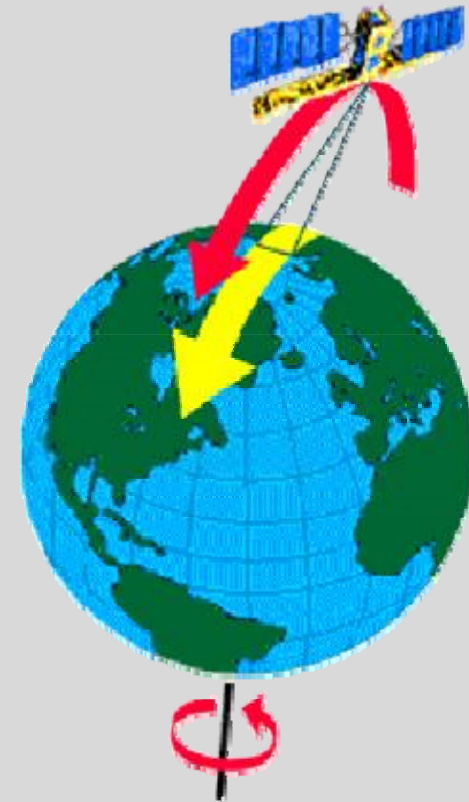


Strategies towards addressing natural disasters Cyclone & Flood in Bangladesh:

Enforcement of Network of Working Group

Dr. Hafizur Rahman

Head, Agriculture (Remote Sensing) Division
Bangladesh Space Research & Remote Sensing
Organization (SPARRSO)



First Joint Project Team Meeting for Sentinel Asia STEP3 (JPTM2013),
Bangkok, 27-29 November, 2013

Scientific Context



Consequences of global warming,
climate change phenomena;

Intensification of disasters: flood,
cyclone, drought etc.;

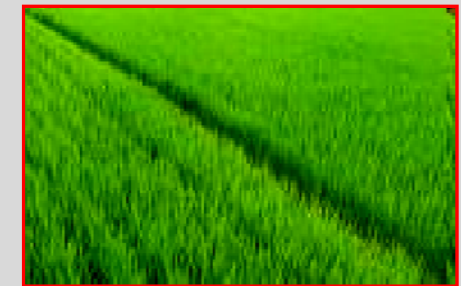


Resulting damages and
casualties in various sectors

with consequences on agriculture
disturbing food security impose



**Great challenges to the
people in this region**

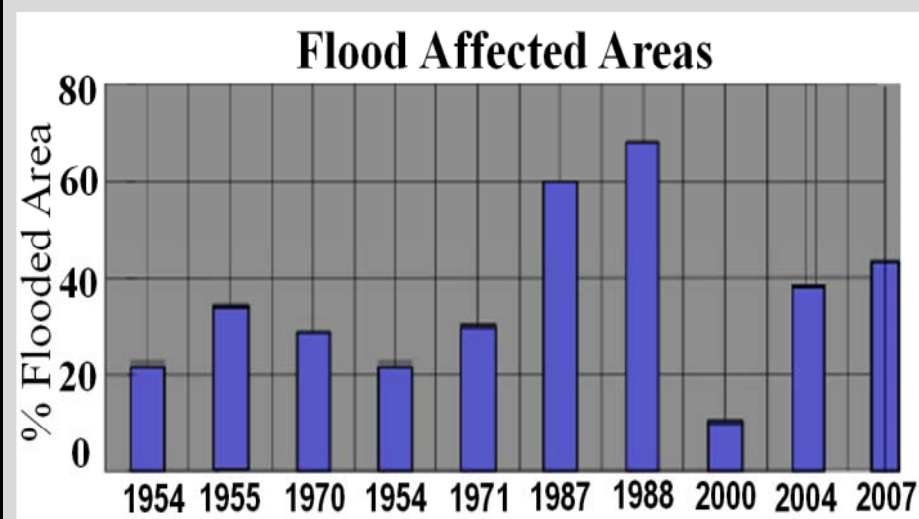


Disasters in Bangladesh

Deaths & Economic Losses

Disaster	Year	Death	Economic Losses (US\$×1000)
Cyclone	2009	172	
Cyclone	2007	3500	2,300,000
Flood	2004	747	2,200,000
Flood	2000		500,000
Flood	1998	918	4,300,000
Cyclone	1995		800,000
Cyclone	1991	138868	1,780,000
Flood	1988	1517	2,137,000
Flood	1987		727,500
Cyclone	1970		500 000

Source: BMD & <http://www.preventionweb.net>

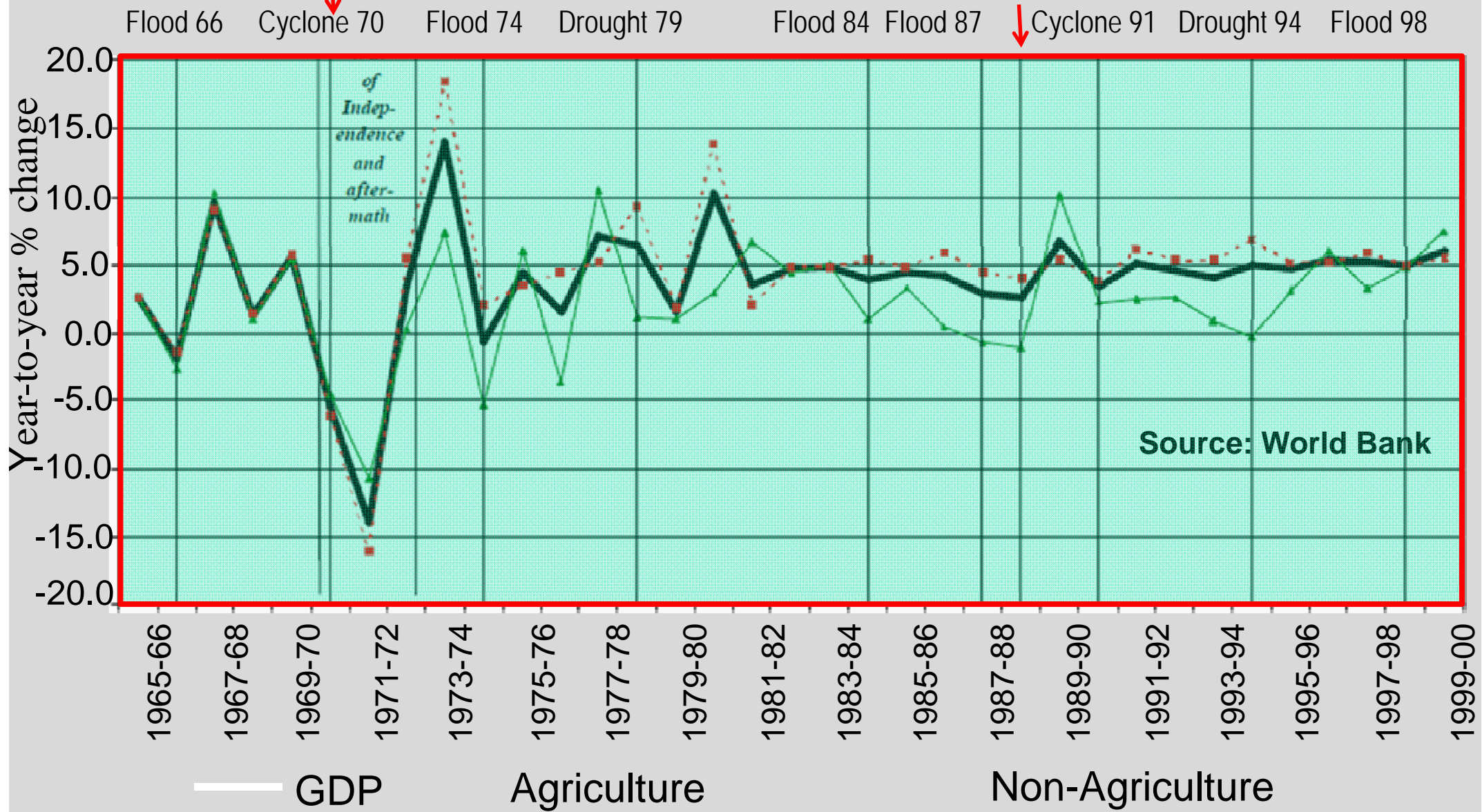


Annual fluctuations in GDP in Agricultural & Non-agricultural Sector Products in Bangladesh

