Space and Water: Benefitting Agriculture in India

Presentation by Indian Delegation to 54th Session of UNCOPUOS

June 09, 2011 - Vienna
• Space programme in India
• Current constellation of EO satellites
• Space for Irrigation water management
• A few Applications
  – Irrigation Potential Assessment
  – Command area development
  – Salinity and waterlogging assessment
  – Reservoir sedimentation assessment
  – Watershed Development
  – Accelerated Irrigation Benefit Programme
  – Snow-melt run-off assessment
  – Agricultural drought assessment
  – Water Resources Information System
  – High resolution imaging application
Space Programme in India

- Self reliance in space transportation, spacecraft operations
- Successful demonstration of space technology Applications
- Strong Institutional Mechanism to sustain the activities
- Steadfast International relations
Earth Observation Assets of India

22.10.2001
TES
Step & Stare PAN

17.10.2003
RESOURCESAT-1
LISS 3 & 4; AWiFS

05.05.2005
CARTOSAT-1
PAN, F/A

10.01.2007
CARTOSAT-2
PAN

28.04.2008
CARTOSAT-2A
PAN

28.04.2008
IMS-1
HySI; Mx

20.04.2009
RISAT-2
X-band SAR

23.09.2009
OCEANSAT-2
OCM, SCAT; ROSA

12.07.2010
CARTOSAT-2B
PAN

20.04.2011
RESOURCESAT-2
LISS 3 & 4; AWiFS
Space based inputs for Irrigation Water Management

Need

• To improve the overall project efficiency
• To reduce the gap between potential, created & utilised
• To maximise the production
• To prevent land degradation

Space technology helps in

• Base line information for planning of new irrigation / water resources projects
• Modernisation and rehabilitation of irrigation schemes
• Performance evaluation of irrigation command Areas
Command Area Surveys: Irrigation Planning

Thematic maps on land use / land cover and soils for land irrigability assessment & their integration for:

- Alignment of distributaries-design of canal network
- Identification of irrigable areas under each of the proposed distributaries
- Designing suitable cropping pattern
- Fixing design discharges at head of the distributaries
Assessing Salinity & Waterlogging

Under Major and Medium Irrigation Commands

Salt Affected Areas

10345.41 sq. km

1701 irrigation commands (429 major and 1272 medium)

Waterlogged Areas

17192.79 sq. km
Reservoir Siltation
Assessment of Available Storage

Advantages

• Rapid silting and loss of storage results in reduction of economic life of reservoir
• Annual siltation rate of Indian reservoirs is ~2 times the designed rate
• RS Technique complements the conventional Hydrographic survey - cost & time effective.

Satellite data provide elevation contour areas directly in the form of water spread areas

Reduction in reservoir Water spread at a specified elevation over a period of time is indicative of sediment deposition

Capacity loss of 1101.773 M Cu.m (34.74%) during 1970 to 2002

Sri Ram Sagar Reservoir

Capacity (M.cu.m) against Elevation (m)
Monitoring & Evaluation of developmental activity in 77 sub-watersheds in 5 districts of Karnataka – Sujala Project

- Watershed prioritization & Development using EO inputs
- Concurrent Monitoring & Mid-course correction of Implementation
- Social & Environmental Impact Assessment
- Improving the quality of life
- Conferred Globe Sustainability Research Award 2010 by the Globe Forum

Monitoring Land use Changes

Increase in Cropping Intensity

Participatory Land and Water Resources Management

Road
Parcel
Water
Drain
Soil
LU/LC

Participatory Implementation

Farm Pond

Watershed Community

Nala bund

Outcome
Assessment of Irrigation Potential Created

Accelerated Irrigation Benefit Program (AIBP)

- Identification of all the canals up to minor level & irrigation & cross drainage structures
- Measurement of lengths and off take chainages
- Capturing the Status of each canal
- Irrigation Potential Creation assessment

Cartosat-1 images showing the Incomplete canal & Pending canals

Jalgaon Minor-2 of Jalgaon Distributary on Parsoda Branch Canal is Incomplete
Snowmelt runoff forecasting in Sutlej basin

AVHRR image of 31 Mar 2009 (snow in blue)

AWiFS image of 07 Sep 2004 with gauge stations

Variation of 3 Months inflows into Bhakra

Forecast Results
Sutlej basin

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National Agricultural Drought Assessment & Monitoring System

No. of districts under drought in 2010

- June: 10 dist
- July: 52 dist
- Aug: 141 dist
- Sep: 109 dist
- Oct: 104 dist

Rainfall deviations

Sowing progress

Integration with ground data

District/ Sub-District Level Drought Monitoring

Normal
Mild Drought
Moderate Drought
Severe Drought
India-WRIS a ‘Single Window solution’ for all water resources data and information in a standardized national GIS framework.

It consists of 12 Major Information systems, 30 sub-information systems, 101 layers with +4000 attributes.
Irrigation - High Resolution Data Applications

- Expanding Irrigation - High Resolution Data Applications
- Assisting New Creation - Inter Linking of Rivers (ILR)
- Enhancing utilisation: Water Use Efficiency (Command Area Development & Water Management)
- Pacing up the Creation (Accelerated Irrigation Benefit Programme)
- Recouping unutilized (National Project for Repair, Renovation and Restoration of tanks)
Thank you for your Kind Attention