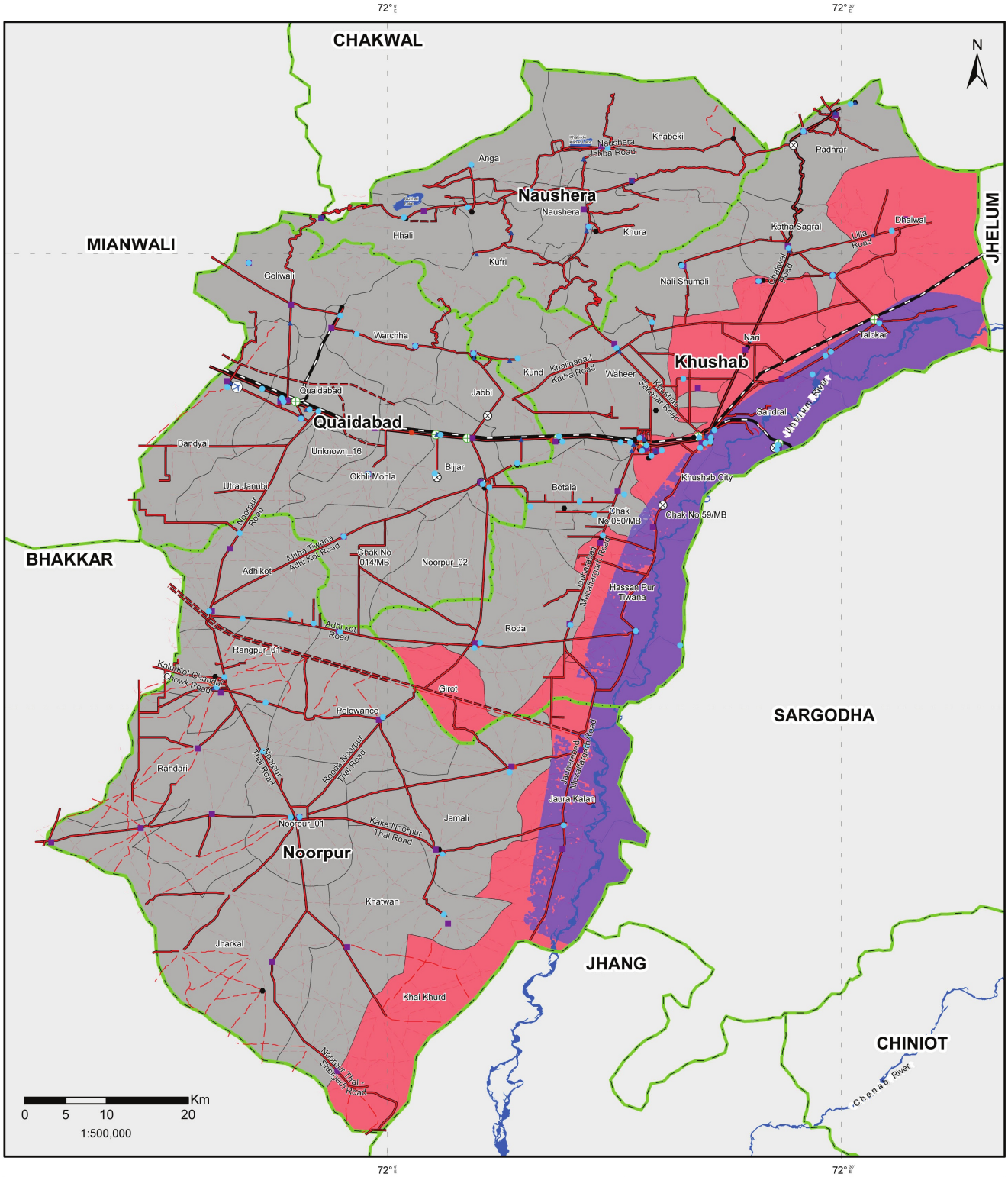
MAP INFORMATION

Data Source(s):
Survey of Pakistan
Pakistan Telecommunication Authority

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-50-C(TR-CT)
Prepared by: Project Management Unit, NDMA
Last Updated: 8th May, 2017

COMMUNICATION TOWERS AND TRANSPORTATION NETWORK EXPOSED TO FLOOD 100 YEAR RETURN PERIOD



Legend

- Mobilink
- Telenor
- Ufone
- Warid
- Zong
- Airport
- Air Field/Landing Strips
- Railway Station
- Bus Station
- Bridge
- Motorway
- Trunk/Highway
- Metalled Road
- Unmetalled Road
- Cart Track
- Pack Track
- Broad Gauge Railway Track
- Other Gauge Railway Track
- River and Reservoir
- Exposed UCs
- Unexposed UCs
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

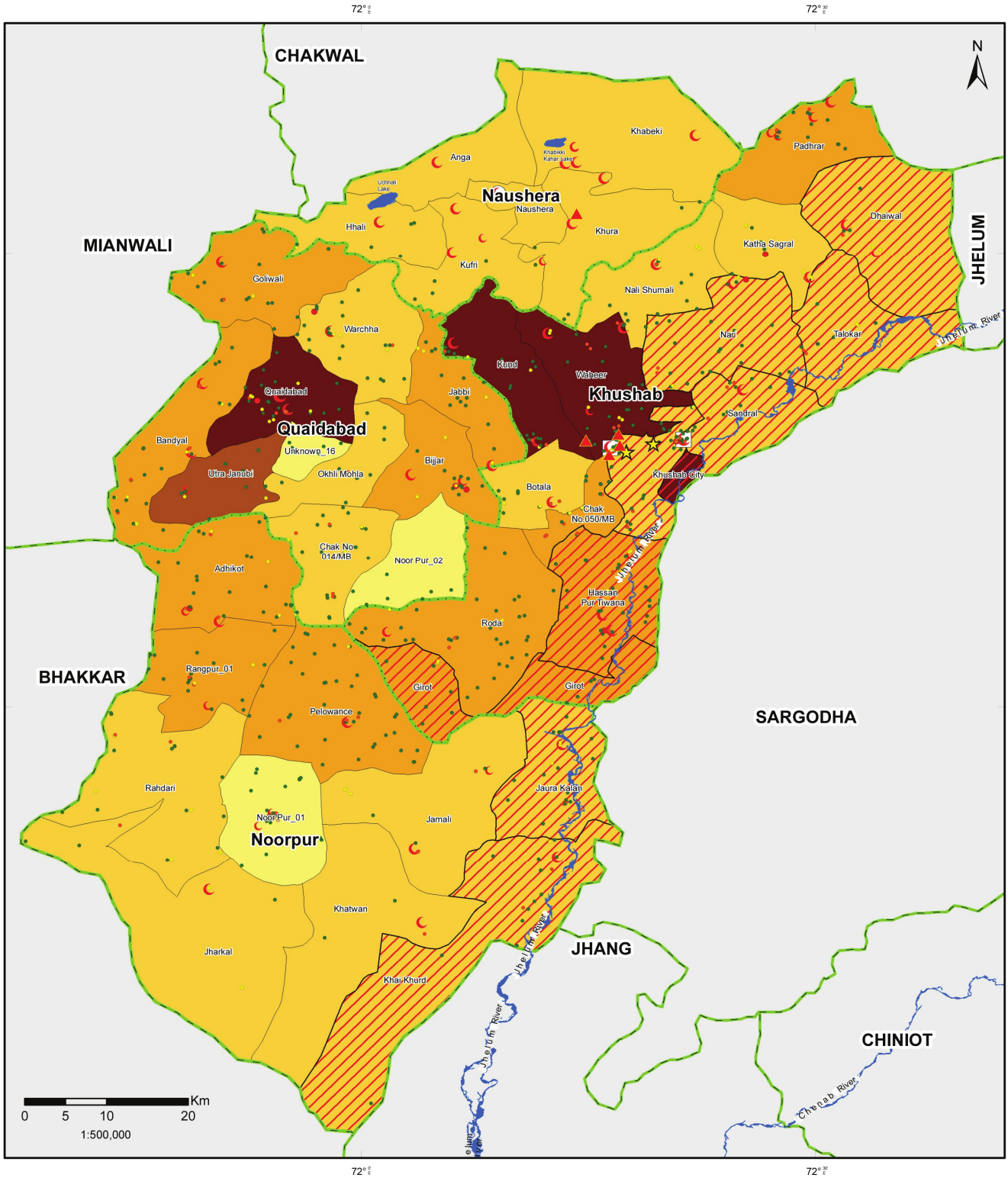
MAP INFORMATION

Data Source(s):
Survey of Pakistan
Pakistan Telecommunication Authority

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-100-C(TR-CT)
Prepared by: Project Management Unit, NDMA
Last Updated: 8th May, 2017

SCHOOLS, HEALTH AND BUILDING EXPOSED TO FLOOD 10 YRP



Legend

- District Headquarters Hospital
- Tehsil Headquarters Hospital
- Civil Hospital & Tuberculosis Clinic
- Basic Health Unit
- Rural Health Centre
- Mental/Child Health/ Dispensary
- University
- College
- Higher Secondary School
- High School
- Middle School
- Primary School

Building Distribution

- < 3000
- 3000 - 4000
- 4000 - 5000
- 5000 - 6000
- > 6000

- Exposed UCs
- River and Water Body
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

