

ESCAP Regional Drought Mechanism

Space Applications Section
ICT and Disaster Risk Reduction Division
United Nations ESCAP

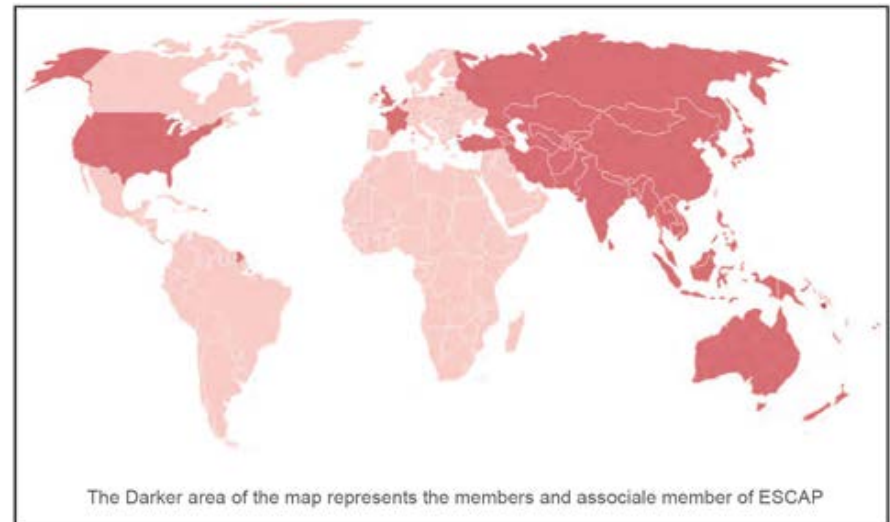


9th GEOSS
Asia-Pacific Symposium
11-13 January 2017
Tokyo, Japan

ESCAP and RESAP

- United Nations Economic and Social Commission for Asia and the Pacific (ESCAP)
- 62 member and associate member States
- ESCAP's Regional Space Applications Programme for Sustainable Development (RESAP) has been operating for around 22 years
- Covers 25 member States

Guided by Resolution 68/5 Asia-Pacific Plan of Action for Space Applications and GIS for Sustainable Development (2012–2017), though focus is primarily on disasters



Regional Drought Mechanism

- Strengthen the capacity of drought-prone member to access and effectively utilize space applications and GIS for drought monitoring and early warning
- Build regional cooperation platforms for capacity building on drought management
- Complement drought monitoring capacity with seasonal forecasting for effective planning
- Build greater capacity of drought-prone member States to develop a long-term planning, climate adaptation and drought management approach through climate risk analysis
- Pilot countries: Mongolia, Sri Lanka, Cambodia, Myanmar, Kyrgyzstan, Bangladesh, Afghanistan, Nepal
- Regional Service Nodes: China, India, Thailand and potentially others providing other services RIMES (seasonal forecasts), Australia (water budgeting (TBC)), etc...

What the mechanism offers..


1. Access to satellite data, products and services

- **Data** from multiple earth observation satellites
- **Products** – Agricultural drought indices
- **Services** – Immediate: seasonal forecasts, *in-season* crop/vegetation monitoring and early warning; next step: crop forecasting, agricultural land use/land cover changes for sustainable agriculture and efficient water management
- **Customization** of services for different institutions

2. Building the Institutional Capacity

- Specialized capacity development
- Networking with Regional Service Providers in China and India, Thailand, as well as with RIMES

