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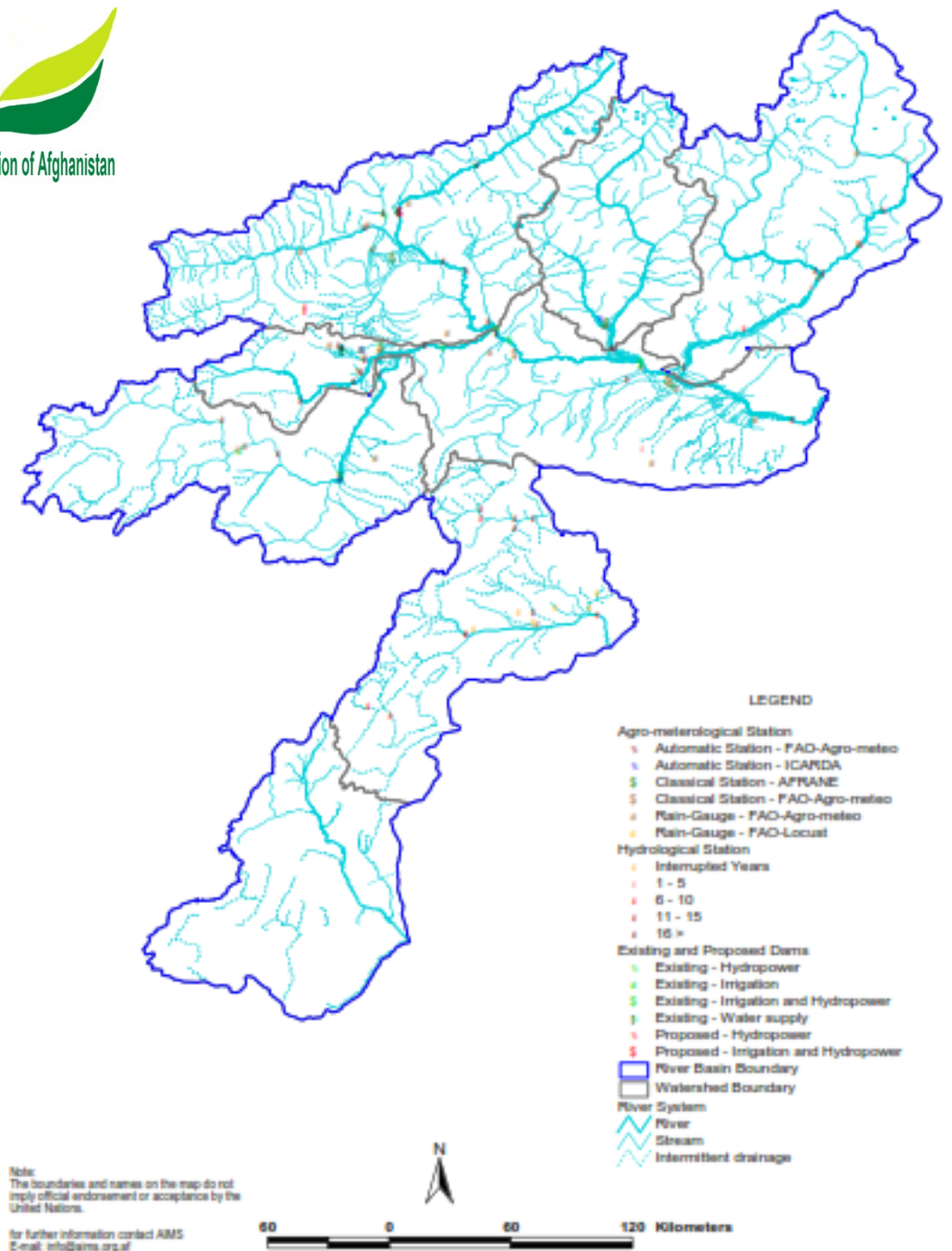
Subject of Presentation:

## Regionalization of the Global Integrated Drought Monitoring and Prediction System (GIDMaPS) for Afghanistan

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Almost 90 percent of Afghanistan's land area is located in the five river basins, namely:

Figure 2.1: Location of Kabul River Basin

- 1- Amu Darya
- 2- Helmand
- 3- Harirud-Murghab
- 4- Kabul
- 5- and western river basins