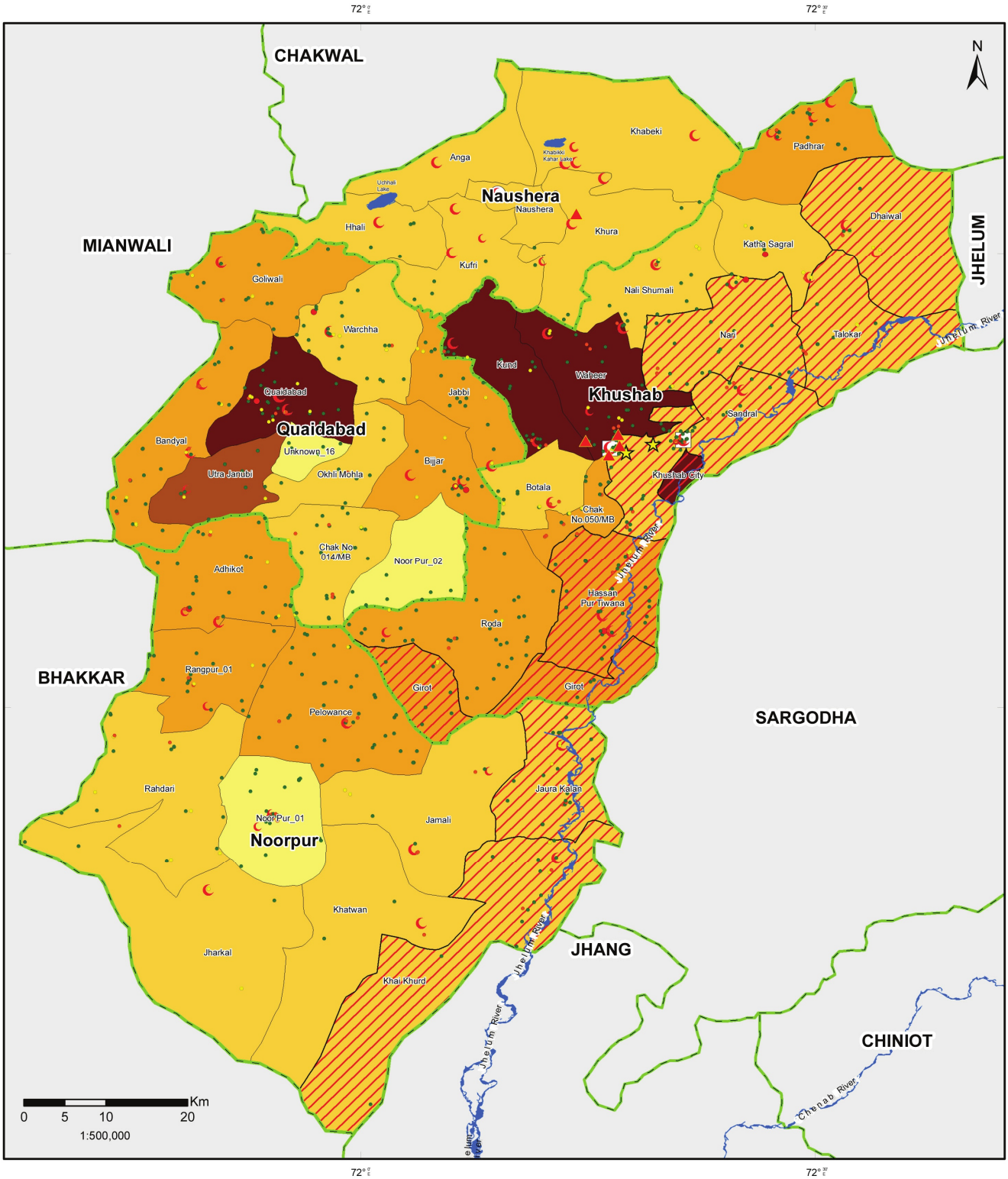
MAP INFORMATION

Data Source(s):
Pakistan Bureau of Statistics
School Education Department
World Health Organization
Health Department Punjab

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-10-C(HF-EF-BD)
Prepared by: Project Management Unit, NDMA
Last Updated: 2nd May, 2017

SCHOOLS, HEALTH AND BUILDING EXPOSED TO FLOOD 50 YRP



Legend

- District Headquarters Hospital
- Tehsil Headquarters Hospital
- Civil Hospital & Tuberculosis Clinic
- Basic Health Unit
- Rural Health Centre
- Mental/Child Health/ Dispensary
- University
- College
- Higher Secondary School
- High School
- Middle School
- Primary School

Building Distribution

- < 3000
- 3000 - 4000
- 4000 - 5000
- 5000 - 6000
- > 6000

- Exposed UCs
- River and Water Body
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

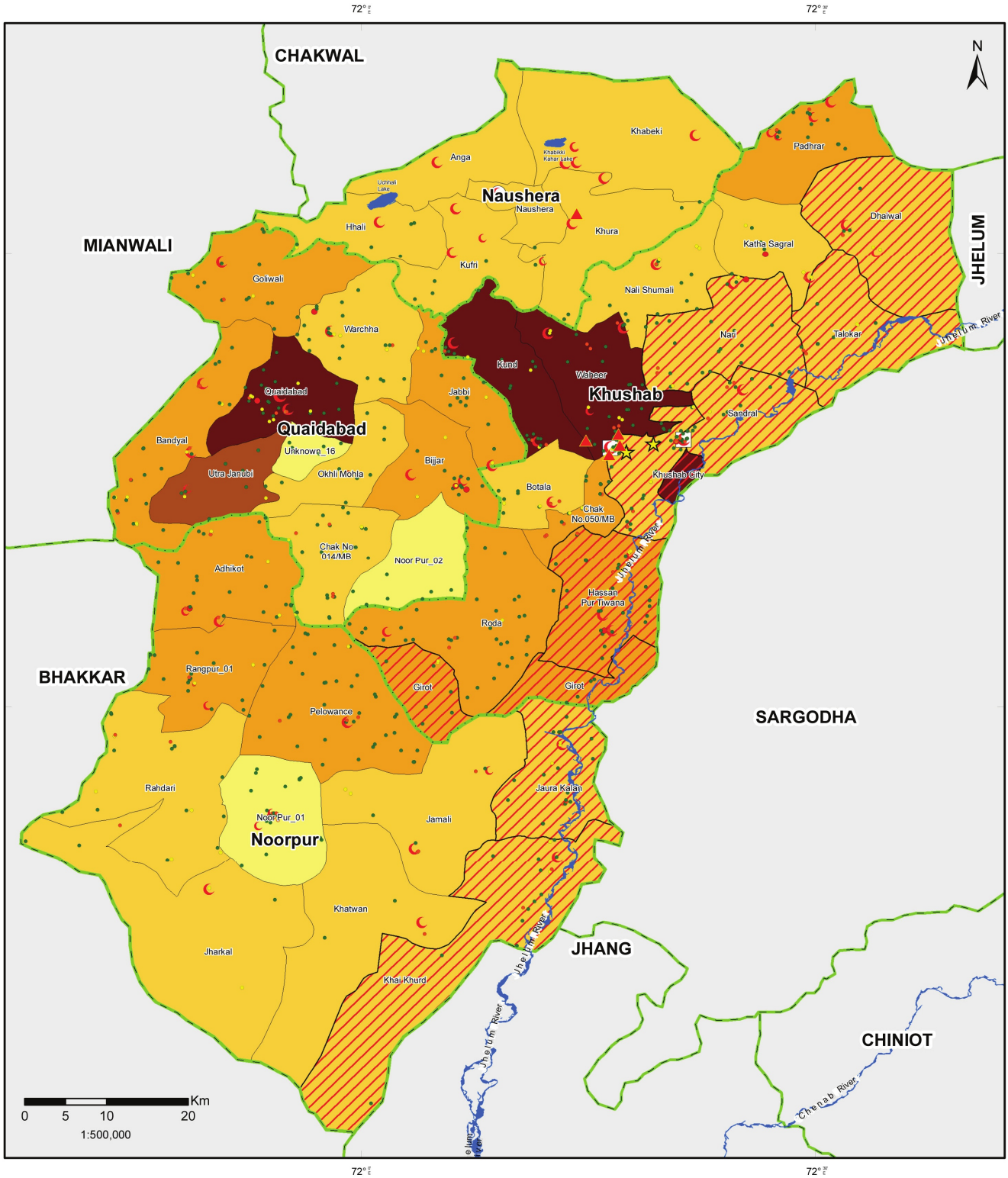
MAP INFORMATION

Data Source(s):
Pakistan Bureau of Statistics
School Education Department
World Health Organization
Health Department Punjab

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-50-C(HF-EF-BD)
Prepared by: Project Management Unit, NDMA
Last Updated: 2nd May, 2017

SCHOOLS, HEALTH AND BUILDING EXPOSED TO FLOOD 100 YRP



Legend

- District Headquarters Hospital
- Tehsil Headquarters Hospital
- Civil Hospital & Tuberculosis Clinic
- Basic Health Unit
- Rural Health Centre
- Mental/Child Health/ Dispensary
- University
- College
- Higher Secondary School
- High School
- Middle School
- Primary School

Building Distribution

- < 3000
- 3000 - 4000
- 4000 - 5000
- 5000 - 6000
- > 6000

- Exposed UCs
- River and Water Body
- Tehsil Boundary
- District Boundary
- Provincial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