Time Period: 1966-2000

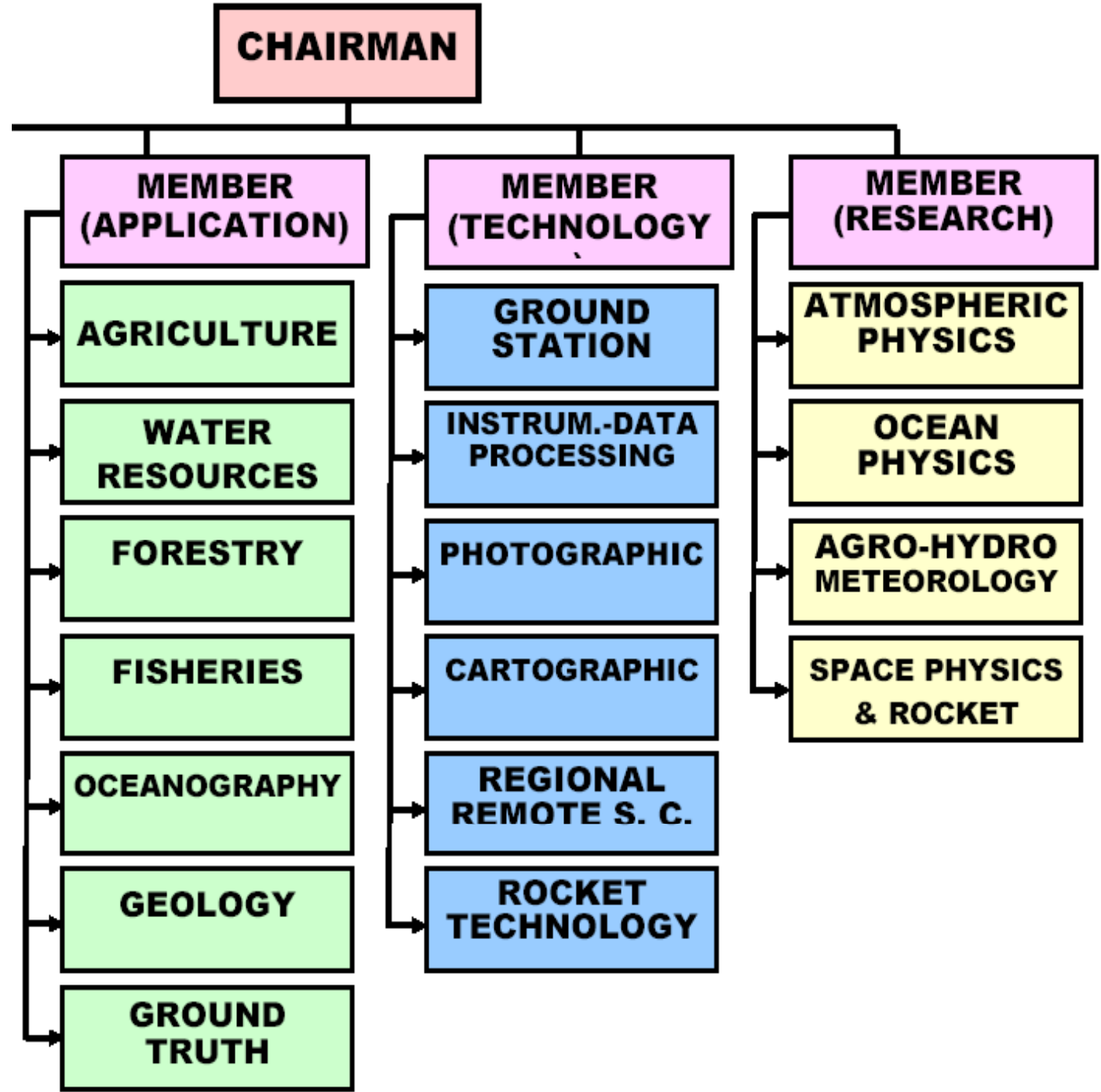
Year of Independence

Flood 88



Bangladesh Space Research & Remote Sensing Organization (SPARRSO)

**Multidisciplinary
Setup of
SPARRSO**



Space Technology Application: Developing Trend

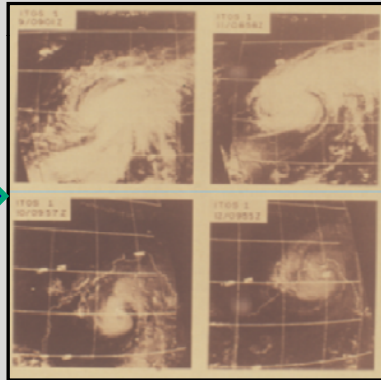
SPARRSO being the national focal point of space & remote sensing activities in Bangladesh providing government with various geo-information in various geo-disciplines.

Application of Space Technology: Cyclone, Flood

SPARRSO introduced satellite based monitoring in BD

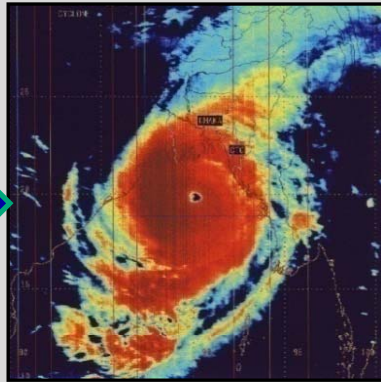
Cyclone

Devastating cyclone of 1970



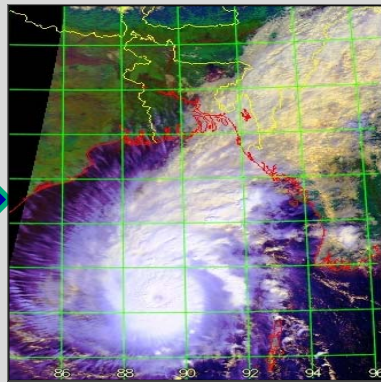
NOAA
HRPT

Devastating cyclone of 1991



GMS

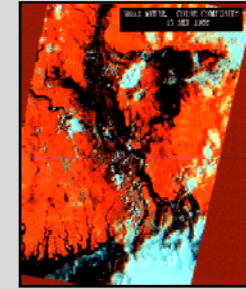
Devastating cyclone of 2007



NOAA
AVHRR

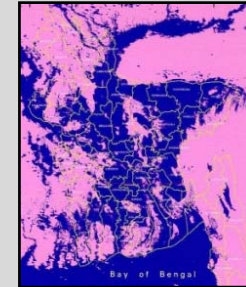
Flood

Visual interpretation of NOAA-AVHRR Image



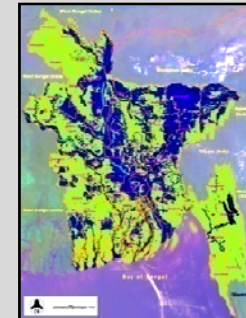
1988

RADARSAT
SAR



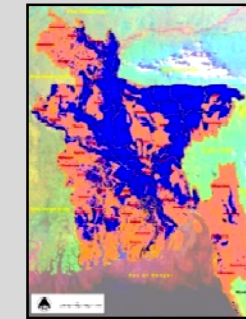
1998

RADARSAT &
NOAA-AVHRR



2004

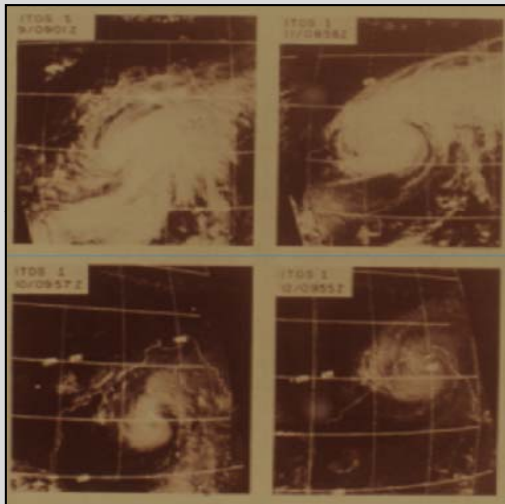
NOAA-AVHRR



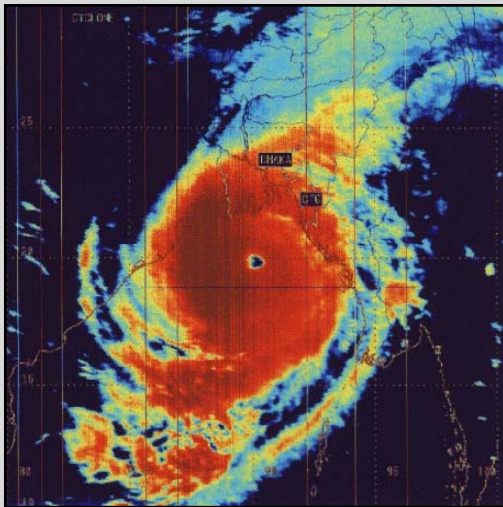
2007

Devastating Cyclones in Bangladesh

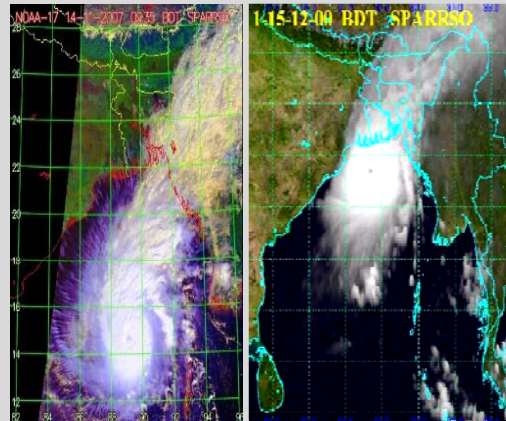
Cyclone 1970
Max. wind speed: 223 km
Storm surge height: 20-30 feet
Death: 5,00,000