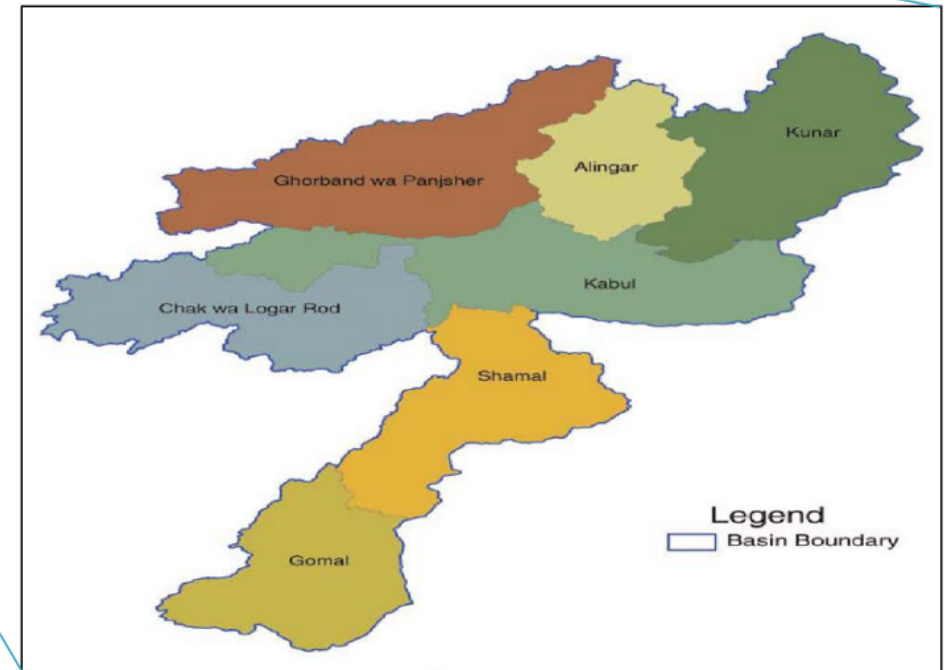


The Kabul (Indus) basin is divided into eight main watersheds:

1. Kabul
2. Chak wa Logar Rod
3. Ghorband wa Panjshir
4. Alingar
5. Kunar
6. Shamal
7. Gomal
8. Pishin Lora

### Some Features

Catchment Area (Sq Km)	76908
Population (% of country)	35
Population Density	93



- The Kabul River basin lies in the northeast quarter of Afghanistan.
- The river flows west to east, joining the Indus River in Pakistan's Northwest Frontier Province. The Kabul River basin (67 370 km<sup>2</sup>)
- It is a plateau surrounded by mountains located in the eastern central part of
- Afghanistan. It encompasses just 12 percent of the area of Afghanistan (Favre and Kamal 2004, Part III)
- It accounts for 35 percent of the population, and has the fastest population growth rate in the country.

