

ALUMNI MAGAZINE
FACULTY OF GEO-INFORMATION SCIENCE
AND EARTH OBSERVATION
UNIVERSITY OF TWENTE

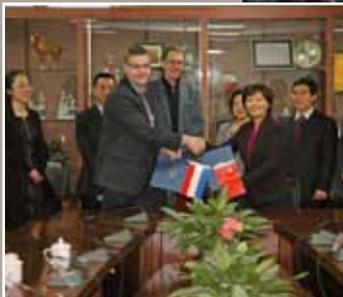
ITC NEWS

SPECIAL FEATURE
HEALTH

SEMA IN TANZANIA



CONVENTION ON CLIMATE CHANGE



MEMORANDUM OF UNDERSTANDING



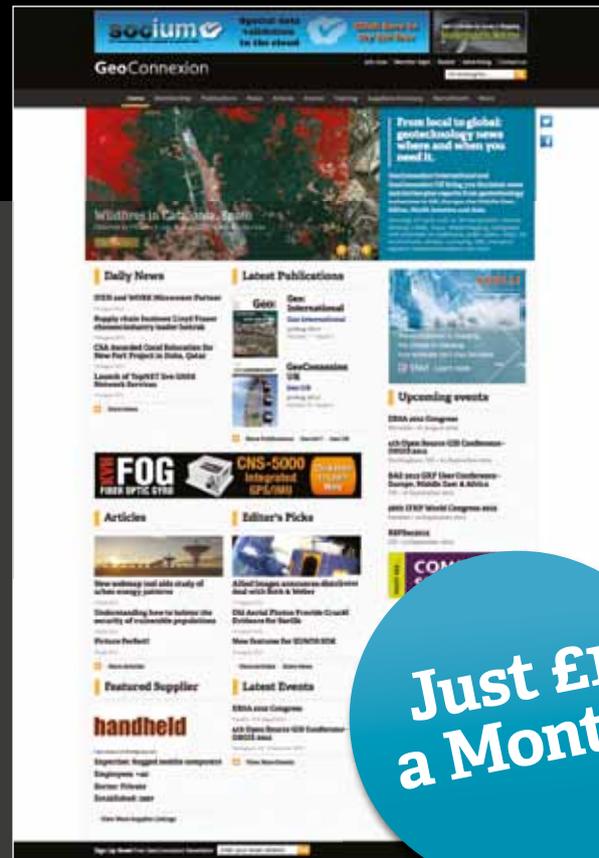
GREETINGS FROM KENYA



New website, latest offers, start saving...

Subscribe and stay ahead of the game!

The content that you can trust



Print and Online Combined Pack

Never miss news as it happens

Join and enjoy access to:

- ✓ Your own printed copy of GeoConnexion International and GeoConnexion UK magazines – 10 issues a year
- ✓ Privileged access to online news, comment and features sections
- ✓ Unlimited access to archive of news, articles, latest recruitments and training
- ✓ Benefit from exclusive events and special offers on industry reports
- ✓ Monthly e-Newsletter, packed with latest news and what's on in the regions

Online Pack

News at your finger tips

Join and enjoy access to:

- ✓ Privileged access to online news, comment and features sections
- ✓ Unlimited access to archive of news, articles, latest recruitments and training
- ✓ Benefit from exclusive events and special offers on industry reports
- ✓ Monthly e-Newsletter, packed with latest news and what's on in the regions

info@geoconnexion.com

geoconnexion.com



3



6



14



22



24



cover

Content

■ MAIN FEATURES

- 3 ITC at United Nations Framework Convention on Climate Change
- 6 Earth Observation for Rice Crop Monitoring

■ SPECIAL FEATURE: HEALTH

- 8 EO2HEAVEN Project
- 10 High Tech Human Touch: Air Pollution and the Healthy City
- 11 Agent-Based Modelling of Cholera Diffusion in Ghana
- 12 Sensors, Empowerment and Accountability in Tanzania (SEMA)
- 13 Putting Health on the Map: Addressing Public Health Challenges Using Spatial Data and Geo-information Tools

■ EDUCATION NEWS

- 14 Tailor-made Training: Climate Change and Food Security in Indonesia
- 15 Building Capacity for Sustainable Urban Management at Thimphu Municipality in Bhutan

■ ANNOUNCEMENTS

- 18 ITC and Beijing Normal University Sign MoU
- 19 Towards Entrepreneurial Skills in ITC Curricula

■ VISITS

- 20 Directorate Visit to China

21 GREETINGS FROM...

■ LIFE AFTER ITC

- 22 Light Detection And Ranging (LiDAR) Monitors Forests from Space
- 23 ITC Alumni Reception in Beijing
- 24 Moving Ahead: ITC Alumni Association Bangladesh

The research project SEMA focuses on how ordinary citizens in Tanzania can directly exact accountability from public health and water providers with a human sensor web.