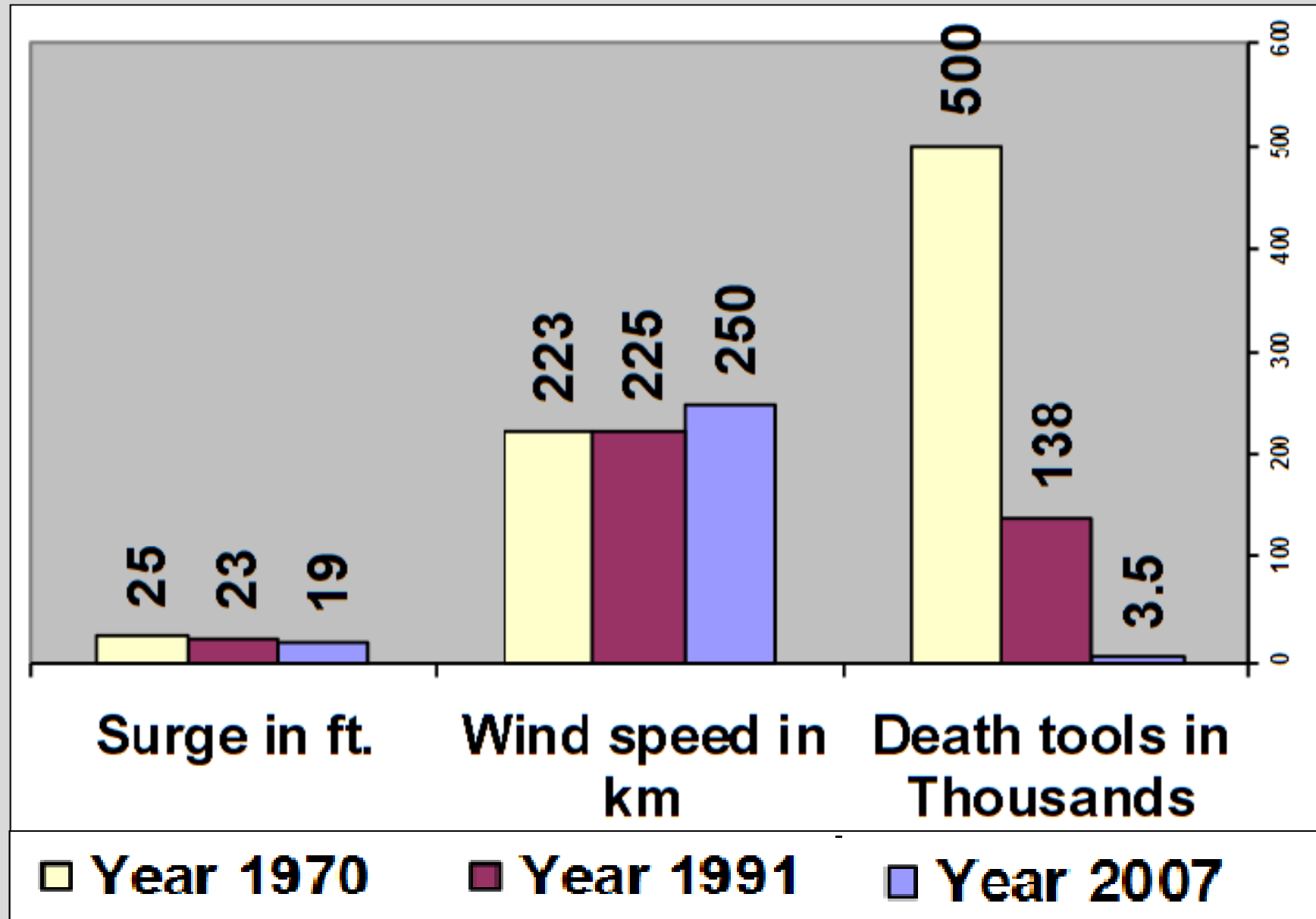
Cyclone 1991
Max. wind speed: 225 km
Storm surge height: 20-25 feet
Death: 1,38,000



Cyclone 2007
Max. wind speed: 250 km
Storm surge height: 15-20 feet
Death: 3,500

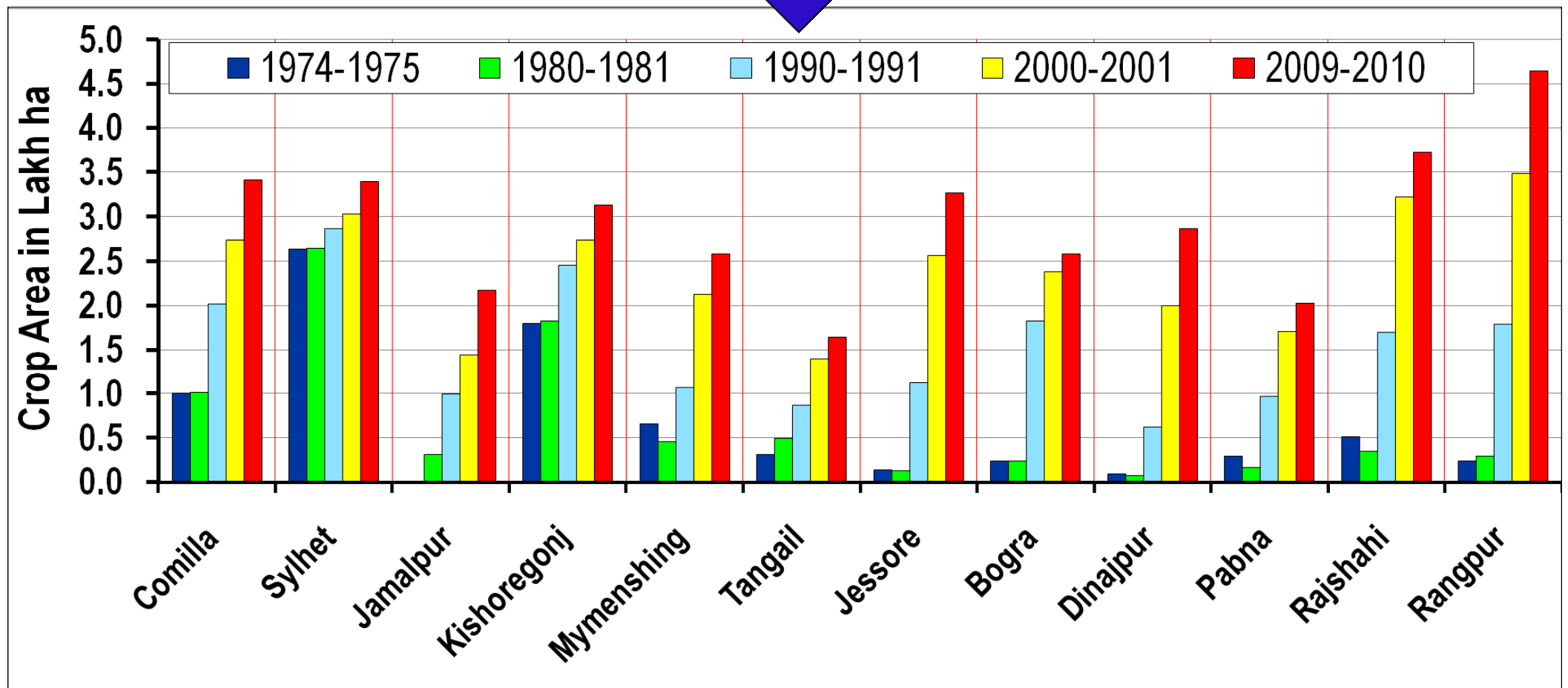
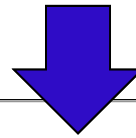