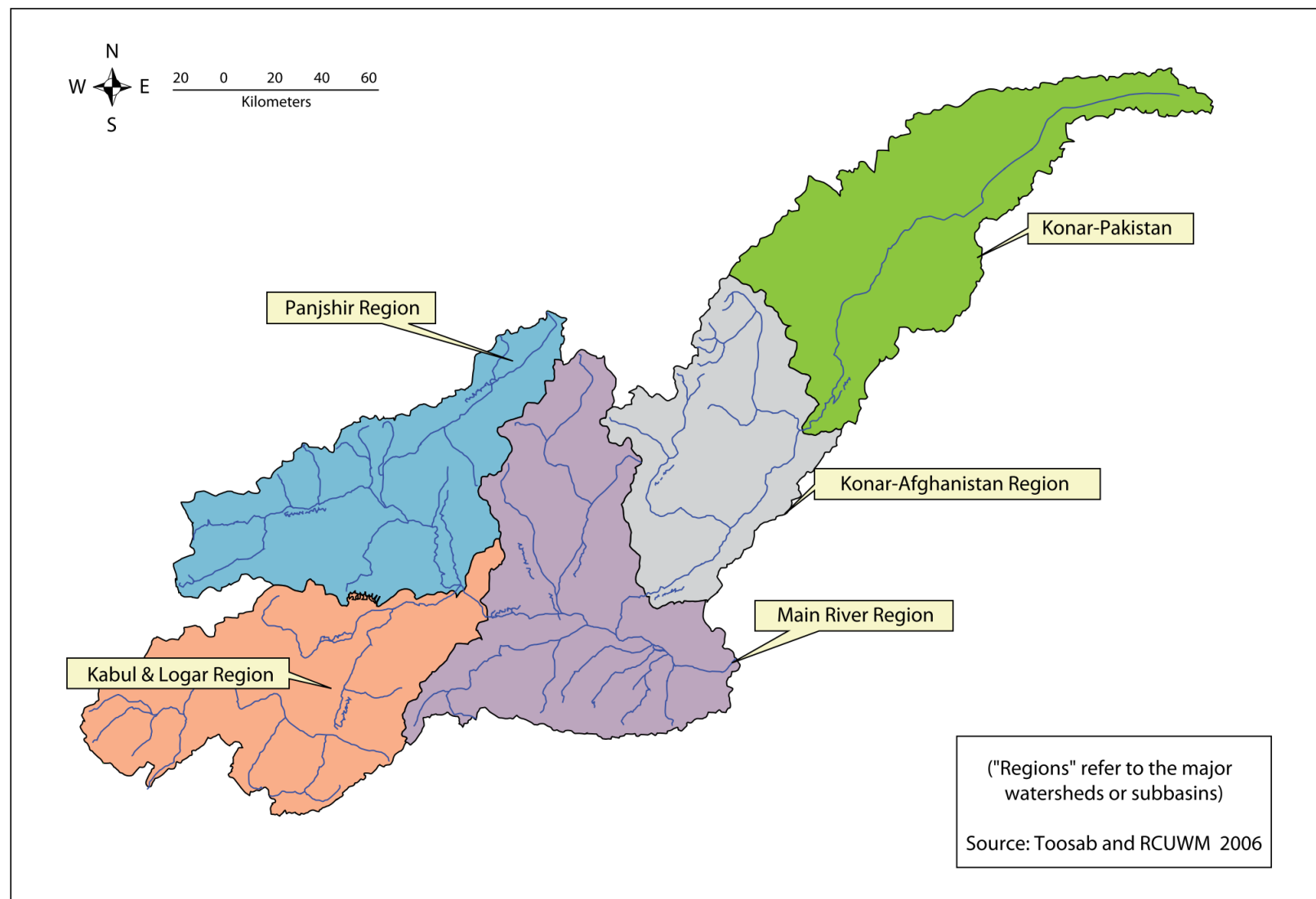
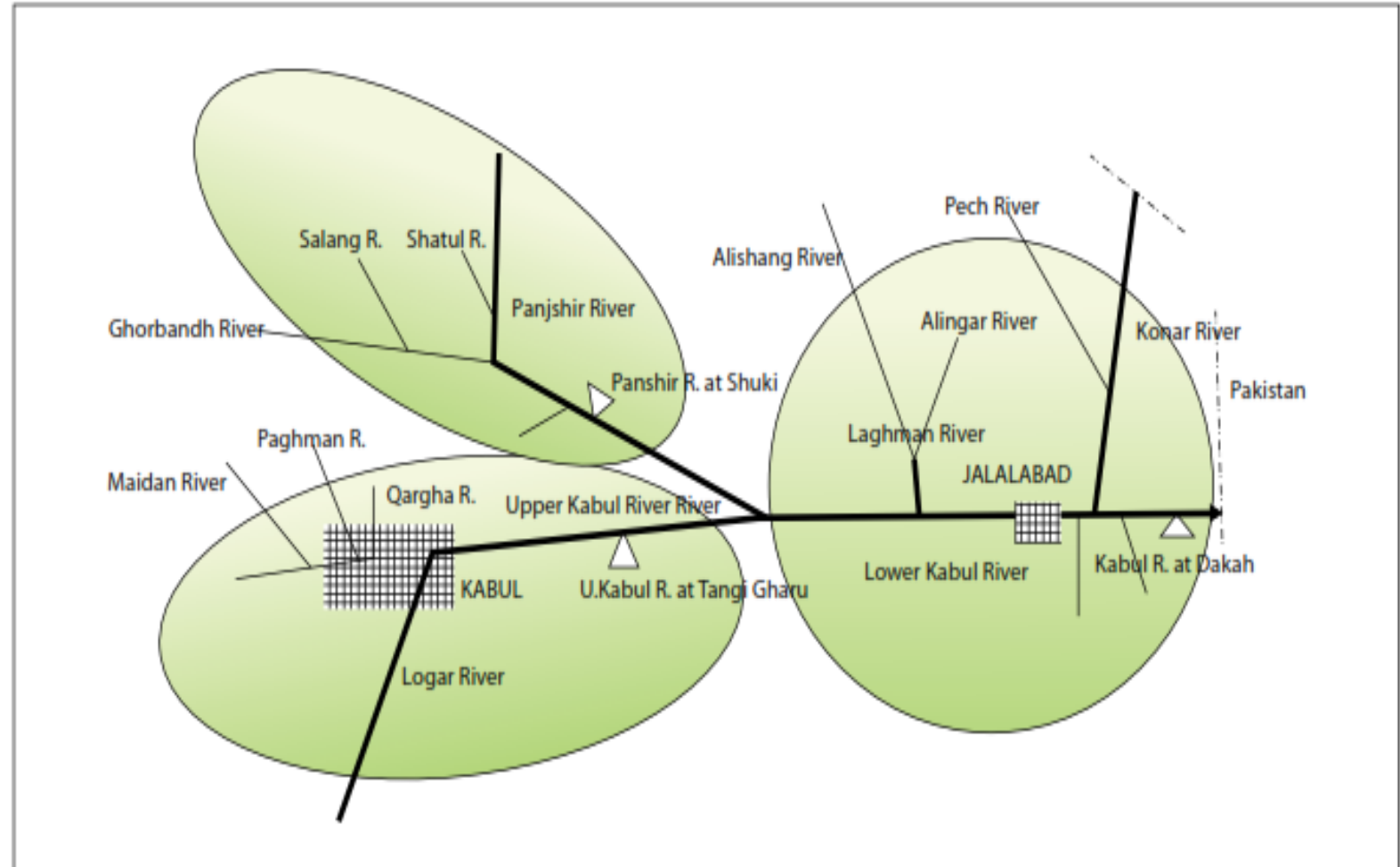