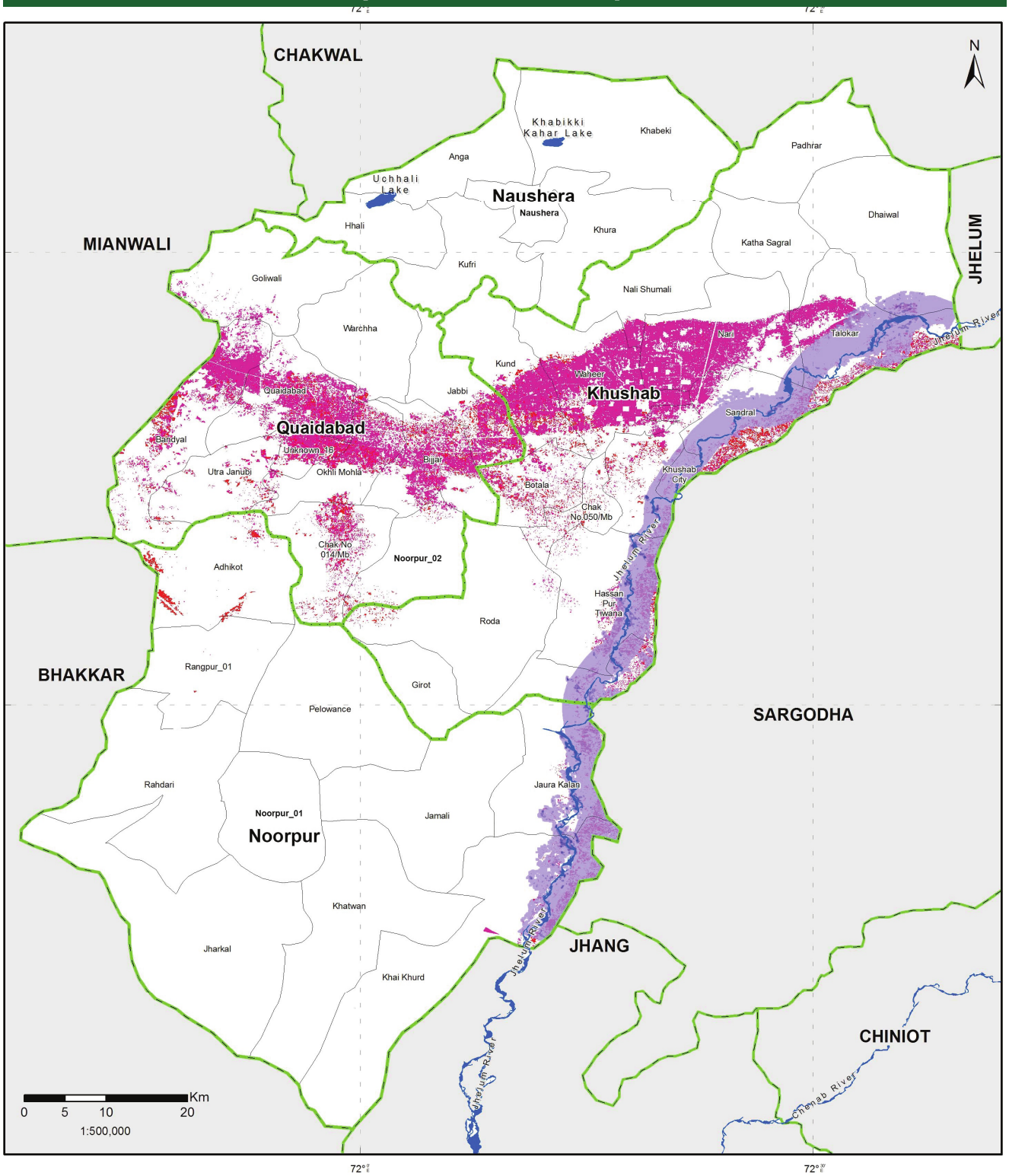
MAP INFORMATION

Data Source(s):
Pakistan Bureau of Statistics
School Education Department
World Health Organization
Health Department Punjab

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-100-C(HF-EF-BD)
Prepared by: Project Management Unit, NDMA
Last Updated: 2nd May, 2017

CROP EXPOSED TO FLOOD RETURN PERIOD 10 YEARS (KHARIF SEASON)



Legend

- Rice
- Sugarcane
- Cotton
- River and Water Body
- Union Council Boundary (Abc)
- Tehsil Boundary (Abc)
- District Boundary (ABC)
- Provincial Boundary
- Line of Control
- International Boundary

Return Period 10 Years

- No Flood
- Low
- Medium
- High
- Very High

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

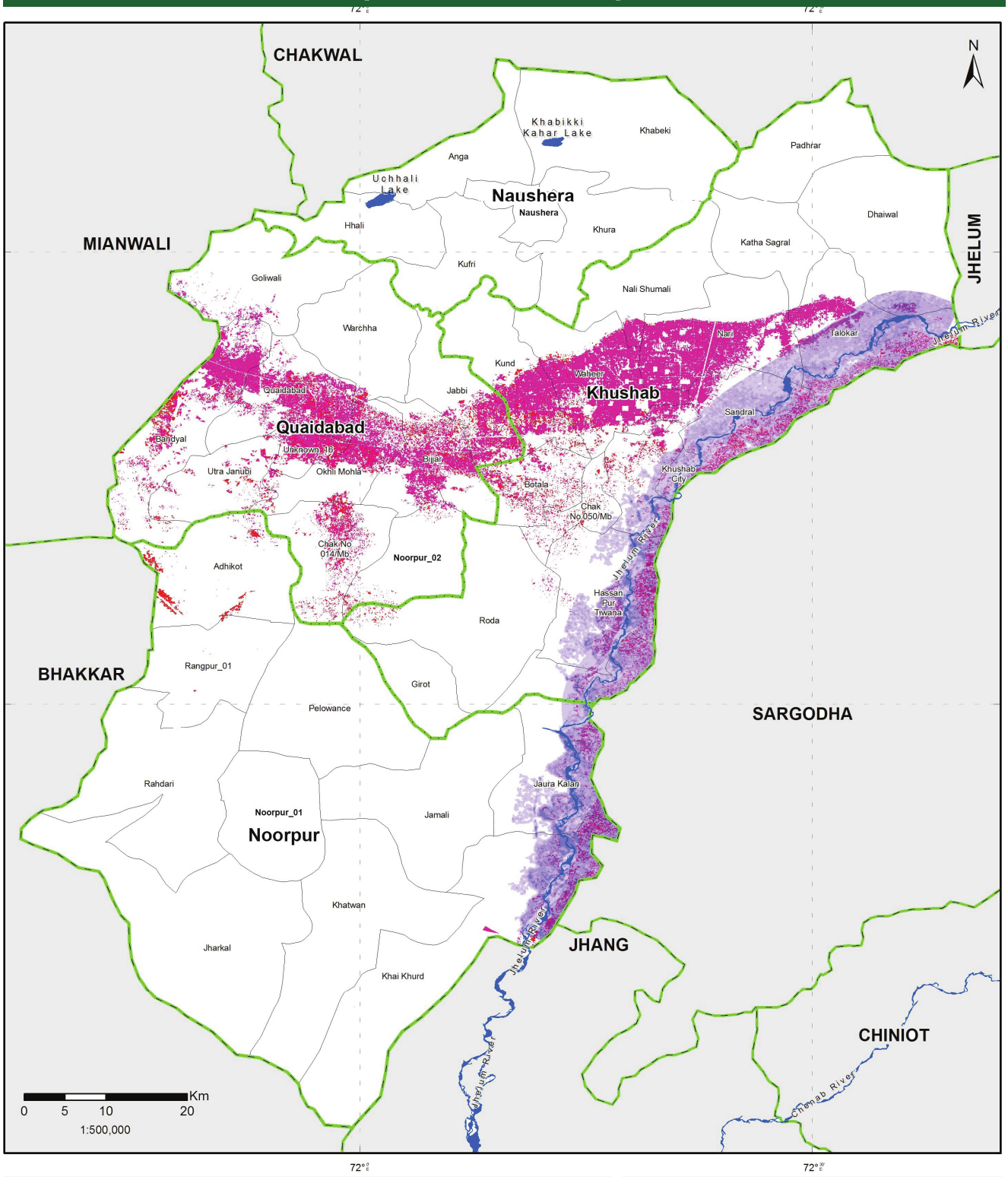
United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Crop Mask-SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-10-KH-CROPS
Prepared by: Project Management Unit, NDMA
Last Updated: 11th May, 2017

CROP EXPOSED TO FLOOD RETURN PERIOD 50 YEARS (KHARIF SEASON)



Legend

- Rice
- Sugarcane
- Cotton
- River and Water Body
- Union Council Boundary (Abc)
- Tehsil Boundary (Abc)
- District Boundary (ABC)
- Provincial Boundary
- Line of Control
- International Boundary