Better monitoring using space technology with better management & policy making resulted in Significant reduction of death & casualties



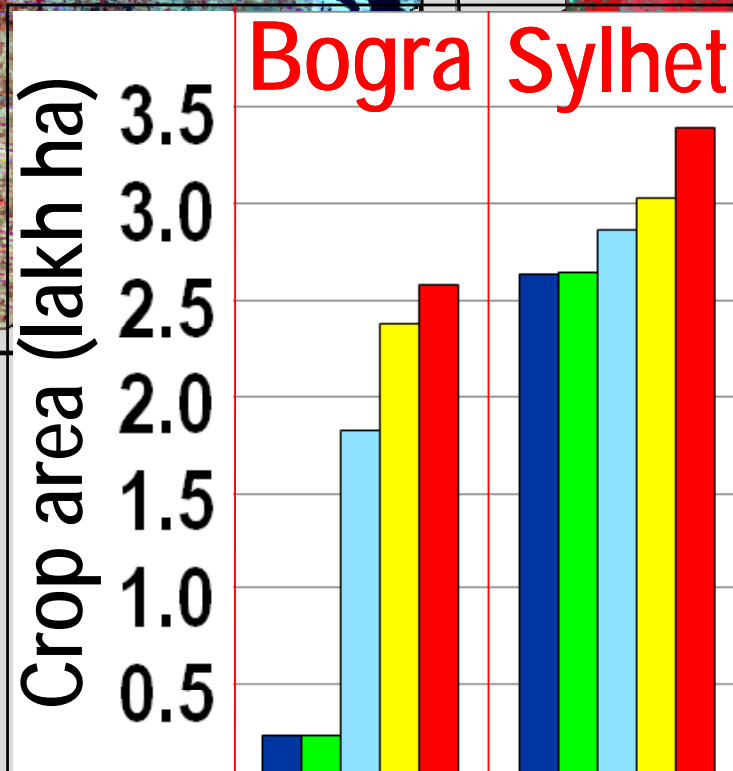
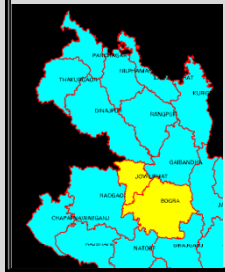
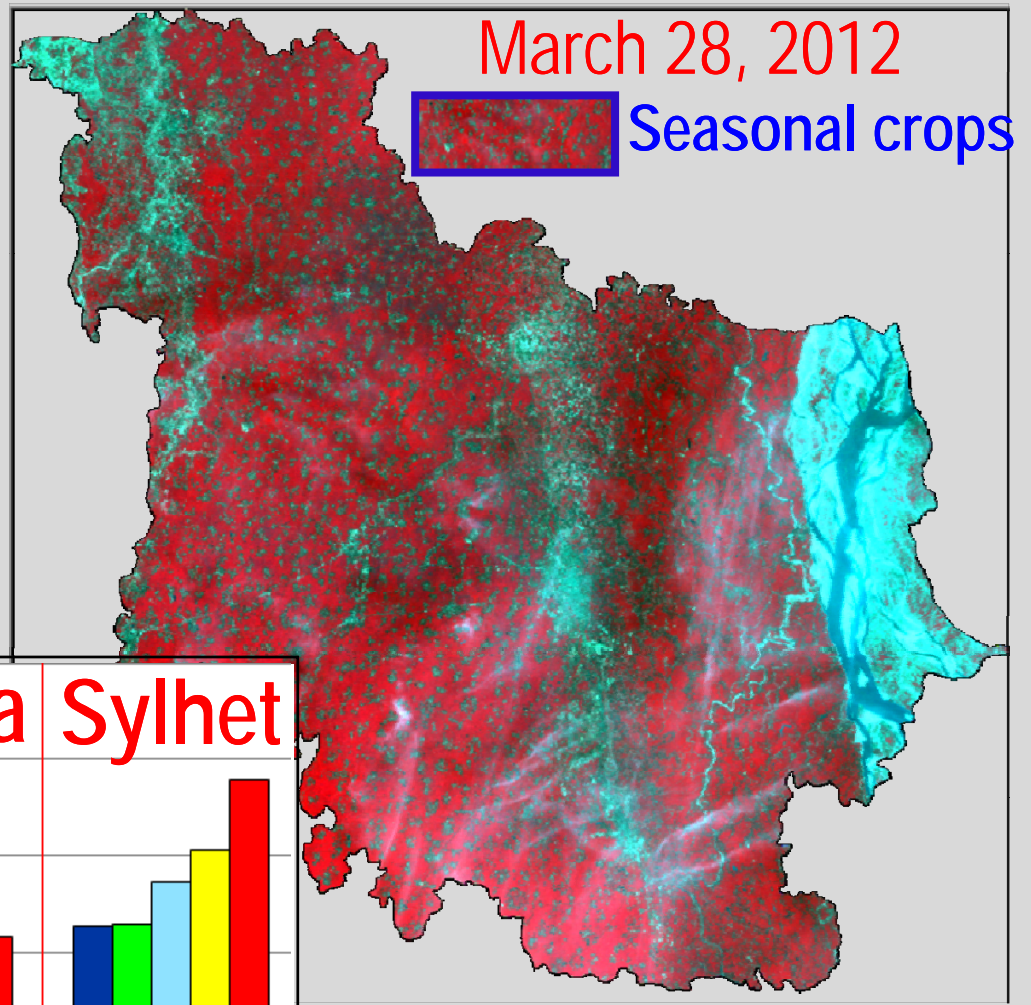
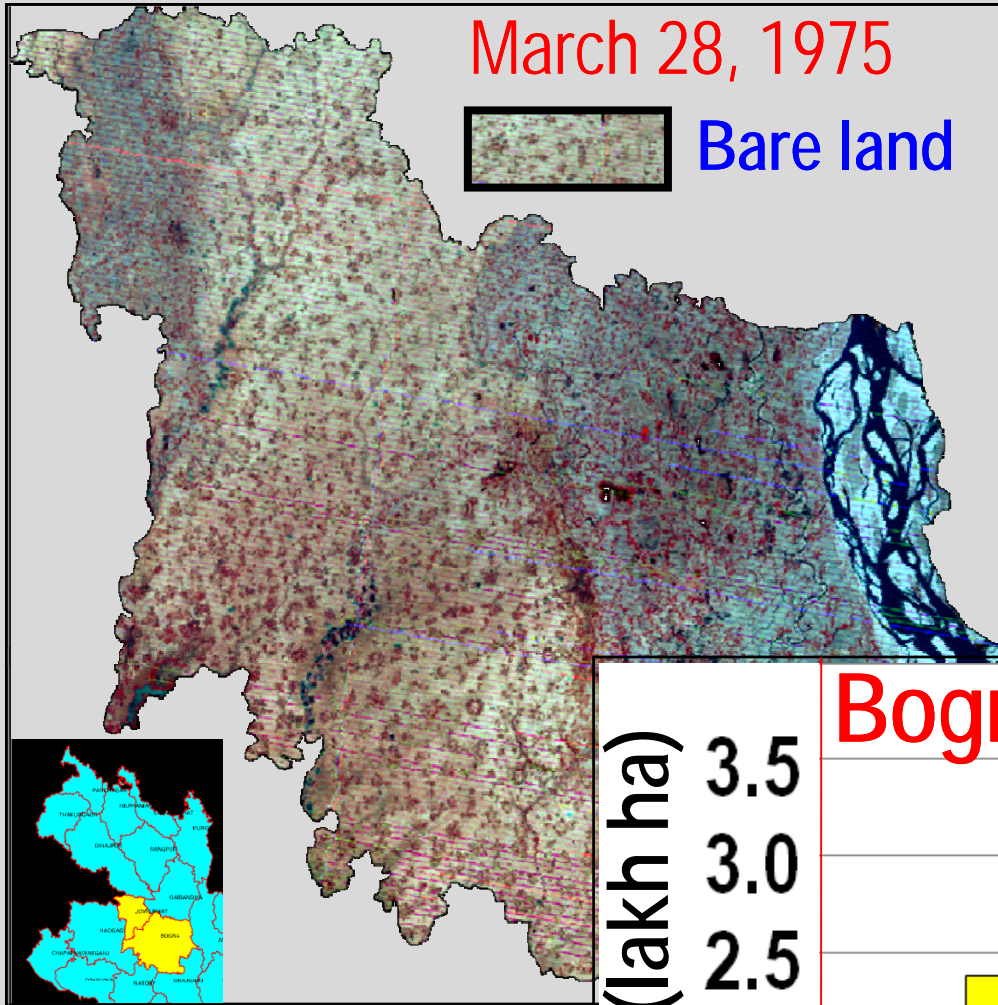
Satellite Based Monitoring of Agricultural Crops Supporting National Food Security