Figure 1. Kabul River basin.

## Schematic Diagram of the Kabul River Sub-basins:

- 1- The Logar-Upper Kabul Subbasin
- 2- The Panjshir Subbasin
- 3- The Lower Kabul Subbasin

From the standpoint of climate, hydrology, and physiographic characteristics, the Kabul River basin is divided into three distinct subbasins. The upper basin consists of two major subbasins – the Panjshir subbasin and the Logar-Upper Kabul subbasin. The third subbasin is the Lower Kabul, which encompasses the watershed area from the confluence of the Panjshir and Upper Kabul rivers near the head of the Naglu reservoir to the border with Pakistan.





# Area and population by river basin

River Basins	Area (Ha.)	Area (Km <sup>2</sup> )	%	Number of Settlements	%	Settled Population*	%	Population Density
Amu Darya	9069189	90692	14.04	4152	13.30	2968122	14.34	33
Harirod-Murghab	7760366	77604	12.02	2959	9.48	1722275	8.32	22
Hilmand	26234136	262341	40.62	14041	44.96	5881571	28.42	22
Kabul	7690829	76908	11.91	7039	22.54	7184974	34.72	93
Northern	7090127	70901	10.98	2969	9.51	2783033	13.45	39
Non-drainage area	6735636	67356	10.43	69	0.22	151629	0.73	2
<b>Total</b>	<b>64580283</b>	<b>645803</b>	<b>100.00</b>	<b>31229</b>	<b>100.00</b>	<b>20691604</b>	<b>100.00</b>	<b>32*</b>

\* Based on CSO 2003-04 figures. Nomadic population not included.

Reference:FAO/UNEP and OSU,, Ibid, 2002

# Background and Rational

## History of Droughts in Afghanistan:

In the past decades, Afghanistan has encountered several droughts which had terrible damage on climate, groundwater and surface water resources, agriculture sectors, forests and also pastures. Extreme droughts are expected to occur more frequently in the coming decades and this may cause major economic losses and social and environmental disasters. The Impacts of the drought in Afghanistan may extend to environment, economic and even society.