Return Period 50 Years

- No Flood
- Low
- Medium
- High
- Very High

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

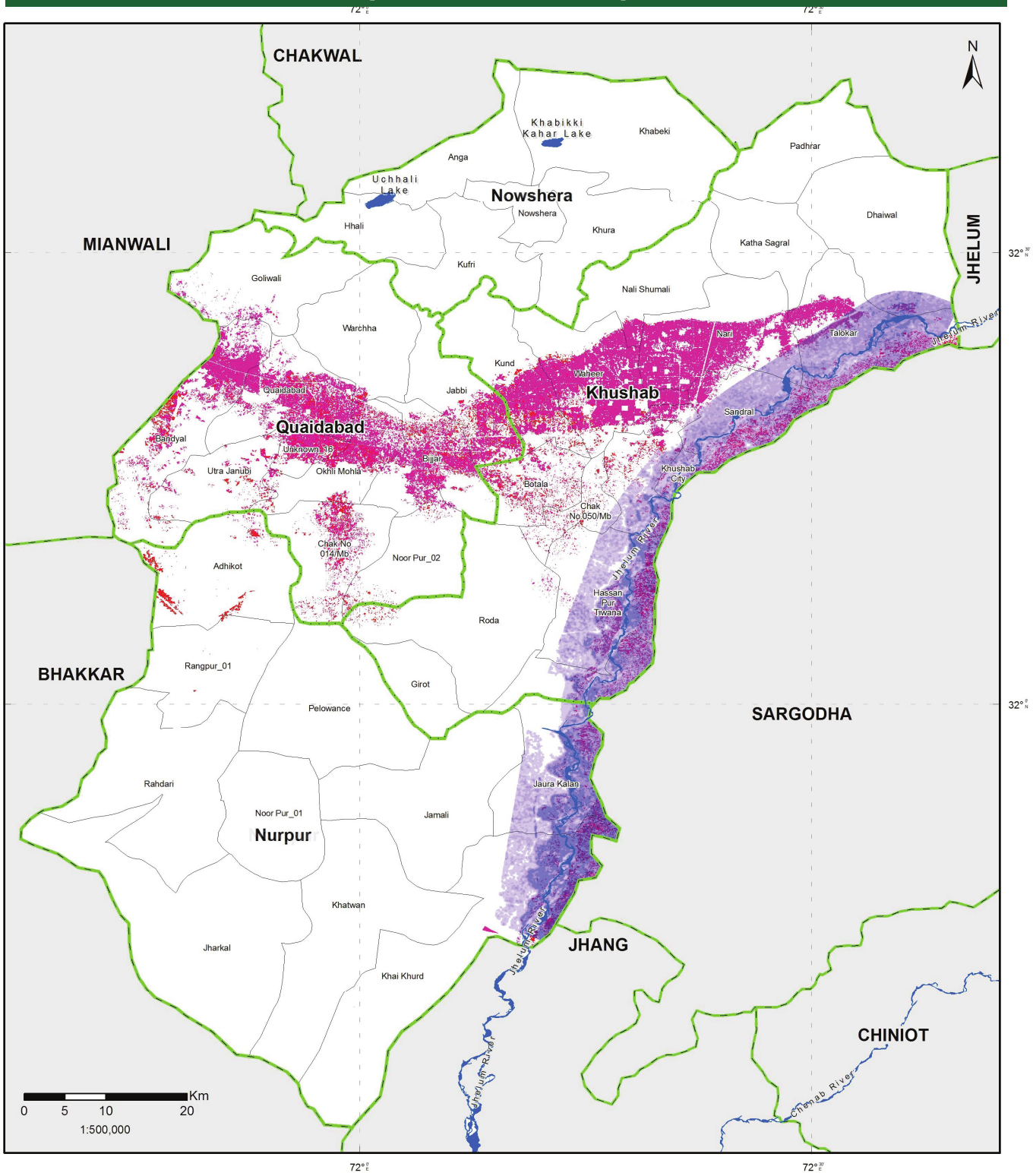
WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Crop Mask-SUPARCO

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-616-APR-2016-EXP-04-NDMA-50-KH-CROPS
Prepared by: Project Management Unit, NDMA
Last Updated: 11th May, 2017

CROP EXPOSED TO FLOOD RETURN PERIOD 100 YEARS (KHARIF SEASON)



Legend

- Rice
- Sugarcane
- Cotton
- River and Water Body
- Union Council Boundary (Abc)
- Tehsil Boundary (Abc)
- District Boundary (ABC)
- Provincial Boundary
- Line of Control
- International Boundary

Return Period 100 Years

- No Flood
- Low
- Medium
- High
- Very High

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
PBS, Govt. of Punjab, Govt. of Pakistan
Hazard Layer-NDMA, Crop Mask-SUPARCO

Datum: WGS 1984
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D VULNERABILITY ASSESSMENT

- SOCIAL VULNERABILITY
- FODD SECURITY



26 SOCIAL VULNERABILITY ASSESSMENT

Vulnerability Assessment has been undertaken in terms of:

(a) Physical Dimension (b) Social Aspects (c) Agro based Food Security

Exposure is defined as the interaction of element at risk and hazard. The hazard severity, extent or magnitude of various return periods indicates the degree to which the elements at risk are exposed to a particular hazard. Primary and secondary sources were used for exposure analysis and it was performed by overlaying hazard information with elements at risk. Elements at risks were considered in the dimensions of population, building, essential & critical infrastructures and livelihood.

Physical Vulnerability Analysis (PVA)

For fragility analysis of buildings the structures are classified into engineered and non-engineered constructions. The engineered structured are analyzed by conducting laboratory experiments on building constituent materials such as brick units, mortar, brick assemblages, brick panels and brick walls for masonry structures and concrete cylinders, reinforcing steel bars, structural beam-column members for reinforced concrete structures. However, the complexity of non-engineered buildings, that depend solely on material properties are not reliable owing to the complexity of structure for modeling On National scale the construction typologies in Pakistan are primarily based on the type of material used in the construction of walls, floors and roof, and the overall construction quality of a structure typology.

Based on the type used according to EMS-98 the building vulnerability scoring for earthquake and flood hazard are given below where fragility against earthquake is calculated using shake table test and numerical analysis approach, while flood vulnerabilty scoring is based on historical damage statistics.

Building Vulnerability Scoring

Building Types	EMS-98	Vulnerability Score	
		Floods	Earthquakes
Reinforced Concrete	RC1	2.5	3.09
Stone Masonry	M1	5.4	5.56
Mud/Adobe Masonry	M2	7.14	7.14
Brick Masonry	M5	3.66	3.79
Wood/Bamboo Traditional	M7	4.82	2.50
Block Masonry	M8	4.24	5.00
Others Undefined	00	5	6.25

Building Vulnerability Scoring as per PBS Classification

Building Types	Floods	Earthquakes
Kaccha	6.5	7
Semi-Pacca	5.0	6
Pacca	2.5	3

The damage state of building material based on the repair cost ratio i.e. the ratio of the cost of repair to the total building cost is given below.

Damage State	Repair Cost Ratio
Slight	0 - 5%
Moderate	5 - 20%
Heavy	20 - 50%
Severe	50 - 100%

Buildings Surveyed for Physical Vulnerability Assessment



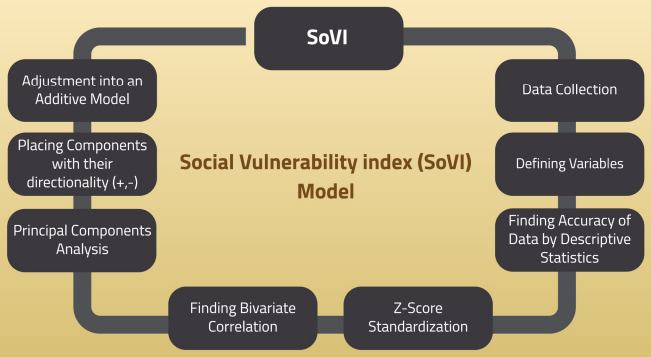
Social Vulnerability Assessment (SVA)

The Social Vulnerability Assessment focuses on the vulnerability characterization of communities, considering both the vulnerabilities of physical systems and the social conditions that can increase or decrease the impact of disasters in the considered area. The assessment is based on susceptibility of populations to loss, which is quantified using the methodology known as Social Vulnerability Index (SoVI). The SoVI for District Khushab is given in the table below.

Factors	Component	Directionality	Variance Observed(%)
1	Age, Education, Health Outcome, Socioeconomic Status	Positive	29.76%
2	Rural Farm Populations	Positive	12.5%
3	Information Access	Negative	6.9%
4	Children with Disabilities	Positive	5.99%
5	Social Benefits	Negative	5.66%
6	Infant safety	Negative	5.61%
7	Low income laborers	Positive	5.31%
8	Poverty/Need for External Income Source	Positive	5.22%
9	Preventative Health Measures	Negative	5%

To obtain a final composite score of social vulnerability, the factors were added to obtain the aggregated factor i.e. the Social Vulnerability Index for each of the District:

SoVI Score = Factor 1 + Factor 2 + Factor 3 + Factor 4 + Factor 5 + Factor 6 + Factor 7 + Factor 8 + Factor 9



