

THE BIG STORY: AGRICULTURE

The Geo-Green Revolution | P. 28

REGIONAL FOCUS

LatAm Calling | P. 64

YOUR GEOSPATIAL INDUSTRY MAGAZINE

GEOSPATIAL WORLD™

Price: INR 150 / US\$ 15 Subscriber's copy, Not for Sale



www.geospatialworld.net

SEPTEMBER 2013 » VOL 04» ISSUE 2 | ISSN 2277-3134

R.N.I No - UPENG/2010/34153; Registration no: UP/GBD-136/2011-13
Publication: 10th of every month | Posting: 15th / 20th of every month

TRIMBLE Transforming the World

A GPS company until 1999, Trimble dared to re-define itself, pursued a much wider range of technologies to cater to chosen vertical markets and over a period of just 14 years became agnostic relative to technology, all the while being central to the change it wanted to see in global geospatial industry P. 22

GET **CONNECTED**

Mobile Geospatial Solutions for a Smarter City

Intergraph® Mobile Alert simplifies reporting for citizens. Cities benefit by enlisting the masses to help define and pinpoint issues, such as road or utility line damage.

Intergraph Mobile MapWorks is a practical tool for local governments. Easy to configure, this app enables you to directly see, edit, validate, and update your enterprise GIS data from the field in real-time.

With Intergraph's mobile offerings, you're fully equipped to make smarter decisions.

GEOSPATIAL.INTERGRAPH.COM/MOBILE



© 2013 Intergraph Corporation. All rights reserved. Intergraph is part of **Hexagon**. Intergraph and the Intergraph logo are registered trademarks of Intergraph Corporation or its subsidiaries in the United States and in other countries.





CLICK!
hexagon.com/geospatial



TWEET!
[@HexGeospatial](https://twitter.com/HexGeospatial)

Leica Pegasus:One Complete Mobile Mapping Solution



- **Asset Management**
- **Planning Verification**
- **Compliance Management**

Capturing at Vehicle Speed

– when it has to be right.



Leica Geosystems AG
Heerbrugg, Switzerland

For more information visit
www.leica-geosystems.com

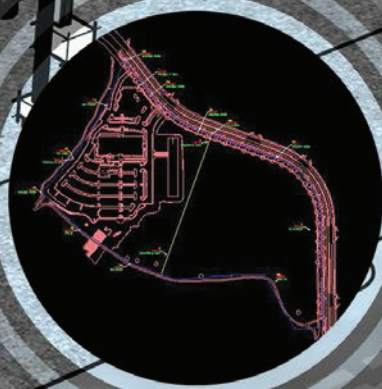
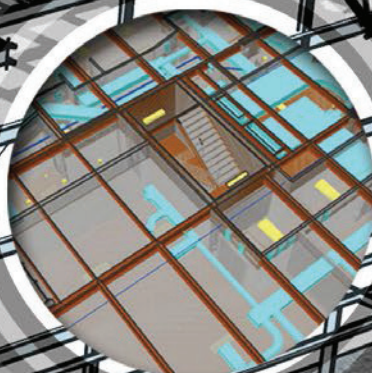
– when it has to be **right**

Leica
Geosystems



REALIZE A NEW MODEL OF PRODUCTIVITY

No matter what business you are in, chances are that geospatial innovations are changing your industry. Trimble helps leading organizations incorporate the power of spatial information into their operations, dramatically improving productivity and transforming workflows. With a broad ecosystem of integrated solutions for positioning, imaging, measurement, modeling and analysis, Trimble can help your business realize a new model of productivity.



**Informed decisions
produce better results.**

www.trimble.com

© 2013, Trimble Navigation Limited. All rights reserved. Trimble and the Globe & Triangle logo is a trademark of Trimble Navigation Limited, registered in the United States and in other countries. All other trademarks are the property of their respective owners.

The Big Story: Agriculture

28 The Geo Green Revolution
Mark Noort & Anand Kashyap

Articles

38 G-tech key for a Common Agriculture Policy, *Philippe Loudjani*

42 RS technology for crop insurance, *Dr Joachim Herbold*

48 UAS to monitor crop health status, *Tamme Van Der Wal*

50 Brazil: GIS for sustainable agriculture, *Mateus Batistella*

Case Studies

52 Smart ICT for weather information

54 Geospatial tools for rainfed agriculture

56 Profiling agricultural activities through GIS

58 GIS field survey for agri planning

60 Monitoring agricultural lands via remote sensing

62 Optimising sugarcane crops with precision agriculture

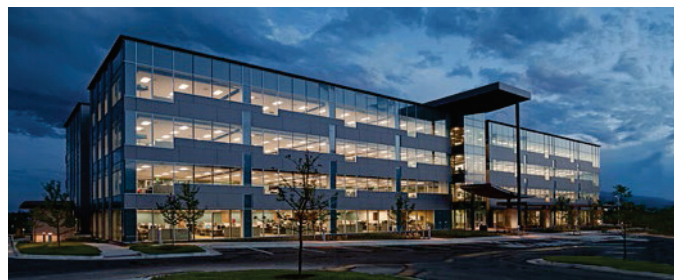
Interview

46 Dr Hanns-Christoph Eiden, President, BLE, Germany



Cover Story

22 Trimble: Transforming the world, *Bhanu Rekha*



Corner Office

18 Bert Turner, *Senior Vice President, Sales, DigitalGlobe*

Special Focus: Latin America

64 LatAm calling, *Renata Dias Rodrigues*

07 Editorial

08 News

16 Product Watch

72 OGC Column

74 Events

Disclaimer

Geospatial World does not necessarily subscribe to the views expressed in the publication. All views expressed in this issue are those of the contributors. Geospatial World is not responsible for any loss to anyone due to the information provided.