Long-term benefits

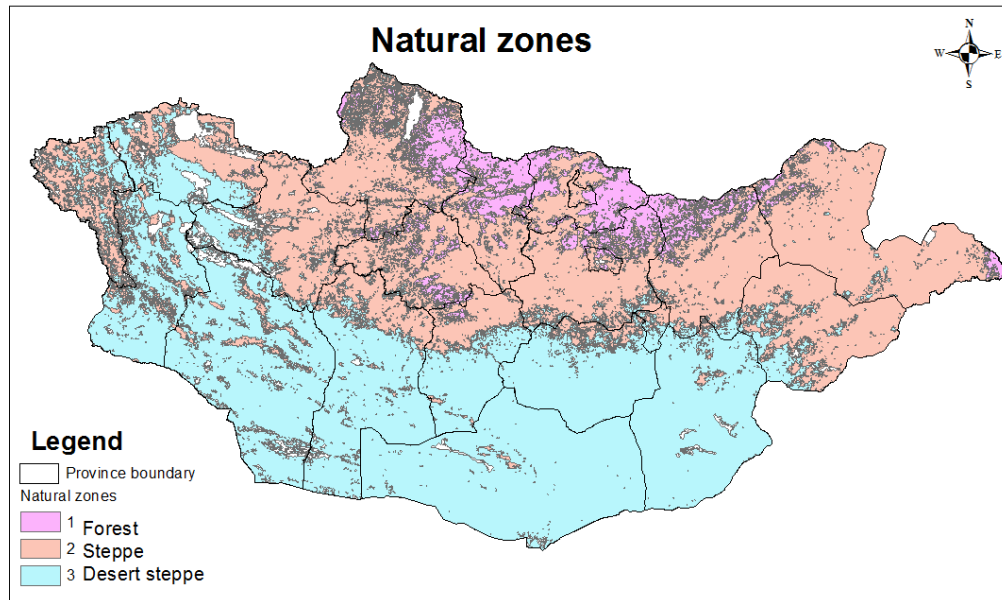
- Link in-season monitoring with forecasts:
- Monsoon Forum  Drought Mechanism
- Additional data, information and tools
- Experts from various countries committed to support
- Customized products for the national circumstances
- Tailored capacity building to utilize space information and applications
- With greater awareness, opportunities exist for other applications – other Ministries, expanding beyond space applications, etc.....



Example of Mongolia and Sri Lanka

Agro-ecological zones identified

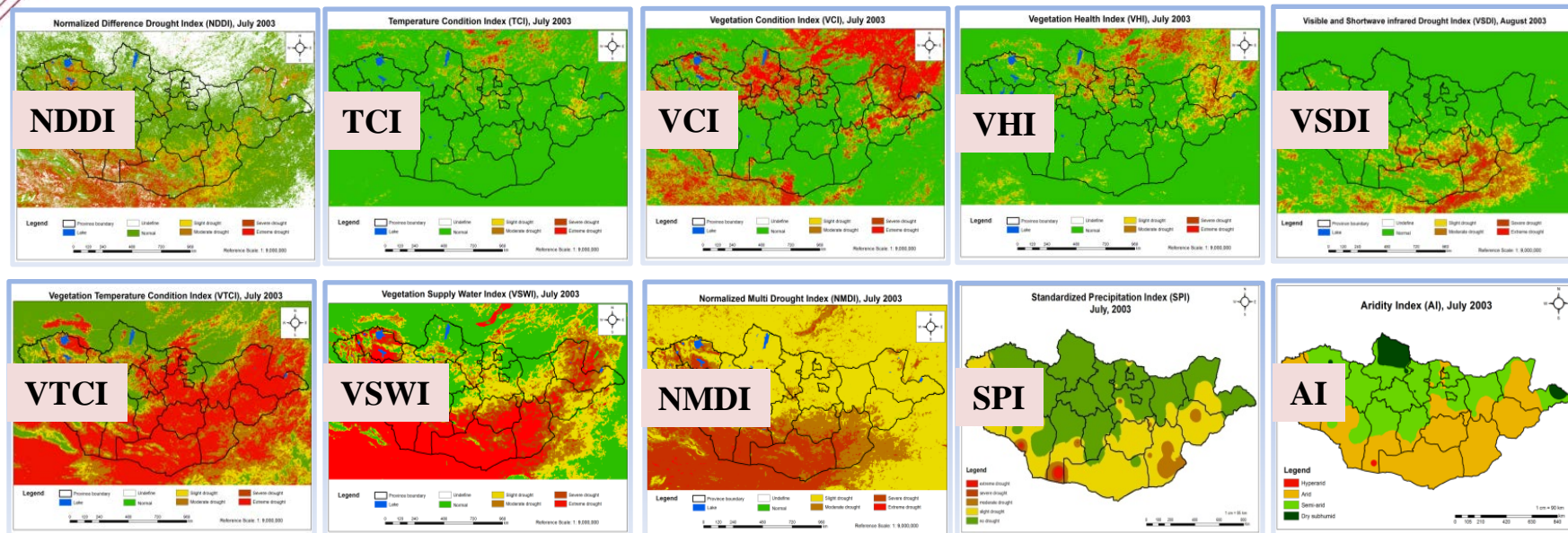
Drought mapping was made combined by 3 regions which has more than 50% correlation including forest, steppe, desert steppe. The correlations between RS index and Drought index calculated by meteorological parameter were different in various natural zones separately.