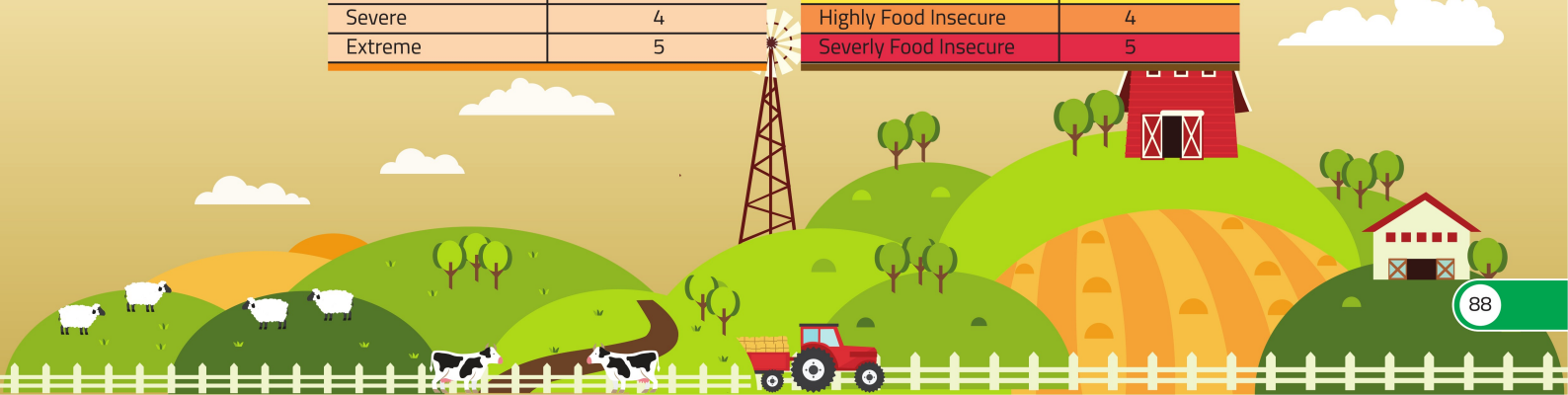
27 FOOD SECURITY

FOOD SECURITY AGAINST DROUGHT

Tehsil	Union Council	Drought Severity Score	Area of UC (sq.km)	Agricultural Land (sq.km)	%age of Agri to Total Land	Total Population Rural UCs (98 Census)	%age of Agri Dependent Population	Food Insecurity	Food Insecurity Ranking
Khushab	Nari	4	171.20	158.46	92.56	14,683	100	37,024	5
Qaidabad	Bijjar	4	118.02	80.47	68.19	20,465	100	27,274	4
Qaidabad	Jabbi	4	102.25	88.73	86.78	18,322	100	34,712	4
Khushab	Katha Sagral	4	102.59	76.20	74.27	15,507	100	29,710	4
Qaidabad	Quaidabad	4	120.72	94.23	78.05	6,104	100	31,222	4
Nowshera	Anga	4	120.76	55.07	45.60	14,523	100	18,241	3
Qaidabad	Chak No 014/mb	4	122.89	57.71	46.97	16,303	100	18,786	3
Khushab	Dhaiwal	4	229.08	149.68	65.34	15,506	100	26,137	3
Khushab	Kund	4	132.75	77.03	58.02	15,005	100	23,210	3
Khushab	Nali Shumali	4	129.36	78.20	60.46	15,379	100	24,182	3
Khushab	Sandral	3	114.02	83.77	73.47	14,672	100	22,041	3
Khushab	Talokar	3	162.55	115.80	71.24	15,018	100	21,371	3
Qaidabad	Bandyal	3	175.85	97.33	55.35	19,855	100	16,605	2
Qaidabad	Goliwali	4	168.06	59.12	35.18	21,091	100	14,071	2
Nowshera	Khabeki	5	261.51	58.78	22.48	15,189	100	11,239	2
Nowshera	Khura	4	157.98	36.89	23.35	15,404	100	9,340	2
Nowshera	Kufri	4	130.30	31.22	23.96	14,154	100	9,584	2
Nowshera	Nowshera	4	50.41	22.26	44.15	5,687	100	17,660	2
Qaidabad	Okhli Mohla	3	94.32	53.83	57.07	15,482	100	17,120	2
Khushab	Padhrar	5	134.15	38.25	28.51	18,787	100	14,255	2
Noorpur	Pelowance	4	242.30	55.63	22.96	18,968	100	9,184	2
Qaidabad	Utra Janubi	4	96.15	22.49	23.39	26,875	100	9,355	2
Qaidabad	Warchha	4	143.77	60.96	42.40	16,784	100	16,959	2
Noorpur	Adhikot	4	176.11	38.45	21.83	20,744	100	8,733	1
Khushab	Botala	1	77.77	65.68	84.46	17,826	100	8,446	1
Khushab	Chak No 59/mb	1	90.10	58.58	65.01	8,192	100	6,501	1
Khushab	Chak No.050/mb	1	47.66	40.20	84.36	20,492	100	8,436	1
Khushab	Girot	1	143.28	50.59	35.31	21,626	100	3,531	1
Khushab	Hassan Pur Tiwana	1	166.71	78.01	46.79	19,368	100	4,679	1
Noorpur	Jamali	5	241.21	10.54	4.37	15,458	100	2,185	1
Noorpur	Jaura Kalan	3	149.44	41.99	28.10	15,157	100	8,429	1
Noorpur	Jharkal	5	382.14	9.26	2.42	15,824	100	1,212	1
Noorpur	Khai Khurd	5	363.02	54.14	14.91	15,978	100	7,457	1
Noorpur	Khatwan	5	292.34	3.68	1.26	14,947	100	630	1
Noorpur	Rahdari	5	267.27	19.22	7.19	16,477	100	3,595	1
Noorpur	Rangpur	5	141.13	22.13	15.68	20,471	100	7,839	1
Khushab	Roda	1	244.95	55.73	22.75	21,582	100	2,275	1
Khushab	Waheer	1	156.86	132.07	84.20	14,661	100	8,420	1

Drought Hazard Severity Score	
No Drought	1
Mild	2
Moderate	3
Severe	4
Extreme	5

Food Insecurity Index	
Food Secure	1
Mild Food Secure	2
Moderatly Food Insecure	3
Highly Food Insecure	4
Severly Food Insecure	5



FOOD SECURITY AGAINST FLOOD

Tehsil	Union Council	Flood Hazard Score (Riverine + Flash)	Area of UC (sq.km)	Agricultural Land (sq.km)	Agricultural Area Exposed	Percentage Agricultural Land Exposed	Total Population (98 Census)	%age of Agri Dependent Population	Food Insecurity	Food Insecurity Ranking
Noorpur	Khai Khurd	4	363.02	54.14	48.84	90.21	15,978	100	36,084	5
Khushab	Hassan Pur Tiwana	4	166.71	78.01	56.14	71.97	19,368	100	28,787	4
Khushab	Sandral	4	114.02	83.77	68.45	81.71	14,672	100	32,685	4
Noorpur	Jaura Kalan	4	149.44	41.99	37.75	89.91	15,157	100	35,962	4
Khushab	Talokar	4	162.55	115.80	67.00	57.86	15,018	100	23,144	3
Khushab	Girot	4	143.28	50.59	29.53	58.37	21,626	100	23,347	3
Khushab	Chak No 59/mb	4	90.10	58.58	25.16	42.96	8,192	100	17,183	2
Khushab	Khushab City	4	15.83	5.87	5.86	99.93	87,859	0	0	1
Khushab	Nari	5	171.20	158.46	7.19	4.54	14,683	100	2,270	1
Khushab	Chak No.050/mb	3	47.66	40.20	3.26	8.10	20,492	100	2,431	1
Khushab	Dhaiwal	5	229.08	149.68	10.74	7.17	15,506	100	3,587	1

Flood Hazard Severity Score	
0.3	1
3.1 - 6	2
6.1 - 9	3
9.1 - 12t	4
> 12	5

Food Insecurity Index	
Food Secure	1
Mild Food Secure	2
Moderatly Food Insecure	3
Highly Food Insecure	4
Severly Food Insecure	5

Cumulative Severity of both Riverine and Hill torrents/ Flashfloods has been taken in account for the assessment.

Food Insecurity= (Hazard Severity) * (Percentage of Agriculture to Total Land) * (Percentage of Agriculture Dependent Population to Total Population)



E | RISK ASSESSMENT



Population Density



Building Density



Health Facilities



Communication Towers



Major Industries



Roads



Education Facilities



Railway



Critical Infrastructure

28 INTEGRATED RISK ASSESSMENT

The given study has employed Integrated Risk Assessment Model, as shown in the figure below, for the cumulative risk assessment of study district. The Model takes into account both quantitative and qualitative risk assessment approaches. The methodology is based on multi criteria evaluation as well as analytical hierarchy process. For this purpose, set of indicators for each risk factors have been carefully taken based on the availability as well as the specific context of the study district. In the given methodology four separate dimensions of risk are considered as "factor Components" i.e. hazard, exposure, vulnerability and capacity. To analyze the value of factor components, a combination of quantitative, qualitative and contextual indicators have be assigned to each factor component. Each factor consists of a sets of indicators which cover several aspects of risk. The Risk Index considered a total of 52 indicators to cover physical, economic, demographic, social, environmental and economic dimensions of risk. Specific weights have been assigned to each indicator in order to acutely calculate its impact on risk. The maximum sum of all the elements of weights and indicators can have minimize value of 100, whereas the minimum sum is 0. The risk formula used in the Study is given below:

Risk= (Hazard x Vulnerability x Exposure / Capacity)

Five classes have been devised to categorize risk between "No to Very Low" Risk to "Very High Risk".

Risk Score	Risk State
>4.1	Extremely High
3.1-4.0	High to very High
2.1-3.0	Moderate to High
1.1-2.0	Low to moderate
0-1.0	No to very Low

Earthquake Hazard Severity Score		
3.0 - 3.9 Richter Scale	1	Very Low
4.0 - 4.9 Richter Scale	2	Low
5.0 - 5.9 Richter Scale	3	Moderate
6.0 - 6.9 Richter Scale	4	High
7 more Richter Scale	5	Very High
0 represents **No Hazard**		

Flood Hazard Severity Score		
0.3	1	Very Low
3.1 - 6	2	Low
6.1 - 9	3	Moderate
9.1 - 12t	4	High
> 12	5	Very High
0 represents **No Hazard**		

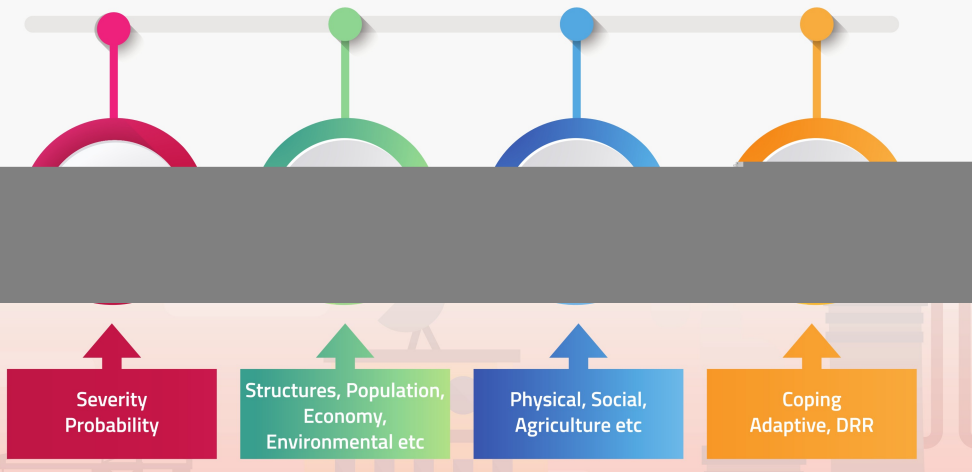
Drought Hazard Severity Score		
No Drought	1	Very Low
Mild	2	Low
Moderate	3	Medium
Severe	4	High
Extreme	5	Very High
0 represents **No Hazard**		