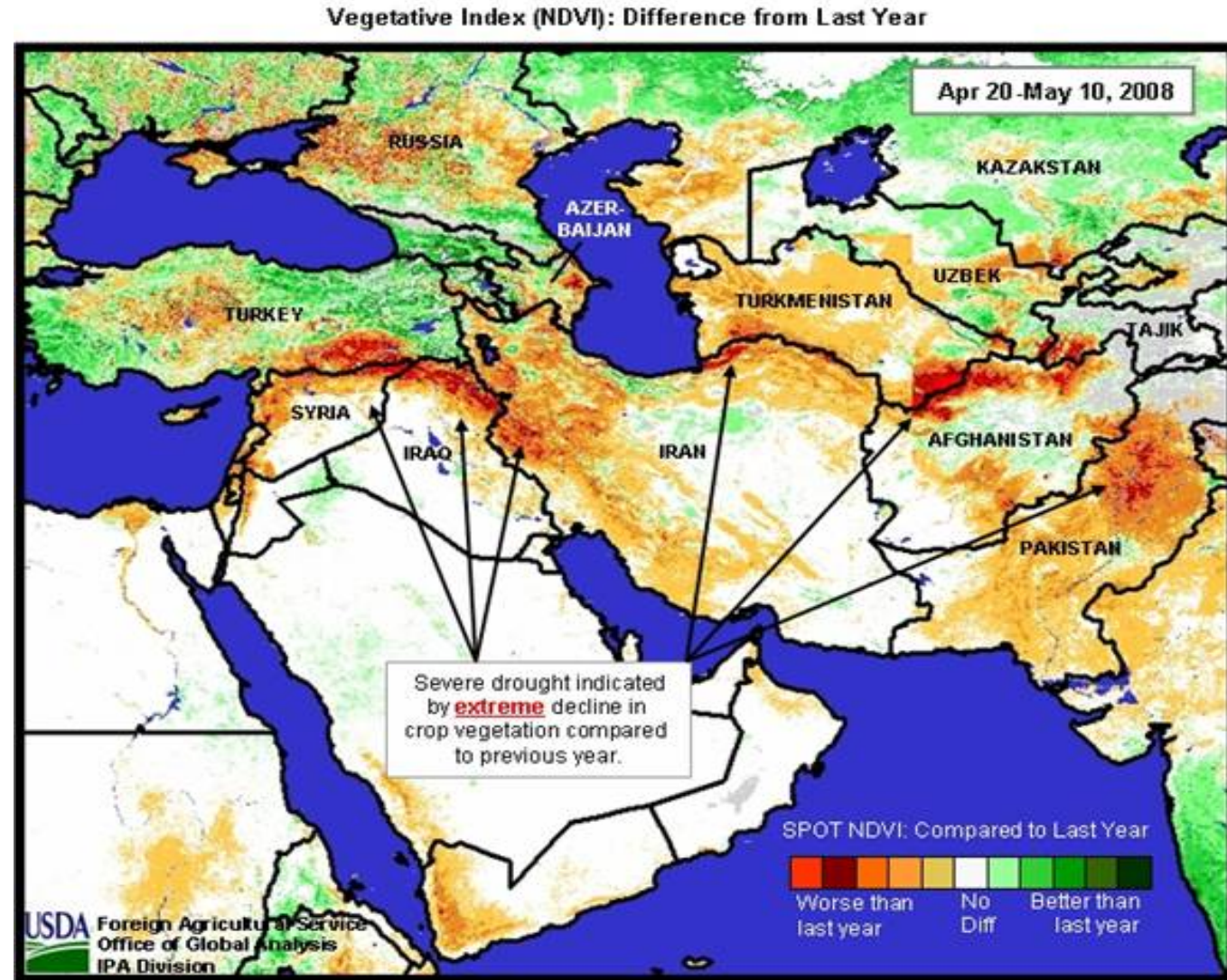




# Background and Rational

## Problem Statement:

- Government anti-drought policies and practices in the country at present are at the embryonic stage & regionalization of the existing system for Afghanistan would to be a practical step toward anti-drought practice.
- The use of a single index to indicate the diversity and complexity of drought conditions and impact is one of the major limitations to drought monitoring. For this reason, the proposed system will provide drought information based multiple univariate drought indicators