Natural regional made from mapping of land cover classification by MODIS data in 2010.

	Soil moisture 10cm vs RS indices	AI vs RS indices	SPI vs RS indices
Forest	$r = >45$ (NDDI, VHI, TCI...)		
Steppe	$r = >45$ (VSWI)	$r = >49$ (TCI)	$r = >46$ (TCI, VSWI)
Desert Steppe	$r = >45$ (VHI)	$r = >45$ (TCI, VHI)	$r = >46$ (TCI)

Indices tested



Mapping 10 drought indices using data 14 years.

Choice the following drought indices.

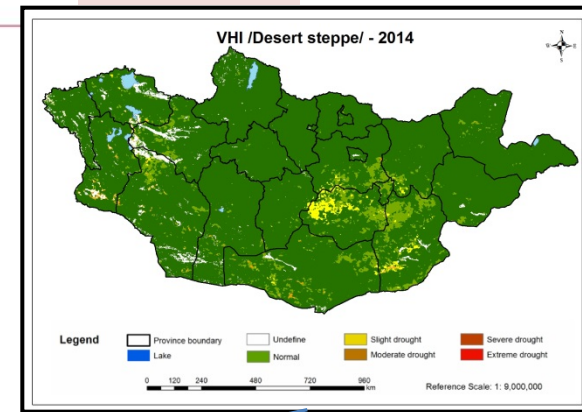
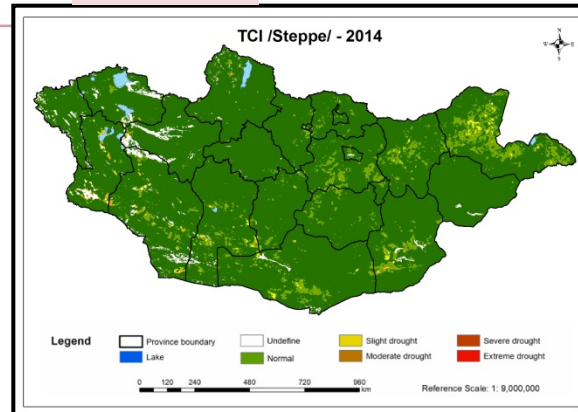
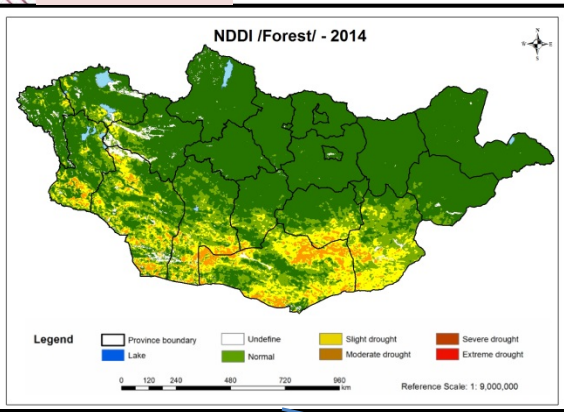
- RS drought indices (**NDDI, TCI, VCI, VHI, VSWI**)
- Meteorological indices (**SPI, AI**)