Exposure Scoring Scale	
1	No to Negligible
2	Low
3	Medium
4	High
5	Extremely High

Vulnerabilty Scoring Scale	
1	No to Negligible
2	Low
3	Medium
4	High
5	Extremely High

Capacity Scoring Scale	
1	No to Negligible
2	Low
3	Medium
4	High
5	Extremely High

Disaster Risk Impact Factor

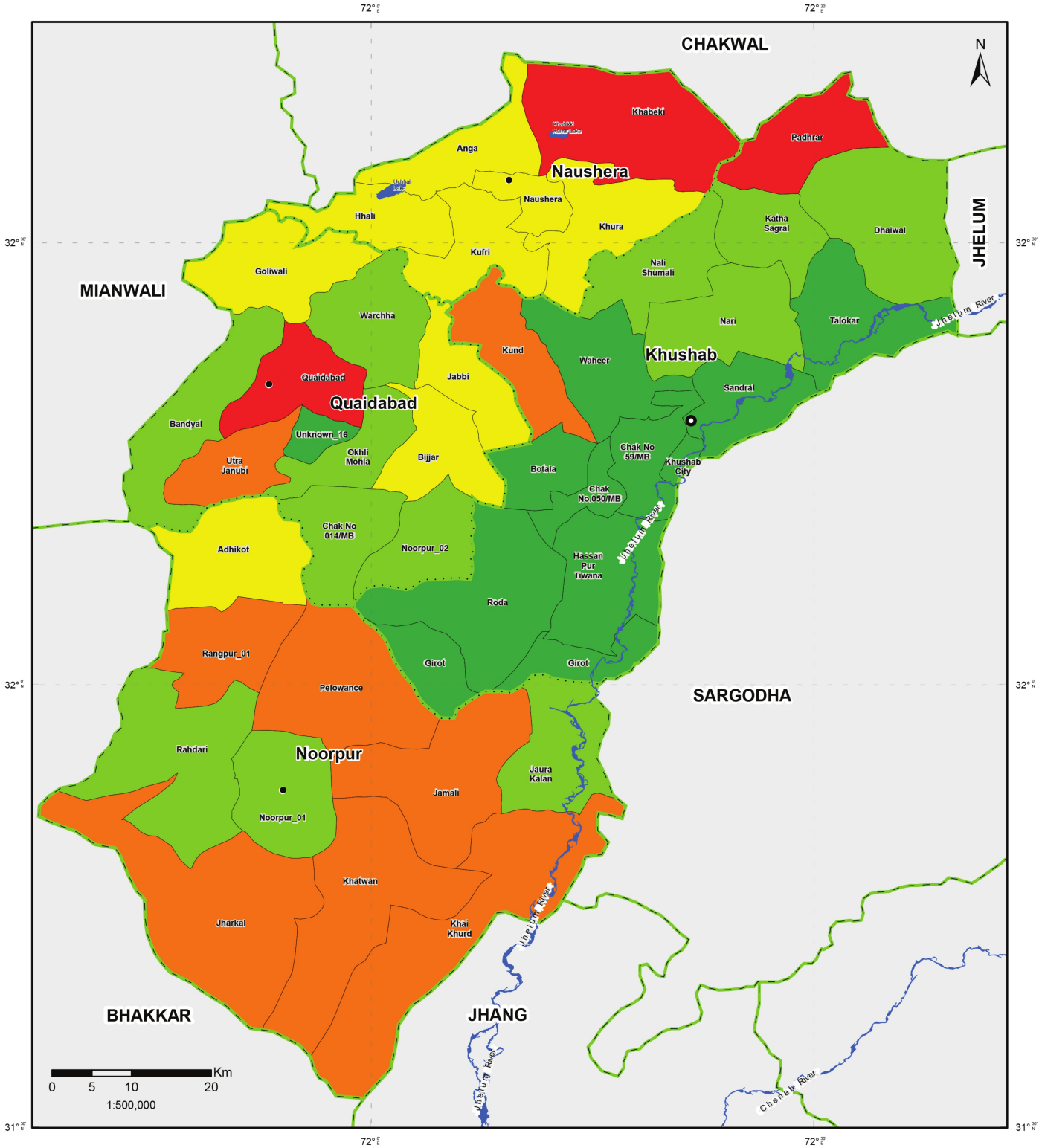


RISK ASSESSMENT BY HAZARD TYPE

		HAZARD			EXPOSURE		VULNERABILTY			COPING CAPACITY	RISK			
	UNION COUNCILS	FLOOD RP 100	DROUGHT	EARTHQUAKE RP 475	FLOOD & EARTHQUAKE	DROUGHT	FLOOD	DROUGHT	EARTHQUAKE	CAPACITY	FLOOD	DROUGHT	EARTHQUAKE	OVERALL
KHUSHAB	BOTALA	0	0	4	0.75	0.67	1.17	2.33	3.00	3	1.00	3.00	4.00	3.00
	CHAK NO 59/MB	2	0	4	1.50	1.33	1.50	1.33	1.50	3	1.00	3.00	2.00	2.00
	CHAK NO.050/MB	1	0	4	0.75	0.67	0.83	1.67	2.00	3	1.00	2.00	5.00	3.00
	DHAIWAL	2	3	4	1.50	1.00	1.50	1.67	1.00	3	1.00	3.00	4.00	2.00
	GIROT	3	0	3	0.63	0.67	2.00	2.00	2.50	3	1.00	1.00	3.00	1.00
	HASSAN PUR TIWANA	5	0	4	1.00	1.00	2.83	2.67	3.50	3	1.00	2.00	3.00	2.00
	KATHA SAG RAL	0	3	4	1.00	1.00	1.00	2.00	1.50	3	2.00	1.00	3.00	2.00
	KHUSHAB CITY	1	1	4	0.25	0.67	2.67	3.00	3.50	3	1.00	1.00	2.00	1.00
	KUND	0	3	4	1.13	1.00	2.17	4.00	4.50	3	2.00	2.00	2.00	2.00
	NALI SHUMALI	0	3	4	0.88	1.00	1.17	2.00	1.50	3	2.00	1.00	2.00	1.00
	NARI	1	3	4	0.88	1.00	2.33	2.00	1.00	3	1.00	3.00	3.00	2.00
	PADHRAR	0	4	4	1.00	1.33	1.50	3.00	2.50	3	5.00	1.00	5.00	4.00
	RODA	0	0	4	1.00	1.00	0.67	1.33	1.50	3	1.00	3.00	4.00	2.00
	SANDRAL	5	2	4	1.13	1.00	2.50	1.33	1.00	3	1.00	3.00	3.00	2.00
	TALOKAR	5	2	4	0.88	0.67	2.33	1.67	1.00	3	1.00	4.00	4.00	3.00
	WAHEER	0	0	4	1.38	1.00	1.67	2.33	3.00	3	5.00	2.00	4.00	4.00
NOORPUR	ADHIKOT	0	3	4	1.13	1.00	1.33	2.67	2.50	3	1.00	4.00	3.00	3.00
	JAMALI	1	4	4	0.88	1.00	1.17	2.33	3.00	3	1.00	2.00	2.00	2.00
	JAURA KALAN	5	2	4	0.88	1.00	3.00	2.67	3.00	3	1.00	5.00	3.00	3.00
	J HARKAL	0	4	3	1.00	1.00	1.17	2.33	3.00	3	5.00	4.00	4.00	5.00
	KHAI KHURD	5	4	3	0.88	1.00	3.50	3.00	4.00	3	1.00	4.00	4.00	3.00
	KHAT WAN	0	4	3	0.88	1.00	1.50	3.00	4.00	3	1.00	3.00	3.00	2.00
	NOOR PUR 01	0	4	3	1.13	1.00	0.50	1.00	1.00	3	1.00	1.00	2.00	1.00
	PELO WANCE	0	3	4	1.00	1.00	1.67	3.33	3.50	3	1.00	3.00	2.00	2.00
	RAHDARI	0	4	3	0.88	0.67	1.00	2.00	2.50	3	1.00	4.00	5.00	4.00
	RANGPUR_01	0	4	4	0.88	1.00	1.33	2.67	3.00	3	1.00	2.00	2.00	2.00
NAUSHERA	ANGA	0	3	4	0.75	1.00	1.17	2.33	2.00	3	1.00	2.00	2.00	2.00
	HHALI	0	3	4	1.00	1.00	1.17	2.33	2.50	3	1.00	2.00	2.00	1.00
	KHABEKI	0	4	4	0.88	1.33	1.33	2.67	2.50	3	1.00	2.00	1.00	1.00
	KHURA	0	3	4	0.88	1.00	1.33	2.67	2.50	3	1.00	3.00	3.00	2.00
	KUFRI	0	3	4	1.00	1.33	1.00	2.00	1.50	3	1.00	2.00	3.00	2.00
	NAUSHERA	0	3	4	0.75	1.00	1.50	3.00	3.00	3	1.00	5.00	4.00	3.00
QUAIDABAD	BANDYAL	0	2	4	1.38	1.00	1.33	2.67	2.50	3	1.00	4.00	5.00	3.00
	BIJJAR	0	3	4	1.00	1.00	1.33	2.67	2.50	3	1.00	5.00	5.00	5.00
	CHAK NO 014/MB	0	3	4	0.88	0.67	1.17	2.33	2.50	3	1.00	2.00	3.00	2.00
	GOLI WALI	0	3	4	0.88	1.00	1.33	2.67	2.50	3	1.00	4.00	4.00	3.00
	JABBI	0	3	4	1.00	1.00	1.33	2.67	2.00	3	1.00	1.00	2.00	1.00
	NOOR PUR 02	0	3	4	0.63	0.67	1.00	2.00	1.00	3	5.00	1.00	2.00	3.00
	OKHLI MOHLA	0	2	4	0.88	0.67	1.33	2.67	2.50	3	4.00	1.00	2.00	2.00
	QUAI DABAD	0	3	4	1.25	1.00	2.17	4.33	5.00	3	1.00	1.00	1.00	1.00
	UNKNOWN 16	0	2	4	0.50	0.33	0.83	1.67	1.00	3	1.00	4.00	4.00	3.00
	UTRA JANUBI	0	3	4	0.88	1.00	1.67	3.33	3.00	3	1.00	1.00	5.00	2.00
	WARCHHA	0	3	4	1.00	1.00	1.00	2.00	1.50	3	1.00	2.00	2.00	2.00