INTRODUCTION

colofon

ITC NEWS is published quarterly by ITC,
Enschede, the Netherlands.

Managing Editor
Janneke Kalf

Editor
Jorien Terlouw

Editing
Janice Collins

Design&PrePress
Composer DTPservice
Henk Scharrenborg

Printing
DeltaHage B.V. Den Haag

Correspondence to
Managing Editor
ITC News
PO Box 217
7500 AE Enschede
The Netherlands
Phone +31 (0)53 487 44 11
Fax +31 (0)53 487 45 54
E-mail itcnews@itc.nl

ISSN
1389 9368

The views expressed by the contributors
do not necessarily reflect those of ITC.

There's a chill economic wind blowing through many parts of the world at the moment but ITC, nothing if not adaptable, is preparing to respond to this challenge. And one way is to foster entrepreneurial skills within its curricula. There's little doubt that such a move would be warmly received and, if you turn to page 19, you can discover how you, the reader, can play a part in realizing this initiative.

Moves are also afoot in the arena of climate change. Pages 3-5 carry a report on the United Nations Framework Convention on Climate Change, where the general discourse is shifting from mitigation to adaptation, and green economy and ecological accounting are in the ascendant. The new landscape concept, which emphasizes the need for more integrated approaches and methodologies, also attracted a good deal of discussion.

A clutch of articles dealing with health issues forms a sizeable part of ITC News 2013-1. And the aspects covered are wide-ranging indeed: from air pollution (page 10), agent-based modelling of cholera diffusion in Ghana (page 11), and the effective use of spatial data and geo-information tools to address a variety of public health challenges (page 8), to a research programme where ordinary citizens form a human sensor web, reporting problems experienced with their healthcare service. Both new and traditional media are used, particularly the ubiquitous mobile telephone. Having just celebrated its 40th birthday, you can certainly say it has come of age!

When it comes to good health, among the foremost requirements is adequate food. Rice is one of the three leading food crops in the world, and the research reported on page 6 investigates the potential of earth observation for rice crop modelling in the Mekong delta. The thesis substantiating the value of the new techniques explored earned a PhD degree in January this year, so the term cutting-edge springs to mind.

Yet a further ingredient that stimulates a healthy mind in a healthy body is of course rest and relaxation. So perhaps it is now time to sit back and do a spot of armchair travelling, allowing this issue to open doors to events in China, Bangladesh, Indonesia, Kenya, Bhutan and elsewhere. No passport or visa required ... and no packing!

Virtually yours,

Janneke Kalf
Managing Editor

Jorien Terlouw
Editor

MAIN FEATURES

ITC at United Nations Framework Convention on Climate Change

Michael McCall

m.k.mccall@utwente.nl

The UNFCCC (United Nations Framework Convention on Climate Change) COP 18/CMP 8 meeting took place in Doha, Qatar, from 29 November to 5 December 2012. Dr Michael McCall, two PhD students, Alejandra Larrazabal and Janik Granados, and post-doc Dr Arturo Balderas of ITC's Department of Urban and Regional Planning and Geo-Information Management (PGM) attended the meeting.

They represented the University of Twente – National University of Mexico WOTRO three-year research project WOTRO-MEX. This research project, entitled “Linking Local Action to International Climate Agreements in the Tropical Dry Forests of Mexico”, focuses on the application and applicability of REDD+ (reduced emission from deforestation and forest degradation) at local level. Professors Yola Georgiadou and Anne van der Veen of PGM are also members, and the principal investigator is Margaret Skutsch of CSTM-UT and UNAM.

UNFCCC meetings are big – in this case 8000 to 10,000 participants, including ministers, presidents, high-level government representatives, technical scientific staff from ministries of environment, forestry and foreign affairs, hundreds of NGOs and academic groups like ourselves, and numerous journalists. The “outer circle” – to which we scientists belong – does not take part in the high-level discussions, but there are numerous fringe meetings, presentations and press conferences, as well as many opportunities to lobby national delegates on various issues. And



Left to right: Michael McCall (ITC/UNAM), Resham Dangl (REDD Forestry and Climate Change Cell, Nepal), Bhaskar Singh Karky (ICIMOD and PhD UT 2010), Tek Maraseni (University of Southern Queensland), Vijay Rawat (Indian Council of Forestry Research and Education), Margaret Skutsch (UT/UNAM) and Arturo Balderas

for the WOTRO-MEX team this means lobbying on REDD+ issues, emphasizing tropical dry forests (not only the iconic Amazonian jungle) and the impacts and complexity of drivers of degradation (not only deforestation), and arguing the importance of local community management, mapping and measurement of biomass carbon.