Yearly combined drought map - 2014

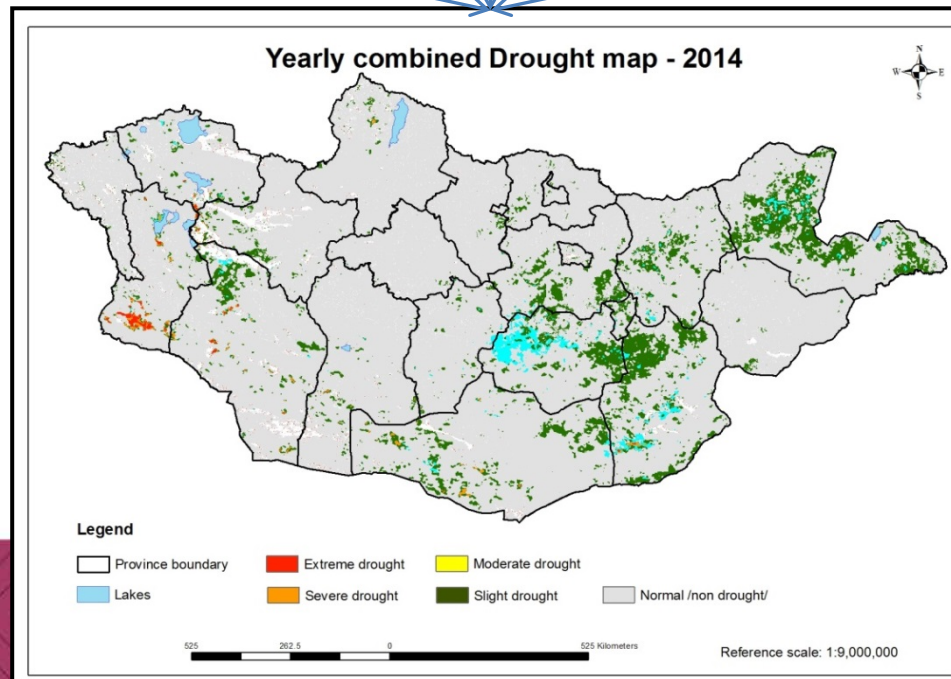
June, 2014

July, 2014

August, 2014



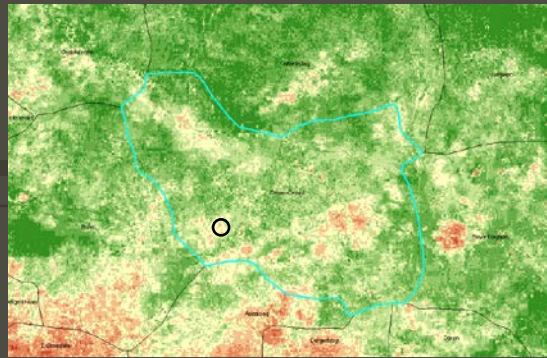
Overlay



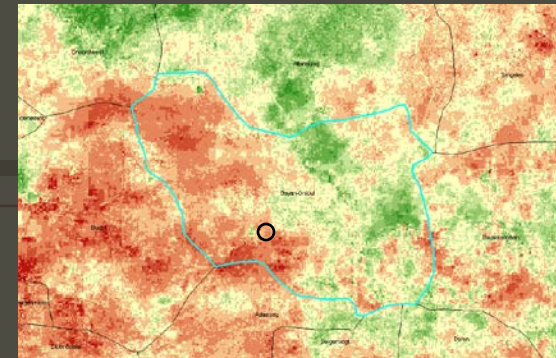
Drought Products Validation

biomass, CO2 and environmental parameter in 2009, 2010, 2011 field study at the Tuv, Dundgovi, Khentii aimags