Risk = (Hazard x Exposure x Vulnerabilty/Capacity)

DROUGHT RISK



Legend

- District Headquarter
- Tehsil Headquarter

Drought Risk

- Very Low
- Low
- Medium
- High
- Very High

- River and Water Body
- Tehsil Boundary
- District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

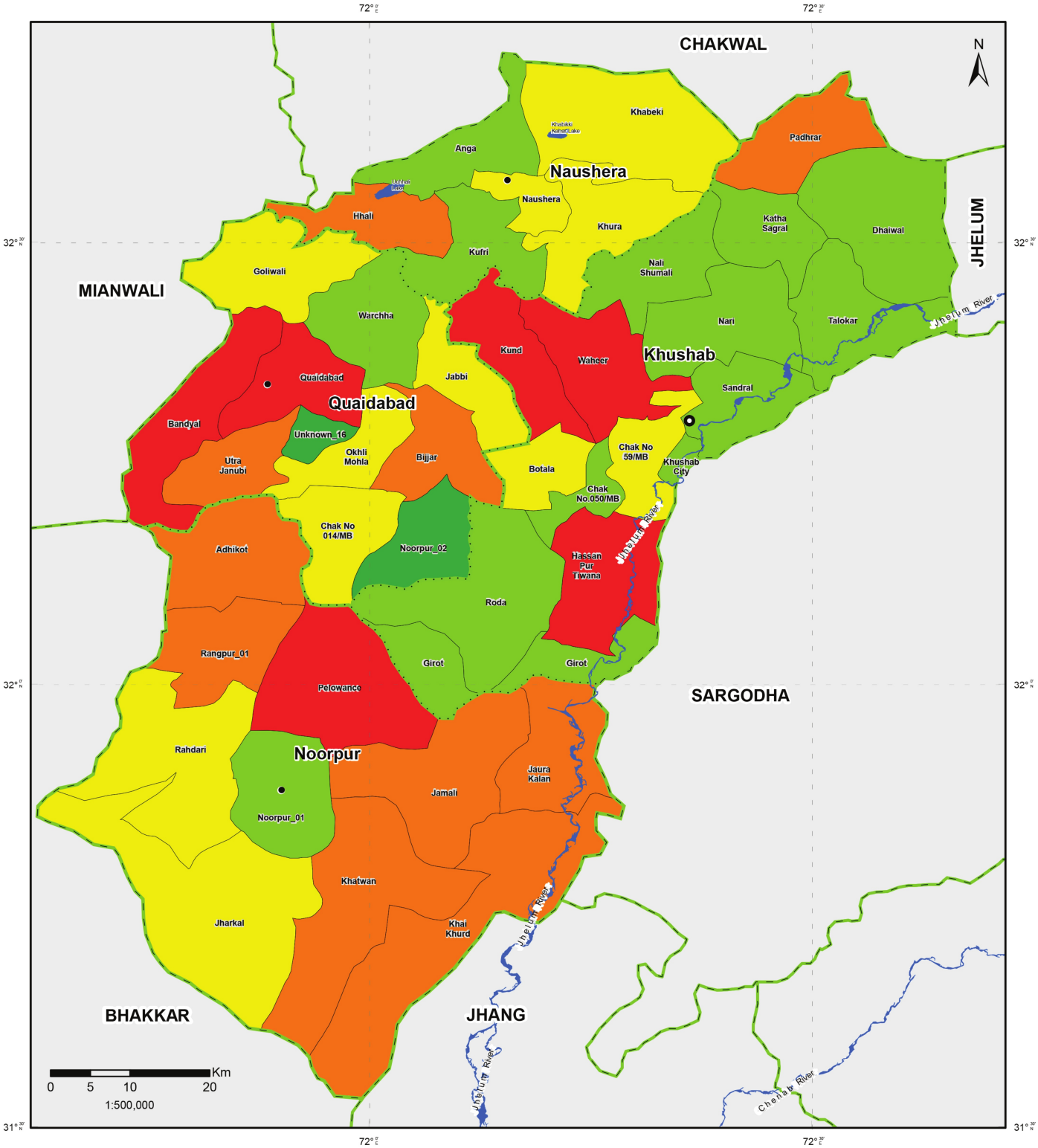
WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Survey of Pakistan

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-622-MAY-2016-RSK-NDMA-DROUGHT
Prepared by: Project Management Unit, NDMA
Last Updated: 10th January, 2018

EARTHQUAKE RISK



Legend

- District Headquarter
- Tehsil Headquarter

Earthquake Risk

- Very Low
- Low
- Medium
- High
- Very High

- River and Water Body
- Tehsil Boundary
- District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

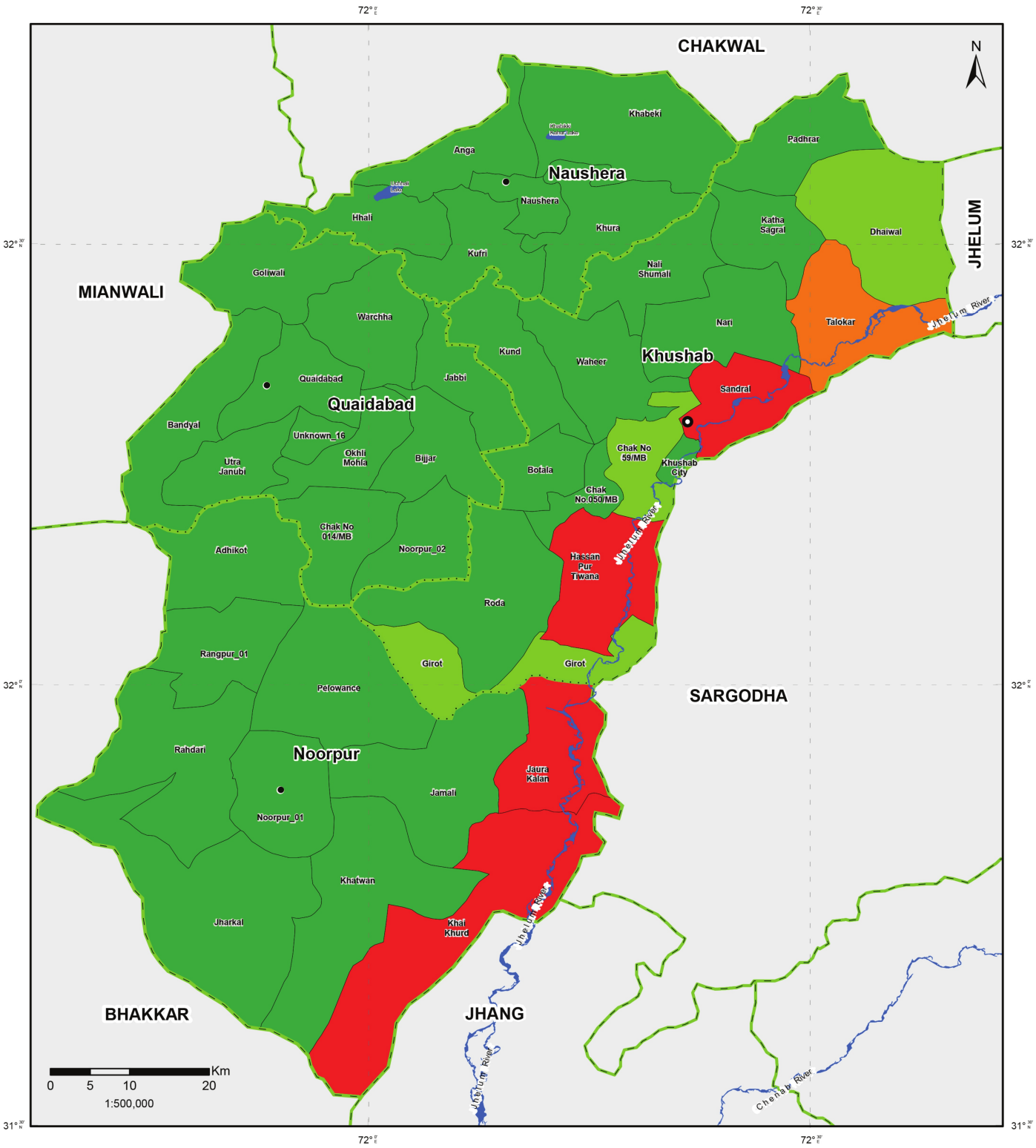
United Nations World Food Programme

MAP INFORMATION

Data Source(s):
Survey of Pakistan

Datum: WGS 1984
Units: Degree
Map No: MHVRA-PUN-622-MAY-2016-RSK-NDMA-EQ
Prepared by: Project Management Unit, NDMA
Last Updated: 10th January, 2018

FLOOD RISK



Legend

- District Headquarter
- Tehsil Headquarter

Flood Risk

- Abc No to Very Low
- Abc Low
- Abc Medium
- Abc High
- Abc Very High

- River and Water Body
- Abc Tehsil Boundary
- ABC District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