Owner, Publisher & Printer Sanjay Kumar
Printed at M. P. Printers B - 220, Phase-II, Noida - 201 301, Gautam Budh Nagar (UP) India
Publication Address A - 92, Sector - 52, Gautam Budh Nagar, Noida, India
The edition contains 76 pages including cover

Geospatial World
Geospatial Media and Communications Pvt. Ltd. (formerly GIS Development Pvt. Ltd.)
A - 145, Sector - 63, Noida, India
Tel + 91-120-4612500 Fax +91-120-4612555 / 666
Price: INR 150/US\$ 15

Advisory Board



Aida Opoku Mensah
Special Advisor, Post 2015 Development Agenda, UN Economic Commission for Africa



Barbara Ryan
Secretariat Director, Group on Earth Observations



Bryn Fosburgh
Sector Vice-President, Executive Committee Member, Trimble Navigation



Dawn J. Wright
Chief Scientist, Esri



Derek Clarke
Chief Director-Survey and Mapping & National Geospatial Information, Rural Development & Land Reform, South Africa



Dorine Burmanje
Chair-Executive Board, Cadastre, Land Registry and Mapping Agency (Kadaster), The Netherlands



Greg Bentley
CEO, Bentley Systems



Dr. Hiroshi Murakami
Director-General of Planning Department, Geospatial Information Authority of Japan



Prof. Ian Dowman
First Vice President, ISPRS



Prof. Josef Strobl
Chair, Department of Geoinformatics, University of Salzburg, Austria



Juergen Dold
President Hexagon Geosystems



Kamal K Singh
Chairman and CEO, Rolta Group



Lisa Campbell
Vice President, Engineering & Infrastructure, Autodesk



Mark Reichardt
President and CEO, Open Geospatial Consortium



Matthew O'Connell
CEO, Adhoc Holdings



Mohd Al Rajhi
Asst Deputy Minister for Land & Surveying, Ministry of Municipal & Rural Affairs, Saudi Arabia



Ramon Pastor
Vice-President and General Manager, Large Format Printing Business, Hewlett-Packard



Stephen Lawler
Chief Technology Officer, Bing Maps, Microsoft



Dr Swarna Subba Rao
Surveyor General of India



Vanessa Lawrence
Director General and Chief Executive, Ordnance Survey, UK

CHAIRMAN

M P Narayanan

Publisher

Sanjay Kumar

PUBLICATIONS TEAM

Managing Editor

Prof. Arup Dasgupta

Editor — Building & Energy

Geoff Zeiss

Editor — Agriculture

Mark Noort

Editor — Latin America (Honorary)

Tania Maria Sausen

Editor — Geospatial World Weekly

Dr. Hrishikesh Samant

Executive Editor

Bhanu Rekha

Deputy Executive Editor

Anusuya Datta

Product Manager

Harsha Vardhan Madiraju

Sub-Editor

Ridhima Kumar

Graphic Designer

Debjyoti Mukherjee

Circulation Manager

Amit Shahi

Geospatial tools for rainfed agriculture

India's Central Research Institute for Dryland Agriculture uses geospatial data and tools to identify and establish trends to promote rainfed agriculture

India is a vast country with total geographical area of 328 million hectares (Mha) and a net sown area of 142 Mha. Out of this, over 85 Mha is under rainfed cultivation which is the domain of Central Research Institute for Dryland Agriculture (CRIDA), a constituent of ICAR, Ministry of Agriculture, Government of India. The government has assigned top priority for developing rainfed agriculture under the XII Five Year Plan through the use of biotechnology and declaring a National Mission on Sustainable Agriculture.

CRIDA has research programmes to address various issues, including soil and water conservation through watershed development projects, water harvesting structures, study of agro-climatic situation, development of crops to withstand drought and shorter length of growing windows, soil fertility improvement, increasing carbon sequestration, increasing biomass availability for incorporation in soils, pest management and a host of others. Geospatial tools are used in a host of these research programmes.

Watershed-based development

The Watershed Development Programme is a major strategy for soil and water conservation in rainfed regions and is implemented across major agro-climatic or agro-ecological regions in the country. Changes in land use and

land cover cause degradation, which requires restoration through interventions. Geospatial tools help in carrying out these tasks through land-use planning based on land capability and suitability, watershed-based development, soil and water conservation, locating water harvesting structures and farm ponds to improve water supply for rainfed agriculture, use of vegetation index to study crop condition, plant vigour, pest and diseases, soil fertility status, yield estimation etc, in addition to climate change studies and modelling.