VHI
2011
.Sep



VHI
2010
.Aug



2011.9.14

*Баян-Өнжүүл сумын төвөөс
өмнө зүг 60км.*

Хадат Толгой

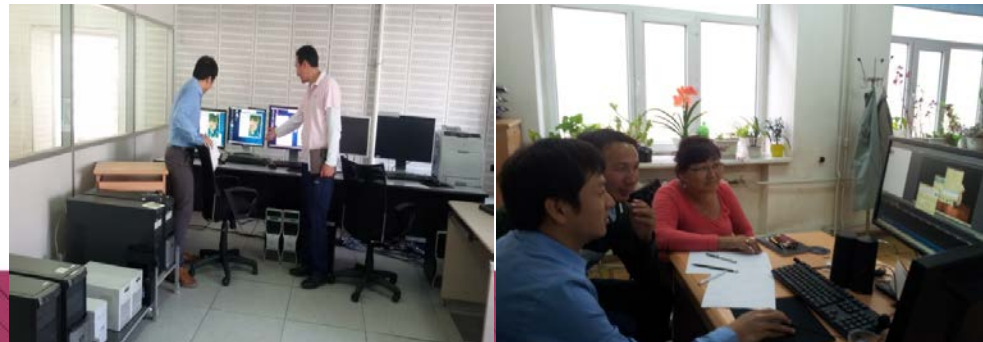


2010.8.18



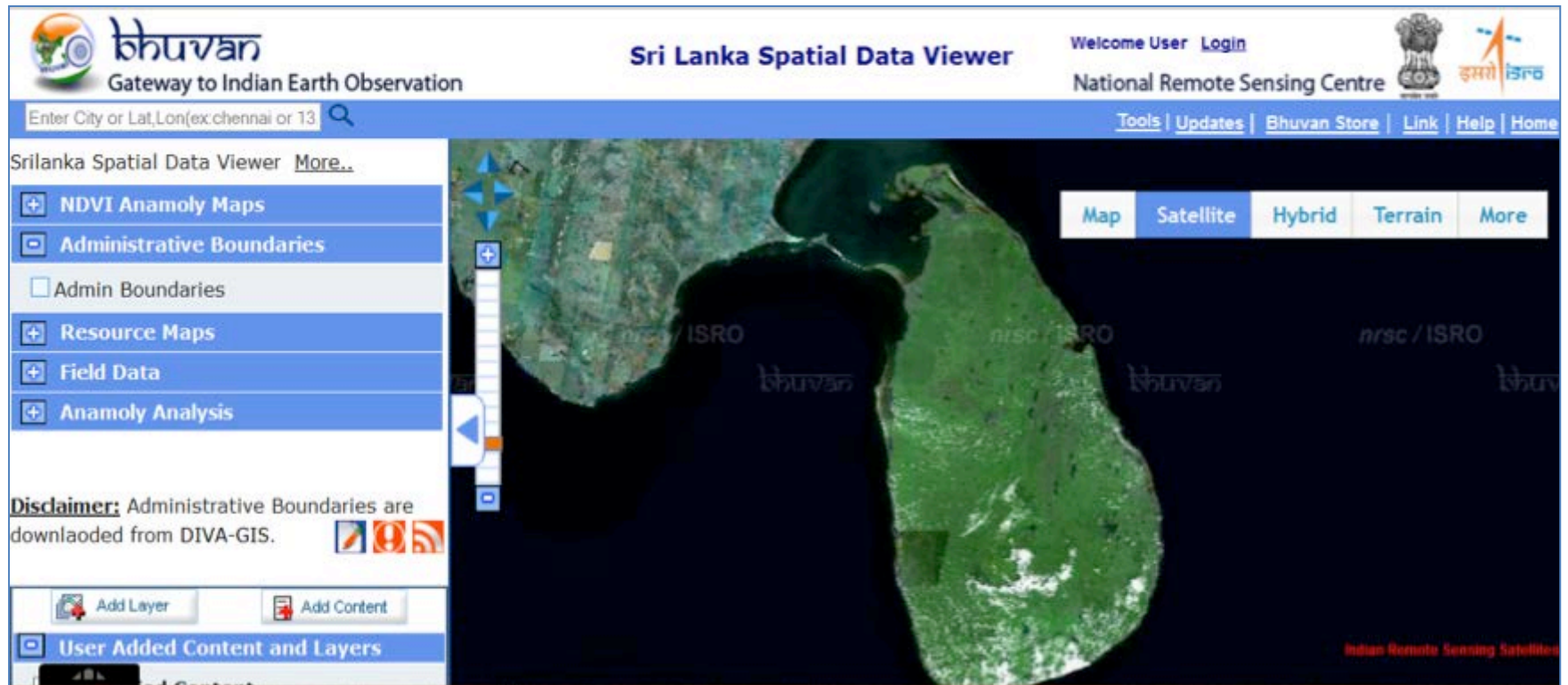
DroughtWatch for Mongolia

- **Data management**
(in-situ, statistics, Geotiff etc.)
- **Data preprocessing**
(RS data processing, composition)
- **Indices calculation**
- **Drought monitoring**
(by single index and combination indices dashboard)
- **Statistics and analysis**
(over the spatial, over time interval)
- **Batch for the whole procedure**
- **DroughtWatch3.1(English+Chinese)**



Access to variety of EO data for Sri Lankan Drought

- Drought Assessment using Interactive tools and data download
- Exclusive access to Sri Lanka for online information
- Training & hand-holding for data processing and analysis



The screenshot displays the Bhuvan Sri Lanka Spatial Data Viewer interface. At the top left, the Bhuvan logo is accompanied by the text "Gateway to Indian Earth Observation". The main title "Sri Lanka Spatial Data Viewer" is centered at the top. On the right, there is a "Welcome User" message with a "Login" link, and the "National Remote Sensing Centre" logo. A search bar is located below the title, with the placeholder text "Enter City or Lat, Lon(ex:chennai