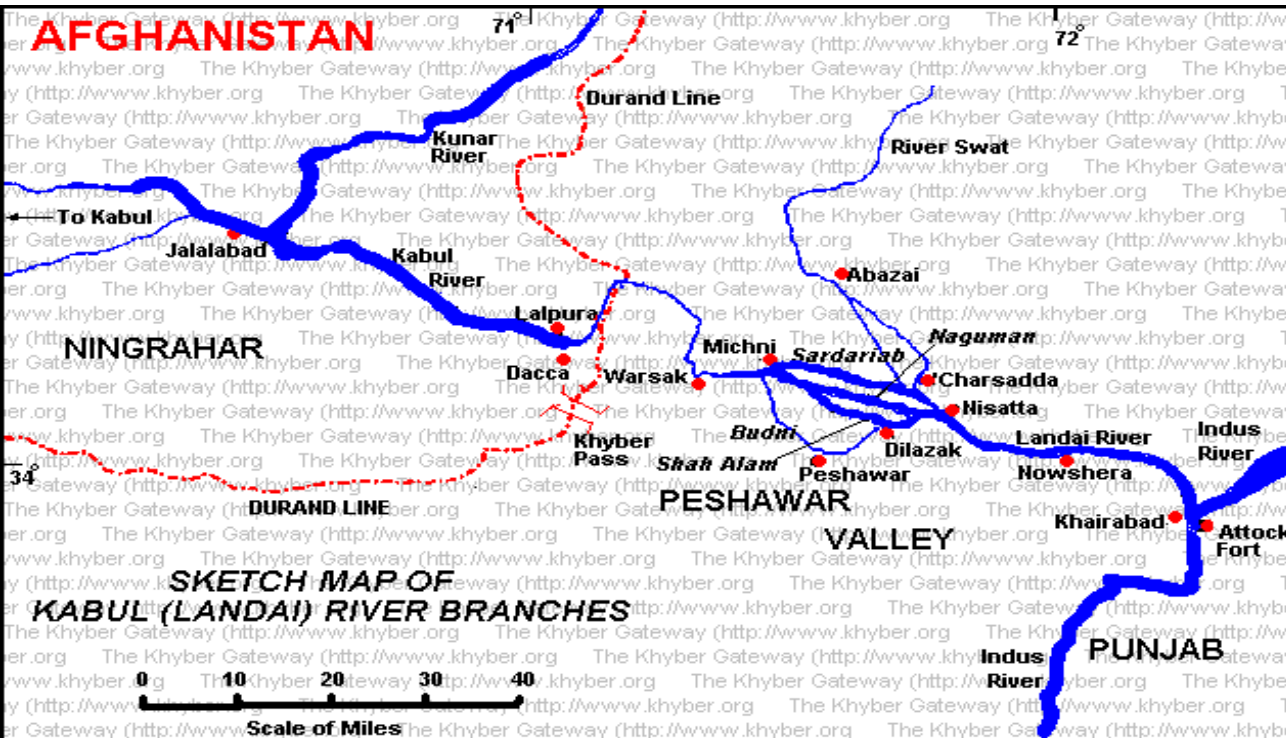




# Project Objectives

## Main objective:

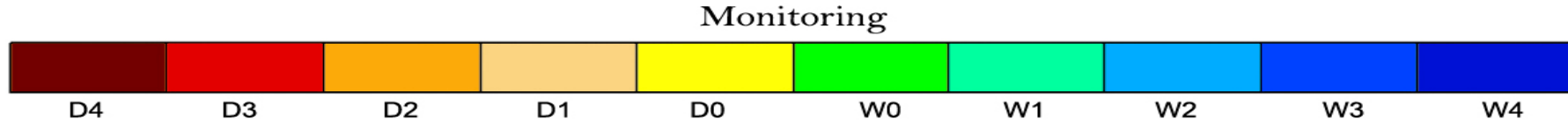
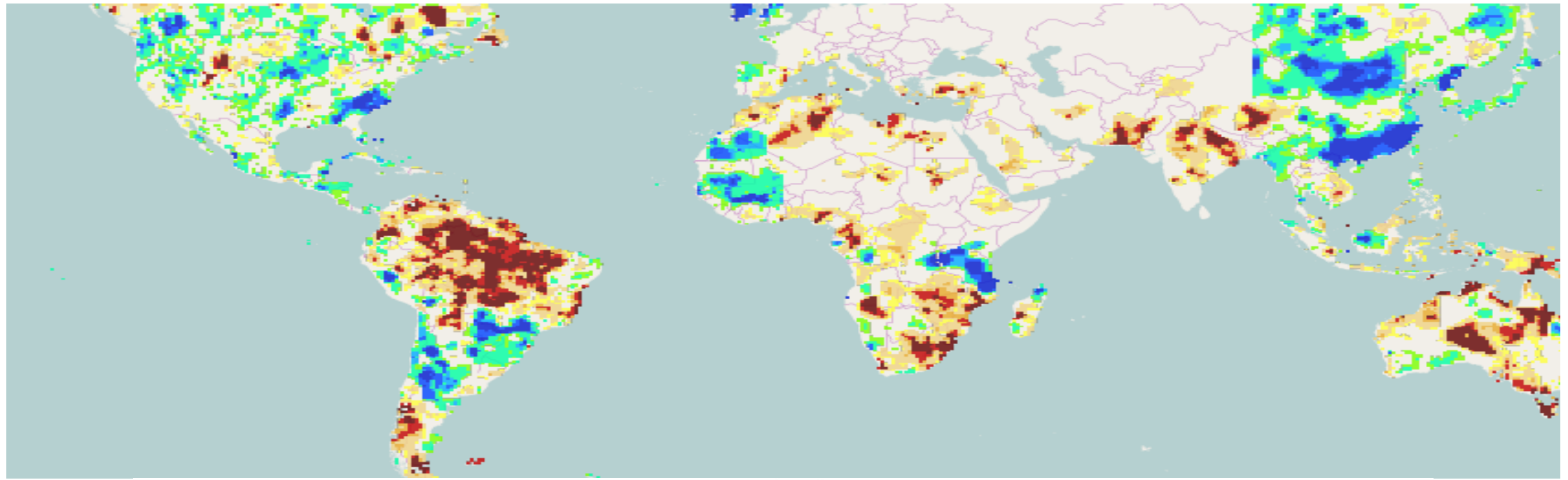
developing, validation & implementing a drought monitoring system for the 2 Afghanistan river basins (Amu Darya & Kabul River Basins)



