CAPACITY DEVELOPMENT IN SPACE TECHNOLOGIES AND APPLICATIONS:
A SYNOPSIS OF THE SRI LANKAN ROADMAP

by
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Space Technologies in National Development:
The Sri Lankan Road Map

Three strategic elements
• National Hub for Receiving and Redistribution of Earth Observation Data
• Nano-satellite Programme
• Domain Specific Collaborative Research on Space Technology Applications

Undertaken in parallel with institutional capacity building of the ACCIMT- the implementing agency, and other stakeholder organizations
National Capacity Development in Space Technology Applications: Nano-satellite Development Program

Key National project planned by the ACCIMT aiming national capacity development in Space Technology Applications,

Development of system engineering capabilities including integration of different competences of institutions and Universities

Initial project planning has already been initiated

Nanosatellite Project: Initial 3u CubeSat

3U Cubesat
(300mm × 100mm × 100mm)

Systems Engineering Model
Flight Model
UNESCAP – Sri Lanka Pilot project on Applications of Space Technologies for Agricultural Drought Monitoring & Early Warning
2016 NDVI

AWiFS

January Feb March May

June July August Sep

Historical Drought Records

Disinventor Data Base

Province
District
District Secretariats Division
Date (YMD)
Cause
Deaths
Injured
Missing
Houses Destroyed
Houses Damaged
Victims Affected
## Disaster Records MODIS_VCI

<table>
<thead>
<tr>
<th>Event</th>
<th>District</th>
<th>DS Division</th>
<th>Date (YMD)</th>
<th>Month</th>
<th>Value</th>
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</table>
Agriculture Drought monitoring and early warning (ACCIMT / UNESCAP pilot project)

» Process and analyze MODIS data, generate monthly Drought severity maps & Circulated to Stakeholder Agencies.
» Represent time series Drought Severity, Graphically for the Yala and Maha Season for every District/ Agro ecological zone
» Awareness program for Science and Technology Officers to check the feasibility of Field data collection for Validate the Drought Mechanism.

Other Existing and Potential Applications (by the Members of the Inter-Agency Forum of Users) of the Geographical Information Systems and Remote Sensing Applications
1. Agriculture and Food Security

**Present Situation**

Department of Agrarian Development - Sri Lanka

- Location Intelligence for Sustainable development in agricultural lands
- Agrarian databases on Agriculture Related Natural Resource Management in Sri Lanka

Ministry of fisheries & aquatic resources development

- Observe sea erosion which can inflicted severe damages to fishing craft and impeded fishing activities
- Remove moss, floating fern and salvinia in reservoirs

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- Space technology based agricultural drought monitoring and early warning

Irrigation Department – Sri Lanka

- Producing land use plans for the initial feasibility investigations, detailed economic appraisal, selection of lands for irrigation, selection of suitable crop patterns, calculation of irrigation requirements, decisions regarding lay out, settlement plans etc...
- Mapping existing land use, Soil survey and land Classification
- Preparation of soil and land use maps of existing major and medium irrigation schemes for the crop diversification program.
Potential Applications

- Agriculture and Food security
- Crop health analysis
- Compliance mapping
- Identification of pest and disease infestation
- Accurately estimate agricultural production and crop damages
- Use of crop zoning and land use planning to optimize land use and land conservation
- Pasture or grazing area monitoring for livestock management

2. Urban planning and development

Present Situations

Urban Development Authority

- Mapping Distribution Pattern of the Undeserved Settlements
- Identified suitable locations for housing projects
- Location selections for mega development projects
Potential Applications

- Spatial planning
- Traffic Management
- 3D modelling of cities and assessing physical transformation of cities
- Study of transportation systems and important aspects both in static and dynamic mode
- Slum detection, monitoring and updating

3. Land and Eco System Management

Present Situations

National Physical Planning Department

- Planning –Integration of National Physical plan and sectoral plans with regional development plans, in order to achieve sustainable development.
- Identify and inventoried all reservations of water bodies (springs, tanks, reservoirs, lakes lagoons, estuaries, rivers and other water bodies, etc), and buffer zones maintained by these State Agencies.
- Delineate Sacred Area Plans and Township development Plan
Ministry of Mahaweli Development and Environment