or 13)". Navigation links for "Tools", "Updates", "Bhuvan Store", "Link", "Help", and "Home" are provided. The left sidebar contains a list of layers: "NDVI Anomaly Maps", "Administrative Boundaries" (with a sub-option for "Admin Boundaries"), "Resource Maps", "Field Data", and "Anomaly Analysis". Below the sidebar, a "Disclaimer" states that administrative boundaries are downloaded from DIVA-GIS. At the bottom left, there are "Add Layer" and "Add Content" buttons, and a section for "User Added Content and Layers". The main map area shows a satellite view of Sri Lanka with a scale bar and navigation controls. A menu at the top right of the map area offers "Map", "Satellite", "Hybrid", "Terrain", and "More" options. The text "nrsc / ISRO" and "Bhuvan" are visible as watermarks on the map. The bottom right corner of the map area contains the text "Indian Remote Sensing Satellites".

Mobile Smartphone - Field Data Collection (FDC)

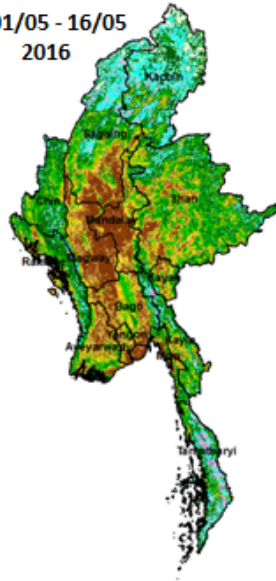
- Mobile smartphone technologies for field data collection, online data transmission and geo-visualisation on Bhuvan platform.
- This has two parts
 - Device based solution for field data collection and upload to server
 - Server-end App to process data, validation and geo-visualization of archived data