# Project Objectives

## Development of the system:

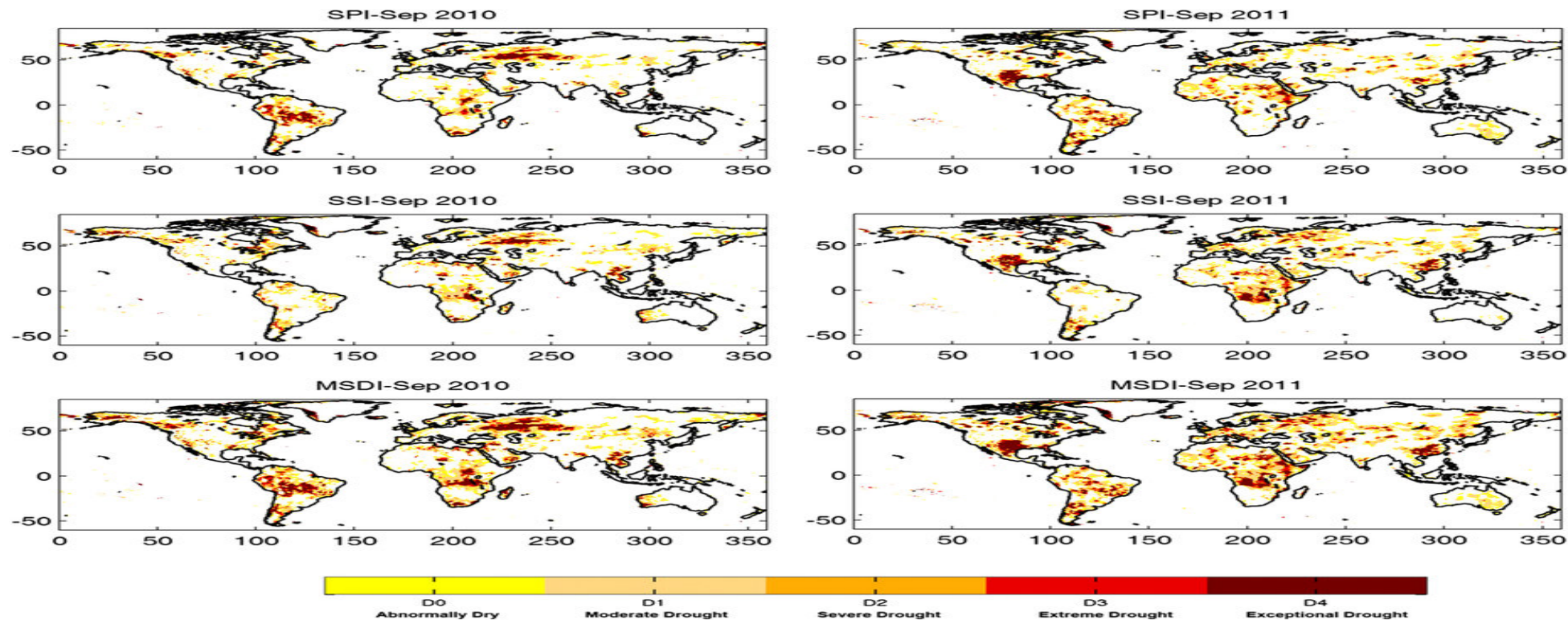
- ✓ System retrieves precipitation & soil moisture from model simulations & remote sensing observations
- ✓ The research will also utilize the merged satellite & ground-based information including the Global Precipitation Climatology Project (GPCP)
- ✓ Obtaining ground based information



# Project Objectives

## Validation & Implementation:

- ✓ Providing near-real-time monitoring of relevant hydrologic variables & a long-term retrospective database using a land surface model.
- ✓ System simulation is driven with hybrid meteorological forcing dataset that combines reanalysis with a suite of observational datasets.
- ✓ Drought monitoring system outputs: water budget components (precipitation, evapotranspiration & soil moisture) & information derived from these such as current drought conditions.





# Research Plan and Methodology

**To calibrate the system and regionalization of the model using data from following sources:**

- Ground-based information (local data)**

- Rainfalls (rain, snow, sleet, the mixture of rain and snow or dew)
- Soil moisture (portable measuring device)