Watershed-based development is critical for the fragile rainfed agro-ecosystems and hence a number of projects have been implemented since 1980s. During the XI Five Year Plan (2002-2007), it was felt that the guidelines for implementation of watershed projects required to be revised. This prompted a geomatics-based research study to develop methodology for assessing sustainability of watershed projects in rainfed agro-ecological-subregions in India. The CRIDA project undertook to develop a procedure for monitoring and evaluation of watershed projects using sustainability indicators to be measured by geospatial tools. Eight treated and untreated watersheds in Rangareddy and Nalgonda districts in the state of Andhra Pradesh were selected for monitoring and evaluation. While the usage of GIS, satellite data and GPS are routine features in



delineation of watersheds and their development, their use for carrying out an objective post-facto monitoring and evaluation by a third-party after exit by a project implementing agency was new.

The study helped to identify 12 critical indicators for sustainable development of watershed projects. Spatial evaluation of the watershed projects indicated that in the selected districts, sustainable agriculture was being practised on 29-43% of the land in treated micro-watersheds. Rainfed agriculture in the untreated watersheds was found to be lagging, underlining the utility of watershed projects. Use of geomatics helped in developing an objective evaluation procedure in addition to measuring 'sustainability'.

Effects of climate change

Sustainability of rainfed agriculture is threatened by climate change. ICAR carried out a study for assessing agricultural vulnerability at the agro-eco-sub-region and district level in the country using a vegetation index. An analysis of the Normalized Difference Vegetation Index (NDVI) time-series data showed variations, indicating the impact of climate change on vegetation growth and vigour. Vulnerable districts were identified for developing climate-resilient technologies. Variations in NDVI were correlated to standard precipitation index instead of the actual daily rainfall to study the impact of extreme weather events like drought, flood, heat and cold waves, cyclone, untimely rain, etc.

National Agricultural Statistics pertaining to agricultural production, yield and net sown area were analysed to corroborate results obtained from study of NDVI variations. All these information helped to identify agriculturally vulnerable regions in rainfed areas. It was found that over 92.98 Mha area in India experienced decreasing trend in NDVI while there was no change on 25.2 Mha. An increasing trend of NDVI was recorded

on 183.96 Mha. Geographically decreasing trends in NDVI was noticed in the Western Ghats, Orissa and Chattisgarh regions of the country, the Northeast states and in lower Himalayas in Himachal Pradesh and southern Kashmir.

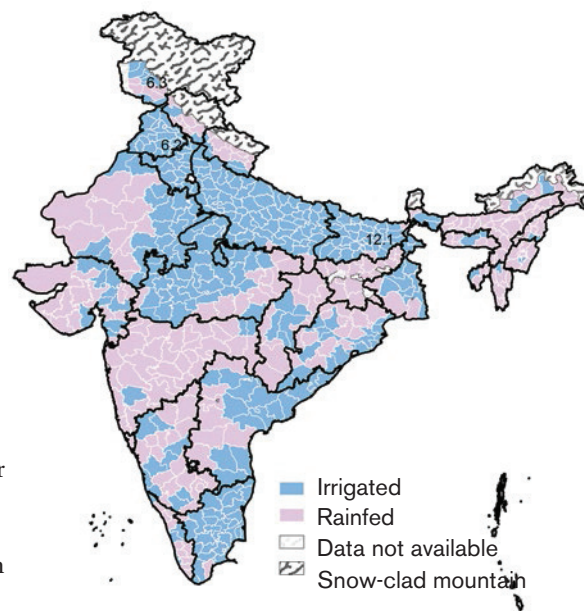
Overall there was an improvement in vegetation cover in the country. In 56 districts covering 30.93 Mha, a decrease in vegetative cover was registered, while in 41 districts with 22.25 Mha, there was no perceptible change in NDVI. In 457 districts accounting for over 249 Mha, a positive trend in NDVI was registered. An analysis of the Standard Precipitation Index indicated that while the regions of Deccan, West Bengal, Bihar, parts of northeast states, western Rajasthan and western J&K were receiving more rainfall, large parts such as the Indo-Gangetic Plain and Arunachal Pradesh were receiving less than normal precipitation.

Conclusion

Geospatial data and tools were fundamental in the above studies and helped identify and establish certain trends for the benefit of rainfed agriculture in India. At present, commercial software like ArcGIS and ERDAS Imagine are being used while an increasing need is being felt for the use of open-source GIS software and improved access to global and national datasets. While the National Remote Sensing Centre under ISRO is committed to supply free archived data, there is a need to develop tailored data like the GIMMS and MODIS datasets for public use in the country. 🌐

Dr Kausalya Ramachandran, Principal Scientist & ICAR National Fellow, CRIDA- ICAR, kausalya@crida.in

Irrigated & Rainfed Districts In India



Source: Dept of Stat & DoA (Gol 2001-2007)