Progressive increases of seasonal crop cultivated areas during 1970 - 2010



Different districts in Bangladesh

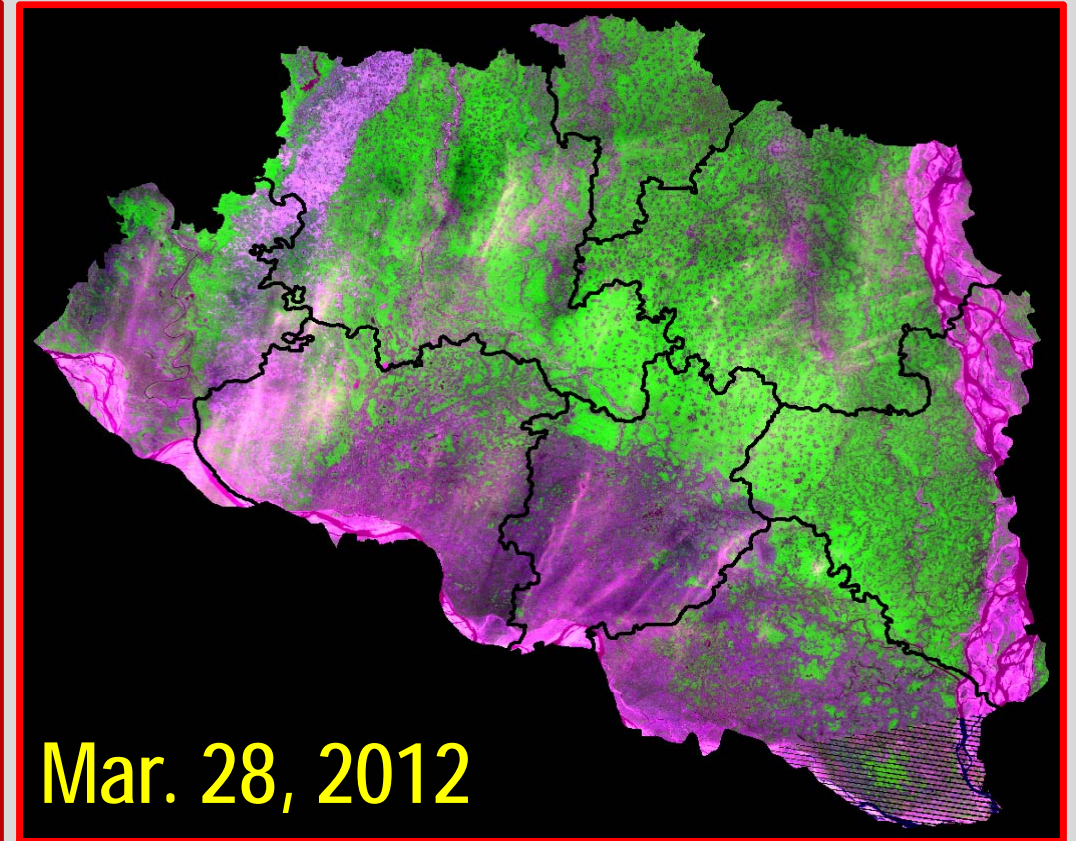
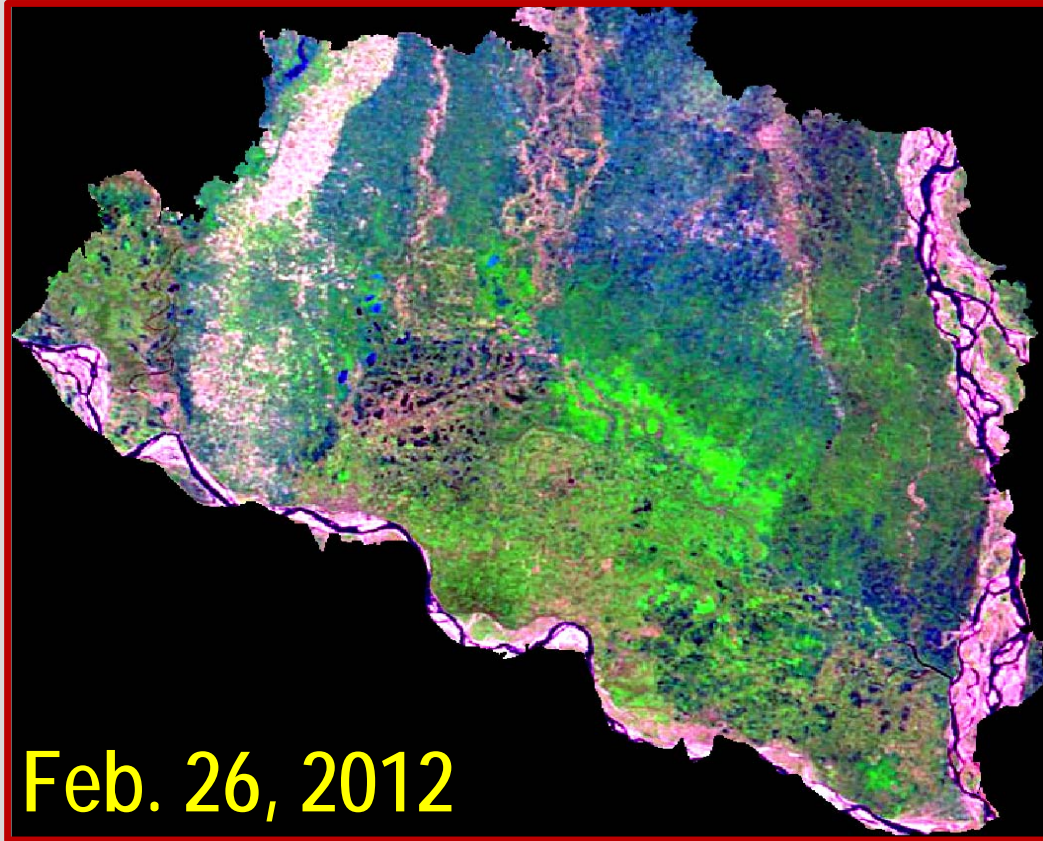
Satellite Based Observation of Landcover



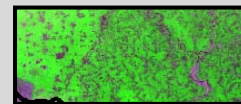
■ 1974-1975 ■ 1980-1981 ■ 1990-1991 ■ 2000-2001 ■ 2009-2010

Development of irrigation over large area

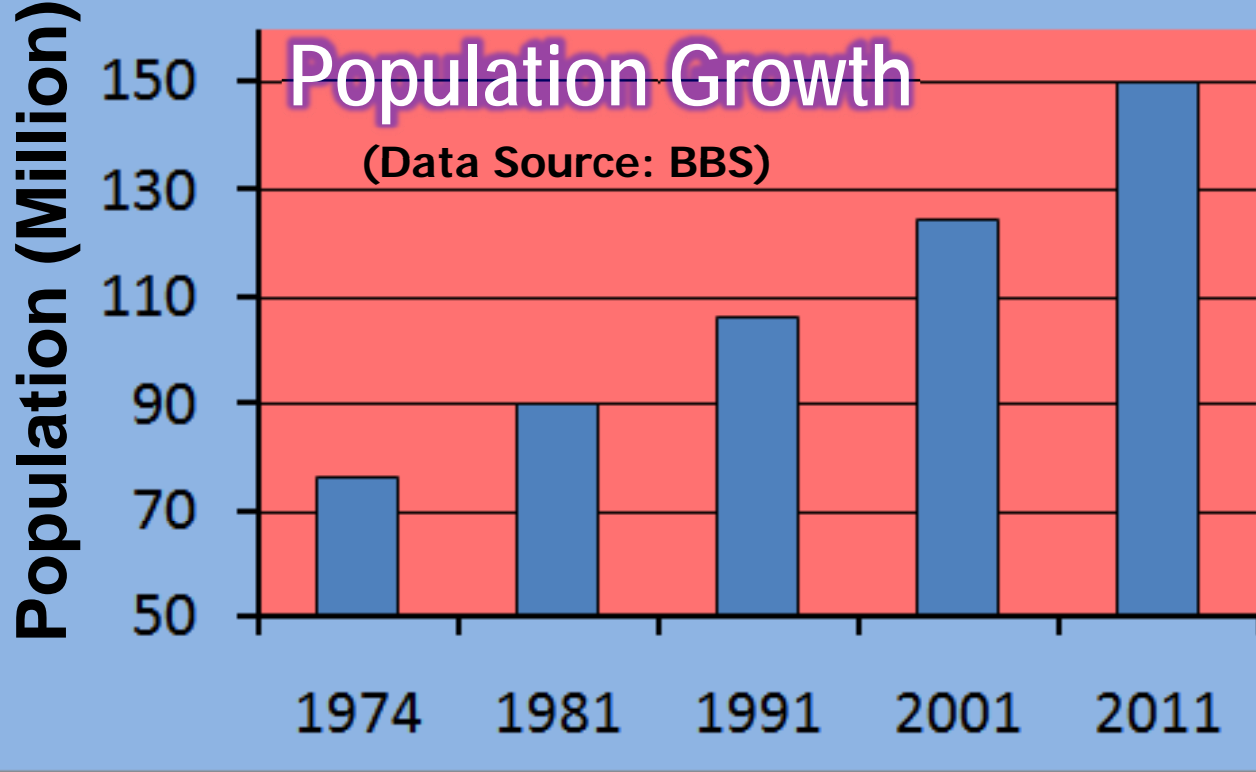
Irrigation over large area → Crop over previously irrigated areas