- Model simulations & remote sensing observations**

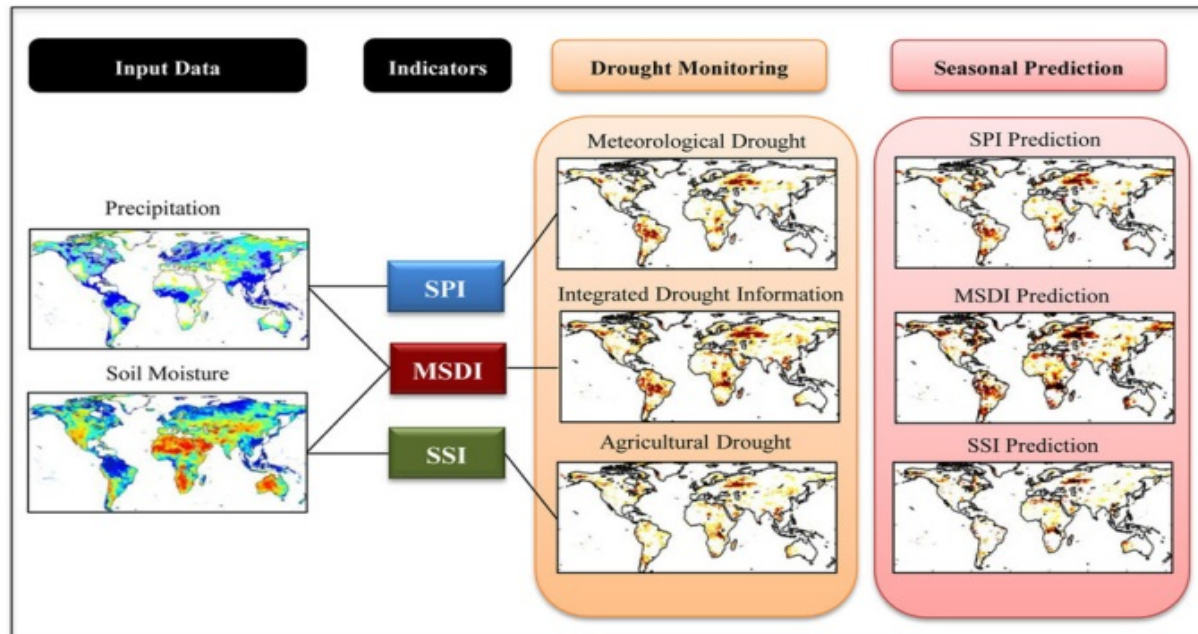
**GIDMaPS integrates precipitation and soil moisture data from model simulations and remote sensing observations including:**

- Modern-Era Retrospective analysis for Research and Applications (MERRA-Land)
- North American Land Data Assimilation System (NLDAS)
- Global Land Data Assimilation System (GLDAS) and the Global Drought Climate Data Record (GDCDR)

# Research Plan and Methodology

## GIDMaPS indicators for monitoring and prediction:

- Standardized Precipitation Index (SPI)
- Standardized Soil Moisture Index (SSI)
- Multivariate Standardized Drought Index (MSDI)



Input data	Variables	Source	Spatio-temporal resolution
MERRA-Land	Precipitation and soil moisture	NASA	2/3°×1/2°, monthly
NLDAS	Precipitation and soil moisture	NASA	0.125°, monthly
GDCDR	Precipitation	UCI, GPCP	0.5° & 2.5°, monthly
GLDAS	Precipitation and soil moisture	NASA	1°, monthly

# Development Impacts of PEER Project

## **Environmental Impacts:**

Hydrological impacts that reduces level of surface waters & lakes, reduction of water flows, extreme impact on quality of ground & surface waters, reduction of potable water, damages to biodiversity & destruction of wildlife

## **Economic Impacts:**

Damages to agricultural producers, livestock, jobs & incomes, food production & tourism industry

## **Social Impacts:**

Population displacement, damages to water resources management, negative impacts on humans health & increase of insecurity



## Conclusion and Acknowledgments

- **This project aligns with USAID priorities in the following ways:**

- ✓ Droughts in Afghanistan have a direct relationship with water supply and management.
- ✓ Providing a validate & reliable source for drought monitoring & prediction which leads us to better and alternative sources of information for water management and agriculture industry.
- ✓ As Amu Darya and Kabul river basins are important sources of water in Afghanistan (and other neighbor countries) implementation of this project will increase national & regional cooperation on shared water resources.
- ✓ Potentially enhance a thriving economy led by the private sector (includes infrastructure, agriculture, alternative livelihoods).
- ✓ Increasing public awareness and directing the society toward a democratic government with broad citizen participation.

# Conclusion and Acknowledgments

- **There is lack of data and knowledge on almost all aspects related to drought monitoring and prediction. Upgrading the institutional capacity for drought monitoring and prediction through this system is another major goal of this project.**

## Engaging with Policy Makers

- ✓ the outcomes of this project will provide the information needed to agriculture sector as agro climatology data to adapt to critical drought period
- ✓ Farmers will be beneficial of created information and data to manage their land and water uses effectively knowing the drought risks
- ✓ The project results will provide the basic information about frequency and special variability of droughts in Afghanistan in order to manage and plan water storage and hydropower projects of Ministry of energy and water
- ✓ Afghanistan National Environmental Protection Agency is another target for taking the advantage of the projects created information.



**Thank you**



Kabul River-1970s