Focus Activities

The team was involved in two focus activities during the UNFCCC meeting. The first was a UNFCCC side event, jointly with ICIMOD, entitled "REDD+ and Poverty Reduction: What is Working and What is Possible?". Moderated by Michael McCall (ITC-UT/UNAM), this event examined the role of REDD+ in poverty alleviation, exploring case studies from India, Nepal and Mexico. McCall noted the differences between poverty alleviation and poverty reduction, specifying that reduction is a general term, while alleviation targets a number of people and not the entire poor population.

Stressing that the REDD+ discussion has been focused mainly on rainforests, Margaret Skutsch (CSTM-UT/UNAM) called for a greater focus on degraded tropical dry forests, which support large populations. REDD+ payments in these areas could be used to reduce forest degradation and enhance forest stocks. Arturo Balderas (ITC-UT) presented the designing of local forest carbon programmes as a mechanism to reduce poverty and strengthen livelihoods.

Other speakers in the side event presented pilot projects and case studies from Nepal on a REDD+ payment system and governance for community forestry, and India's national-level approach to REDD+, climate change policy and forestry management programmes. In discussion, participants considered the enabling conditions to implement REDD+ in non-rainforest areas; how to equitably distribute REDD+ payments to all user groups, including women; and misconceptions about shifting cultivation.

The second WOTRO-MEX activity was a stand at the Forest Day 6 exhibition organized by CIFOR, ICRAF and others, which is the biggest gathering of climate/REDD+ oriented forestry experts globally. Posters were presented by McCall, Larrazabal, Granados, Balderas, Skutsch and other team members. ITC's visible representation at the Forest Day enabled renewed contacts with many researchers, NGOs and potential funding agencies, such as IGES Japan, the Global Canopy Programme and Rainforest Alliance.

Some Thoughts on UNFCCC COP18

Mitigation – Adaptation

The overall discourse is moving from mitigation to adaptation: both wherever possible, but recognizing that we have squandered a decade of opportunities for mitigation, and that now we must ensure adaptation to a 2C or higher global temperature and an array of climatic/meteorological/biological stresses. Similarly, in disaster-risk themes the focus is on vulnerability, not on (reducing) the hazards themselves.

There were calls for bigger and longer-term funding commitments to adaptation (e.g. Norway accepts a "mismatch" of expenditure on mitigation, and a balance towards adaptation support for vulnerable countries, as in food security). Good planning for adaptation means good planning: all planning should respond to actual circumstances – and the current context is climate change and more extreme events. Thus, there is nothing exceptional when it comes to planning for adaptation, although the same moral political issue arises as for mitigation finance: who should pay for it?

Green Economy

Related to adaptation was the frequent discourse on moving towards a green economy (although it could be argued that the green economy is about long-term mitigation). Green economy is strong in Indonesia, for example, where REDD+ finance is seen as an agent towards green economy, not an end in itself, and the Ministry of Finance (not Environment) is responsible for the green economy shift.

"The honeymoon for REDD is over," said CIFOR. "REDD has been a 'good starting point', because it captured the interest of the politicians and elites" (UNEP). Now is the time to leverage it for a green economy and ecological accounting. "REDD+ is not a conservation nor even a forest programme – it is a step towards Green Growth." The elephant in the dining room was the notable lack of discussion on human population growth, and the stresses that this lays on finite resources, not least on land space. Only one stand in the event was devoted to population issues.

Landscape

The new silver bullet is the *landscape* concept and approach. This approach comes out of a very wide consensus that more integrated approaches and methodologies are needed for handling



Manmade Natural Landscape, Mexico (photo M. McCall)



Participatory GIS in Enschede (photo M. McCall)



Participatory GIS Community Landscapes, Mexico (photo M. McCall)



Community tree nursery, Mexico (photo M. McCall)

the individual but interconnected problems of degradation, lower productivity, loss of natural capital and resources, etc., and misplaced funding and projects.