Irrigated area



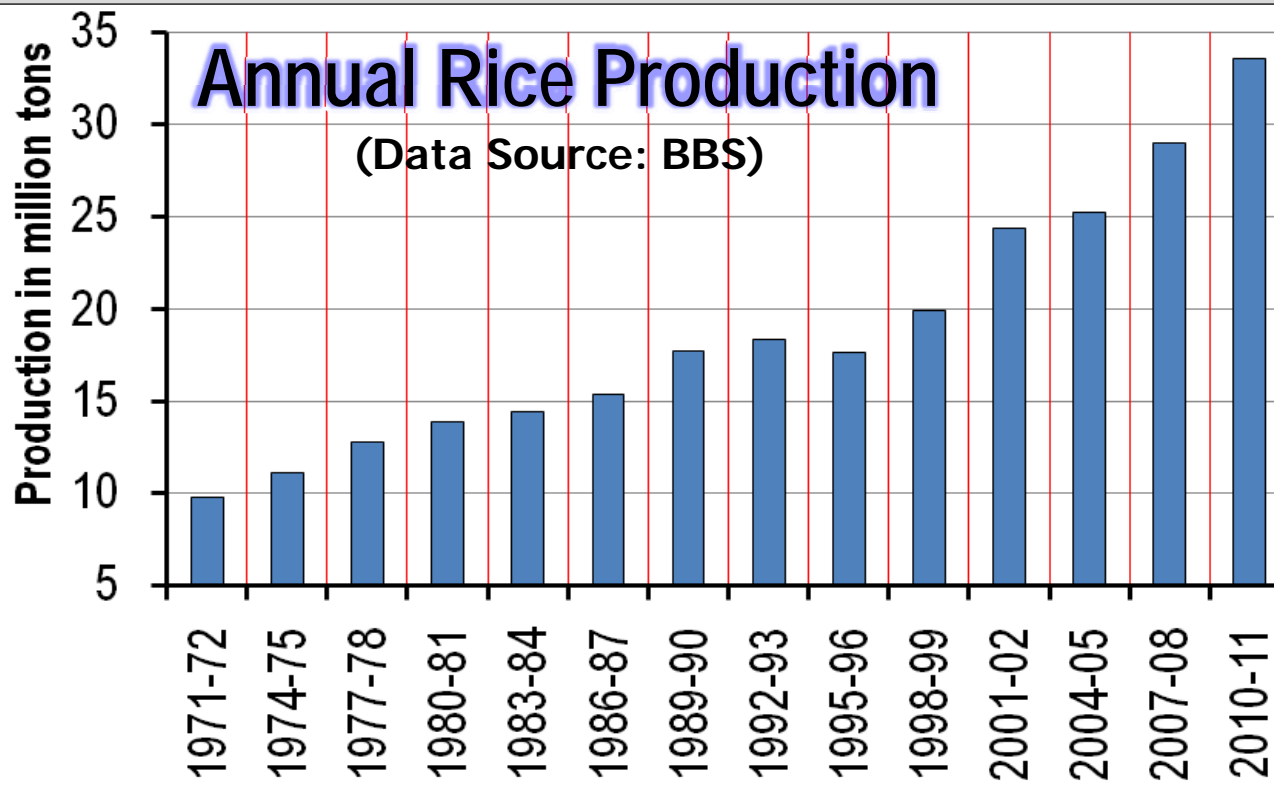
Crop area



**During
(1974-2011)**



**Population Increased by
96%**

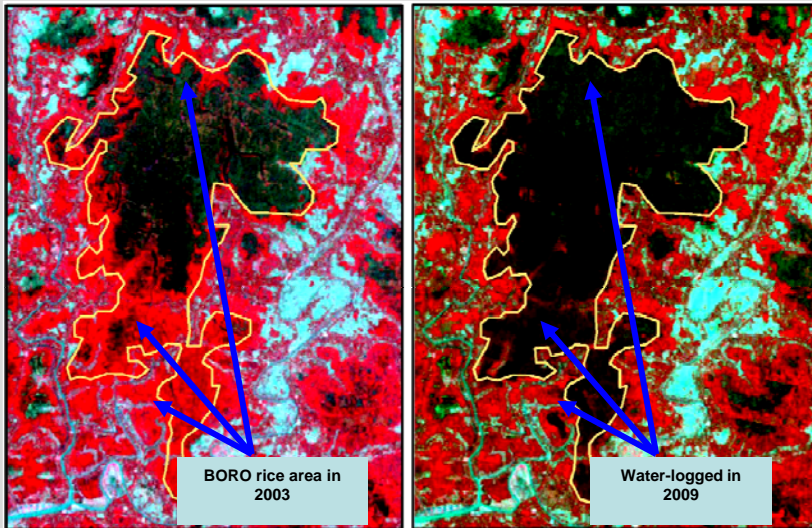


**Rice Production
Increased by
202%**

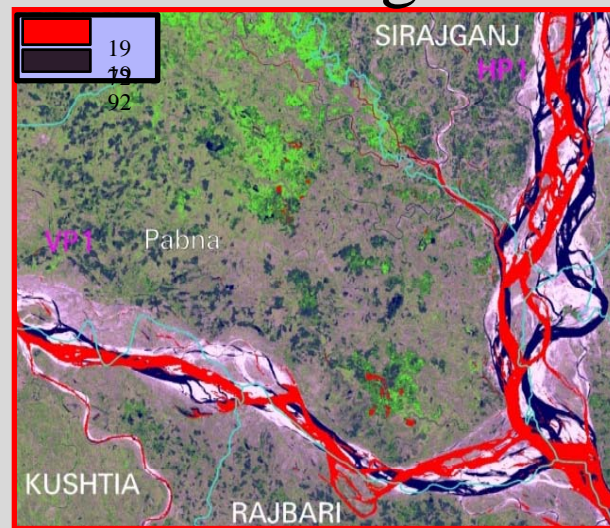
Application of Space Technology in Bangladesh

(Combating Against Disasters)