- For Sustainable environmental and sustainable development projects
- For Environmental Assessment and Management Framework - giving details of potential environmental issues and guidelines on what type of environmental assessment tools to be applied for various sub-project activities

Potential Applications

- Land cover mapping
- Soil fauna monitoring
- Wetlands monitoring and management
- Wildlife tracking
- Biodiversity monitoring and management
- Forest change detection mapping
4. Ocean Resource Management

Present Situations

Coast Conservation and Coastal Resource Management Department

• Coastal water quality monitoring program to identify the locations of beaches where it is suitable for bathing, recreational monitoring program to identify the locations of beaches where it is suitable for bathing, recreational activities, fishing and other beach related activities and mitigate the impacts for coastal habitat.

• To develop “Coastal Hazard Maps” for four hazards namely Tsunami, Storm Surges, Coastal Erosion and Sea Level Rise

• Off-shore sand mining & beach nourishment to protect coastal lands, infrastructure, dwelling units, properties & livelihood from acute sea erosion

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Mapping Mangrove Species Using Hyperspectral Remote Sensing in Koggala lagoon

National Aquatic Resources Research and Development Agency (NARA)

• Water Quality in the Puttalam- Dutch Canal-Mundel Estuarine System

• Shoreline configuration and process the information collected in order to create organized databases capable of feeding the production of thematic maps, nautical charts and other types of documentation
Potential Applications

To detect
• Oil Spill Events
• Chemical Spills
• Ship Accidents

• Mapping marine resources
• Coral reef monitoring and management
• Detect ocean sedimentation
• Salinity observation

5. Disaster Risk Management

Present Situations

Disaster Management Centre (DMC)

• Mapping of areas inundated by actual floods
• Simulation of Hazard Scenarios
• Preparation of 1:50000 scale hazard zonation maps
• Spatial resolution of modelling
• Assessing coastal erosion
Potential Applications

- Response planning
- Damage and needs assessment
- Disaster scenario modelling
- Provide accurate information on exact location of an emergency situation
- Hazard mapping for infrastructure planning

6. Health Education and Social Services

Present Situation

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Geographic Information Systems for niche modelling of infectious diseases using remotely sensed environmental factors

Study is conducted to model the Dengue Fever using the aspects of human-mosquito-virus interrelationship triangle which are demographic, ecological, entomological, climatic, and social.
Potential Applications

• Mapping the trend of the disease transmission
• Geographical distributions of disease prevalence
• The spatial modelling of environmental aspects of disease occurrences
• Epidemic Surveillance
• Identifying health inequalities
• Modelling health services

Challenges

• Affordable and accessible data and analytical tools are expensive
• Mostly research projects have been carried out on relatively limited resources
• Tradeoff between spatial and temporal resolution
• Limited interconnected between geospatial community with other communities
• Data sharing difficulties
• expensive software's and limitation of technical people
• Funding issues
National Capacity Development in Space Technology Applications

Unmanned Aerial Vehicle (UAV) for aerial imaging applications in areas of Agriculture, irrigation, urban planning, forestry and archeology etc.

National Capacity Development in Space Technology Applications

- **Establishment of Spectro-Radiometry Laboratory and a spectral signature bank**
  - A research project initiated to develop a spectral signature library (bank) for identifying spectral signatures for our home-grown crops, in particularly paddy, using a spectroradiometer.
International Cooperation

- UNESCAP RESAP
- CSSTEAP
- UNOOSA
- APRSAF
- HIST

Bilateral/Inter-agency
- ISRO (India)
- SSAU (Russia)
- RADI (China)

International Cooperation

- Interventions
  - Postgraduate Training
  - Short term specialized training for experts
  - Expert Missions
  - Collaborative Research
  - Technical Assistance
Thank You!