Geo-visualization of Collected Data

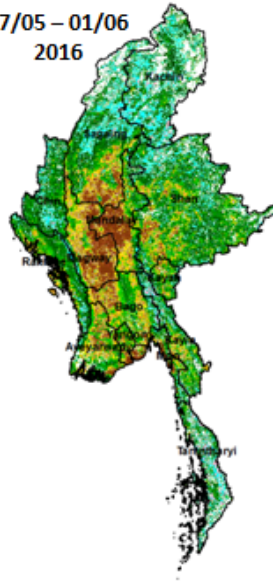


ISRO support to Myanmar

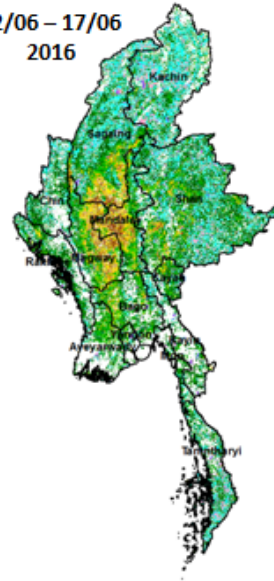
01/05 - 16/05
2016



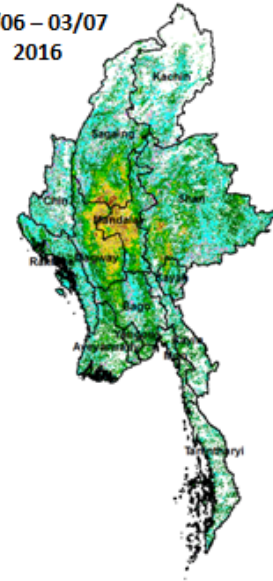
17/05 - 01/06
2016



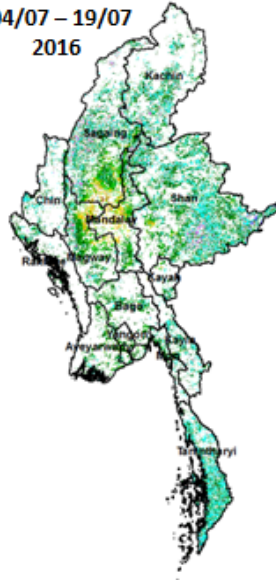
02/06 - 17/06
2016



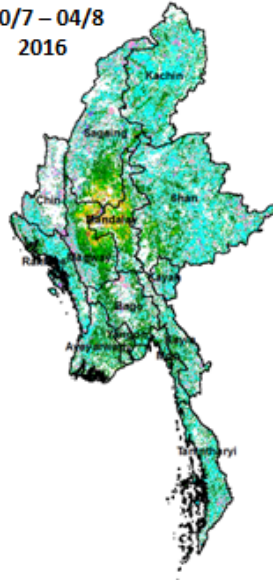
18/06 - 03/07
2016



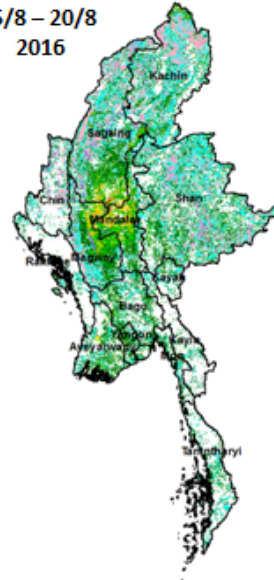
04/07 - 19/07
2016



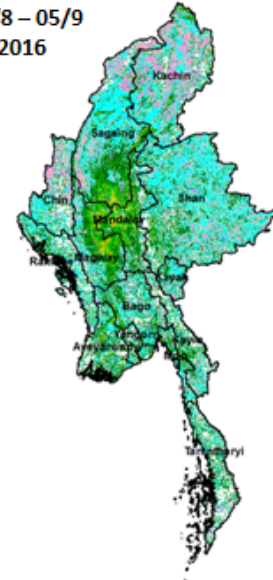
20/7 - 04/8
2016



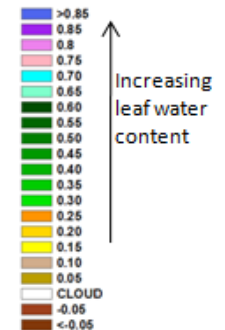
05/8 - 20/8
2016



21/8 - 05/9
2016



Progression
of Myanmar
NDWI during
the summer
cropping
season 2016



Thank you

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