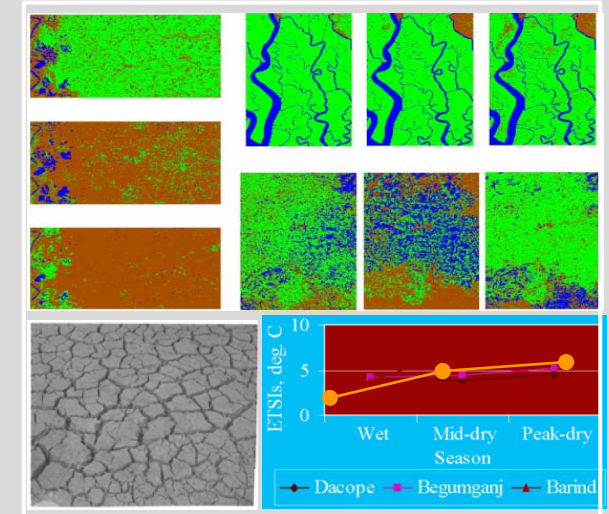
Water logging



River erosion & Channel migration



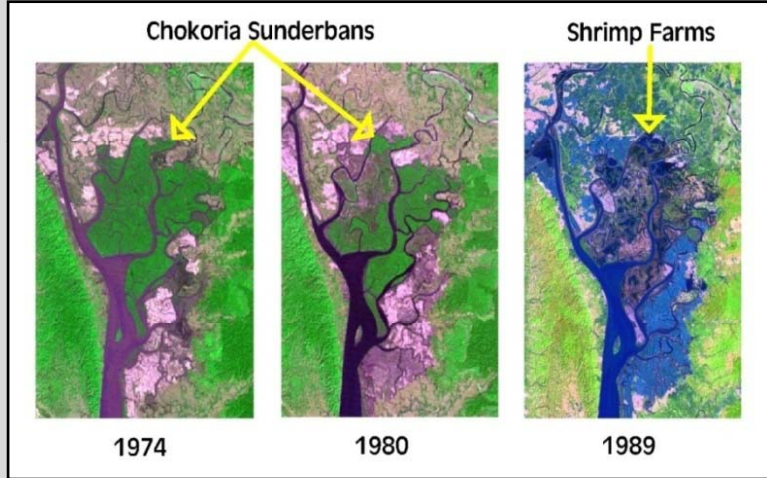
Drought



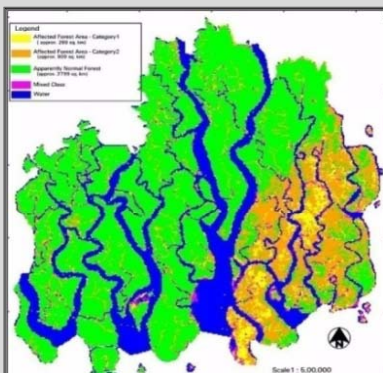
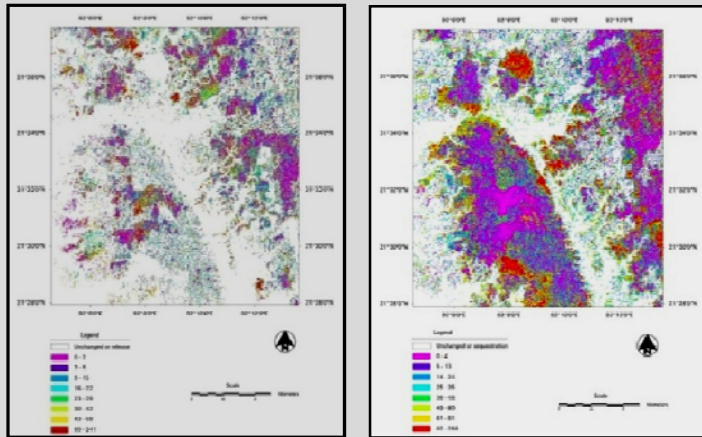
Drought Monitoring & Early Warning System at SPARRSO

Application of Space-based RS Technology in Bangladesh

Mangrove Deforestation



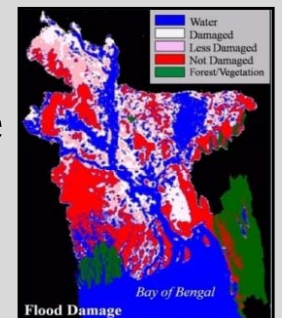
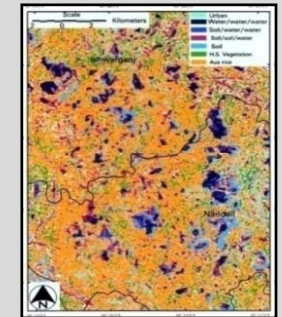
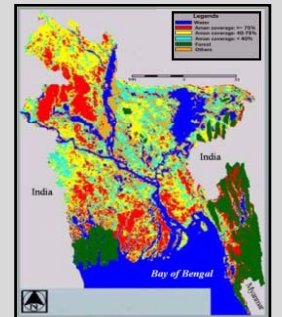
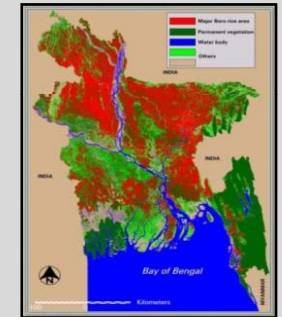
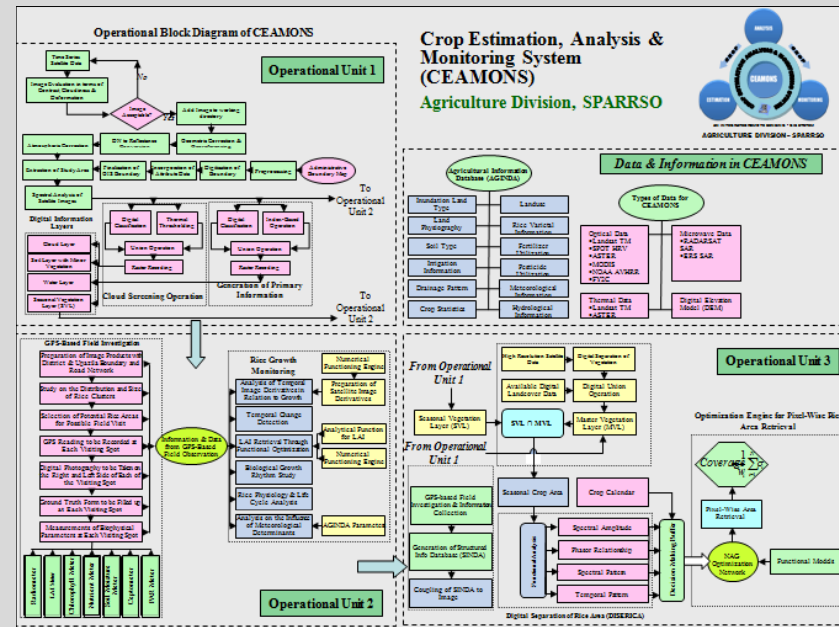
Carbon Flux Study (1992-2001)