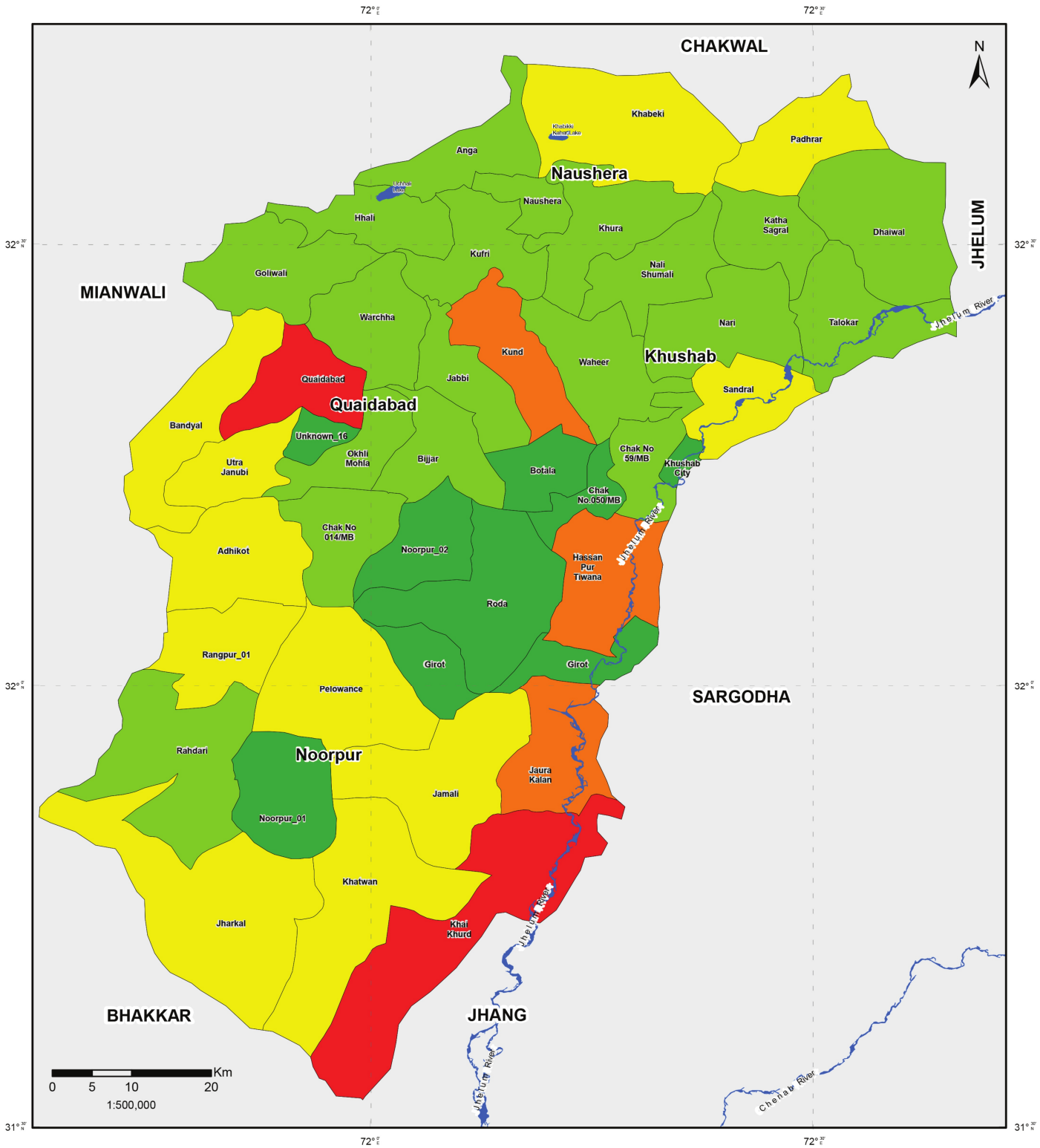
Data Source(s):

Survey of Pakistan

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-622-MAY-2016-RSK-NDMA-FLOOD
Prepared by: Project Management Unit, NDMA
Last Updated: 10th January, 2018

COMPOSITE RISK



Legend

- District Headquarter
- Tehsil Headquarter

Composite Risk

- Very Low
- Low
- Medium
- High
- Very High

- River and Water Body
- Tehsil Boundary
- District Boundary
- Provinvial Boundary
- Line of Control
- International Boundary

Multi Hazard Vulnerability & Risk Assessment, Khushab, Punjab, Pakistan

WFP United Nations World Food Programme

MAP INFORMATION

Data Source(s):

Survey of Pakistan

Datum: WGS 1984
Units: Degree

Map No: MHVRA-PUN-622-MAY-2016-RSK-NDMA-COMPOSITE
Prepared by: Project Management Unit, NDMA
Last Updated: 10th January, 2018

DATA SOURCES

DATA TYPE	DATA SOURCE
Agriculture Based Industries	Directorate of Agriculture, Crop Reporting Service, Punjab, Lahore x(Development Statistics-2015)
Animals Slaughtered in Recognized and Un-recognized Slaughter Houses by Type in the District	Directorate of Livestock and Dairy Development (Ext.) Punjab,Lahore
Annual Cellular Subscribers	Pakistan Telecommunication Authority (PTA)
Area Sown under Wheat, Rice, Cotton and Sugarcane in the District	Directorate of Agriculture, Crop Reporting Service, Punjab, Lahore.
Area Sown by Mode of Irrigation	Bureau of Statistics, Punjab, Lahore (2013-2014)
Birth Registration	Multiple Indicator Cluster Survey (MICS) Punjab: 2011
Broadband Subscribers by Technology	Pakistan Telecommunication Authority (PTA)
Building Distribution	PBS
Canal System	Agriculture Department Punjab
Cellular Communication Towers	Pakistan Telecommunication Authority (PTA)
Child Delivery - Location and Type of Assistance	Pakistan Social and Living Standard Measurement (PSLM): 2013-2014
Child Statistics	Multiple Indicator Cluster Survey (MICS) Punjab: 2011
Climatology	http://www.Myweather2.Com/City-Town/Pakistan/Khushab/Climate-Profile.Aspx http://en.Climate-Data.Org/Location/3077/
Diesel and Electric Tube wells Installed by Ownership	Directorate of Agriculture Crop Reporting Service, Punjab, Lahore.
Distribution Of Land Use/ Land Cover (LU/LC)	Space and Upper Atmosphere Research Commission (SUPARCO)
Education Facilities	School Education Department, Government of Punjab
Elevation Bands	National Aeronautics and Space Administration (NASA)
Establishment of Private Poultry Farms in the District (2013-14)	Directorate of Poultry Research Institute, Punjab, Rawalpindi
Flood Inundation Frequency	National Disaster Management Authority (NDMA)
Geology	Geological Survey of Pakistan (GSP)
Health Facilities	Health Department Punjab/ District Health Information System Punjab (Government Of Punjab)
Household Characteristics	Multiple Indicator Cluster Survey (MICS) Punjab: 2011
Industries	District Officer (E&IP), Khushab
Key Indicators - Child Mortality Statistics	Multiple Indicator Cluster Survey (MICS) Punjab: 2011
Khushab City Land Use Map 2013	NDMA
Landline Service	District Pre-Investment Study – 2012, Directorate Of Industries, Punjab Poonch House, Multan Road, Lahore.
Literacy Rate- 2015	2015 Projected

DATA TYPE	DATA SOURCE
Literacy Ratio	Pakistan Social and Living Standard Measurement (PSLM): 2014-2015
Major Industries	District Officer(E&IP), Khushab
Metaled Roads Length By Type Zone and District	Planning & Design Directorate, Punjab Highway Department, Lahore.
Mineral Productions	Directorate General, Mines and Minerals, Punjab, Lahore. (Development Statistics-2015)
Motor Vehicles 'Registered' By Type	Additional Director General, Excise & Taxation, Punjab, Lahore.
Number of Cattle, Sheep and Buffaloes in the District	Source:-Census of Agriculture 2000 & 2010- Census of Livestock 1996 & 2006
Number of Registered Factories & Employment Level	Bureau of Statistics, Punjab, Lahore
Number of Work Animals by Type in the District (2006)	2006 Census of Livestock, Agricultural Census Organization, Pakistan Bureau of Statistics
Percentage of children that have been immunized by Type of Antigen- Based on record and recall	Pakistan Social And Living Standard Measurement Survey (PSLM) 2013-2014
Population	Population Census 1998, Population Census Organization, Government of Pakistan. Projections were calculated on the basis of the Inter-Census Growth Rate for the two Censuses Of 1981 And 1998, and do not factor in changing Fertility And Migration Patterns.
Population by Age Group, Gender and Rural /Urban	Population Census 1998
Population by Mother Tongue- 2015	2015 Projected
Population Distribution	Pakistan Bureau Of Statistics (Population Census 1998, Population Census Organization, Government Of Pakistan. Projections Were Calculated On The Basis Of The Inter-Census Growth Rate For The Two Censuses Of 1981 And 1998, And Do Not Factor In Changing Fertility Patterns)
Population on Basis of Religion-1998	1998 Census
Post-Natal consultations of the District	Pakistan Social and Living Standard Measurement (PSLM): 2013-2014
Railway Network	Punjab Development Statistics 2011 / Respective District Offices
Sales of Fertilizer by year 2013-2014	Director General Agriculture, Punjab, Lahore
Socio-Economic Statistics of The District Khushab (In Percentage)	Multiple Indicator Cluster Survey (MICS) Punjab: 2011
Threshers and Harvesters in the District (2012-13)	Directorate of Agriculture Crop Reporting Service, Punjab, Lahore.
Total tractors in the District by 2004 Census	2004 Agricultural Census Wing & Pakistan Bureau of Statistics, Government of Pakistan, Lahore)
Tractors by Make in District (2012-13)	Directorate of Agriculture Crop Reporting Service, Punjab, Lahore
Types Of Health Facility	Health Department Punjab
Veterinary Institution in the District	Department Of Livestock & Dairy Development, Khushab

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