Forest Damage by Cyclone '07

Monitoring Rice Crop

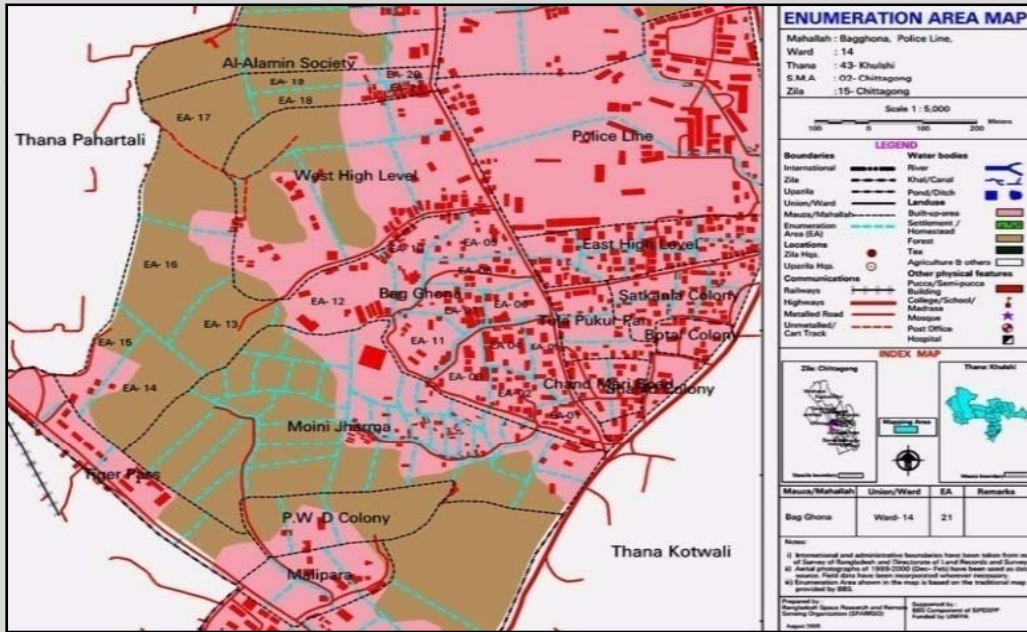
Scheme for operational crop monitoring



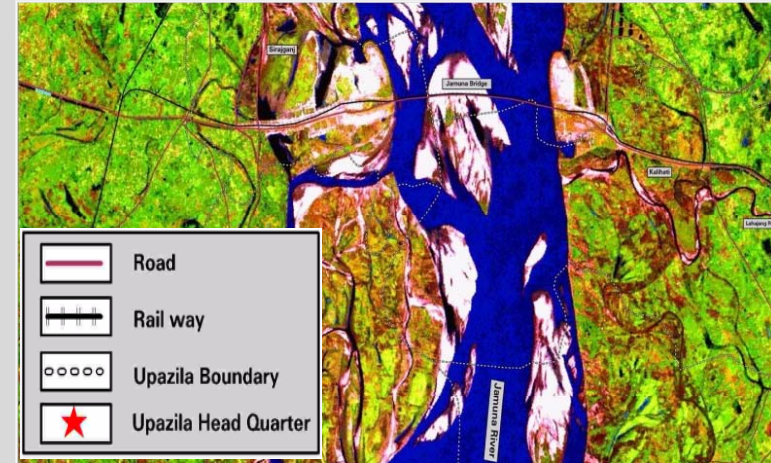
Crop damage assessment

Support to development planning

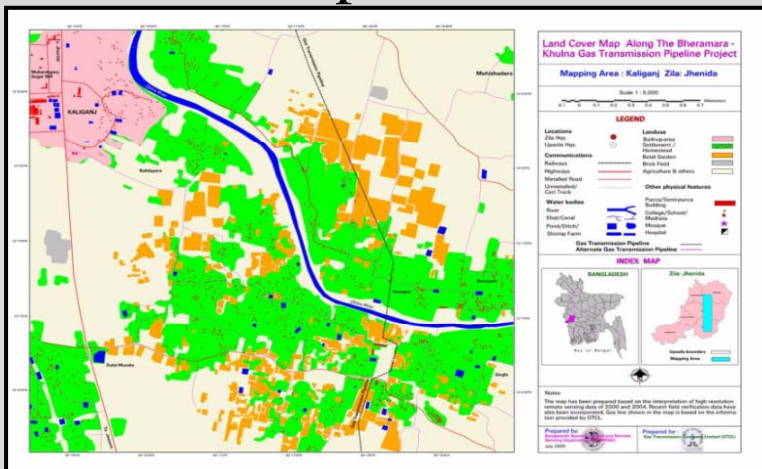
Digital database



Jamuna bridge site selection map



Map for Gas Transmission Pipeline



Monitoring of Coastal Afforestation



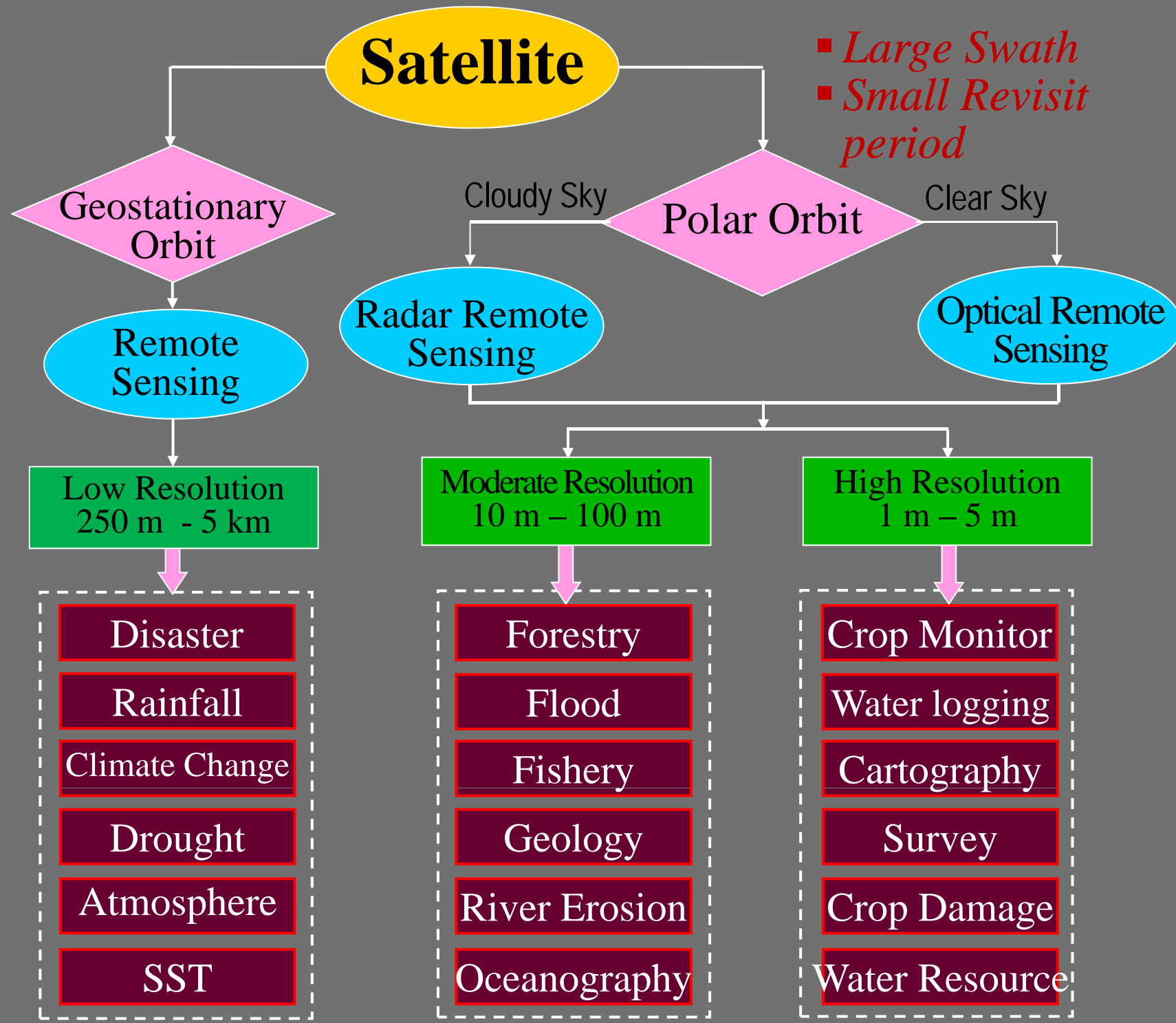
Geoinformation Management

Important phases of geoinformation management:

- Geospatial data acquisition & processing
- Analysis & retrieval of geoinformation
- Construction of geospatial database
- Dissemination of geoinformation

Proper coordination is to be ensured between different phases of geoinformation flow.

Generalized Satellite Data Requirements in Bangladesh



Strategy of SPARRSO Towards Operationalization

1. Experimental approach to optimize satellite data requirements for a particular application with satellite data of different technical specification (varying spatial & temporal resolution, spatial overages, revisit period, optical and microwave).

2. Application of GIS-based thematic information layer to supplement & facilitate the analysis enhancing the information content while reducing the requirement of number of satellite data.

3. Satellite data application considering the following:

- Capturing information on spatially dynamic surface process/feature using limited number of high spatial resolution satellite data
- Capturing information on temporally dynamic surface process/feature using larger number of multi-date moderate spatial resolution satellite data.

Strategy Towards Operationalization

Functional Working Group (WG)

1. Theme-specific collaboration is under development forming working groups with relevant organizations at national & international levels involving RS technologists and field level officers-workers & stakeholders.
2. Hybrid approach involving space-based technology coupled with utilization of the existing conventional facilities and potentialities to be integrated to device a hybrid type operational mechanism.
3. Creation of awareness among the general people on climate change, precautionary measures during disasters contributed by local administration of the government, NGOs & other volunteer organizations etc..

Algorithm and satellite data requirements

- 1) Standardized operational framework for each of the major disaster events have to be developed & utilized to ensure quality.
- 2) Satellite data is one of the major ingredients in conducting activities in any particular geodiscipline. Satellite data of appropriate technical specification including optical & microwave data of moderate to high spatial resolution, with revisit period of 3-5 days seems to be appropriate.

Conclusions

1. Threats of climate change, global warming, increased disasters, fluctuating crop productivity affecting food security & various geo-environmental issues iterate the necessity of space-based technology in this region & urgency for a system like WINDS.
2. Availability of microwave & high resolution optical satellite data to be ensured in case of necessity.
3. Generalized RS-GIS-GPS operational frameworks to be developed under Sentinel Asia program for major types of disaster in this region with possible quality control approach through generalized validation and accuracy assessment procedures.
4. WINDS program appears to be useful and effective. Thus WINDS operation and services should be continued in future.

THANK YOU