The concept that many agencies have fallen on for this is *landscapes*. Such agencies include CIFOR (who has long used it in a specific way and at geographical scale), GCP, JICA, ODI, the CFP, UNREDD, UNEP, Globe International, and significantly the World Bank. This is seen as a new idea and “high-level politicians/ decision-makers must be persuaded to see that integration is necessary”, which implies integration of forests, agriculture, agroforestry, food, environment, conservation, farming systems, settlements, institutions, policies and programmes.

The actual term *landscape* was not made very clear, beyond being a convenience for saying we need a much more holistic approach. CIFOR, for example, promoted the “evolution of Forest Day into a Landscape Day at future UNFCCC COPs, involving agriculture and rural development stakeholders. This triggers questions: Will forest issues stay visible? Will agriculture issues stay visible? Who will set the agenda?” CIFOR suggests an analytical rather than administrative approach to landscapes, arguing that working at a landscape level does not challenge traditional sectors, but helps to combine their efforts.

More fuzzy and cuddly was the slogan “Living Landscapes and PPP (People, Place and Purpose)” from the CPF Collaborative Partnership on Forests (UNEP, UNDP, CIFOR, ICRAF, FAO, ITTO, World Bank, CBO, GEF, IUCN, etc.).



Community Mapping Forest, Kenya (photo M. McCall)

There were numerous other references to landscape-type concepts during COP 18. Indonesia argued that REDD+ is a whole change in management, “beyond carbon ...”, towards alleviating poverty. Japan reintroduced its *Satoyama* Initiative, aiming to conserve sustainable human-influenced natural environments (socio-ecological production landscapes). Indonesia’s One Map programme, running since November 2012, aims to show all land uses as GIS layers on one map (thus transparency), including indigenous peoples’ claims to land and resources. The CGIAR Climate Change, Agriculture and Food Security programme puts forward definitions of the landscape-scale approach as “larger than a single farm, smaller than a region”, while REDD Indigena has a holistic approach linking water, forests, soil, living things, bio-energy and cosmovisions.

Finally UNEP-UNREDD rediscovered integrated land use planning and the World Bank identified the need for good spatial planning. It is good to see some of ITC’s core principles and practices receiving recognition ■

MORE INFORMATION

UNFCCC (United Nations Framework Convention on Climate Change) COP 18/CMP 8 meeting: http://unfccc.int/meetings/doha_nov_2012/meeting/6815.php

Forest News: a blog by the Center for International Forestry Research (CIFOR): <http://blog.cifor.org/12517/landscapes-for-sustainable-development/>

The mission of the Collaborative Partnership on Forests (CPF) is to promote sustainable management of all types of forests and to strengthen long-term political commitment to this end (www.cpfweb.org/en/).

The *Satoyama* Initiative aims to conserve sustainable human-influenced natural environments (socio-ecological production landscapes and seascapes) through broader global recognition of their value (<http://satoyama-initiative.org/en/>).

REDD Indigena’s holistic approach linking water, forests, soil, living things, bio-energy and cosmovisions: www.forestpeoples.org/sites/fpp/files/publication/2011/03/aidesepreddindigenasp.pdf

Earth Observation for Rice Crop Monitoring

Ha Nguyen

nguyen08492@itc.nl

Rice, along with wheat and maize, is one of the three leading food crops in the world: together they supply more than 50% of all calories consumed by the entire human population. Over 87% of the global rice is produced and consumed in Asia.

Vietnam is the second largest rice exporter, its largest rice-producing region being the Mekong delta. The delta is located in the southernmost part of Vietnam (see figures 1 and 2), covering an area of 39,000 km². The delta is well-known for its rice production, fruits and fisheries owing to its favourable climatic conditions (characterized as savannah type). The major cropping systems practised in the delta's irrigated lowlands are double and triple sequential mono-cropping of rice. The rice produced is mostly exported, providing about 90% of the total annual export revenues of the country. The delta also caters for about 50% of the total domestic rice consumption.

Since there is a high demand for rice crop monitoring in the Mekong delta, this research investigated the potential of using earth observation data for identifying and mapping irrigated rice cropping systems, estimating rice biophysical parameters, and assessing rice yields of the region. The methods and techniques developed and evaluated in this study are based on ISODATA (iterative self-organizing data analysis technique algorithm) and the divergence statistic, the inversion of a vegetation radiative transfer model, and the integration of remote sensing data and a crop growth simulation model.

Utilizing the hyper-temporal SPOT Vegetation NDVI (Normalized Difference Vegetation Index) imagery and the ISODATA clustering algorithm allowed relevant rice-cropping differences in the Mekong delta to be captured. The research found that, in spite of the cloudy conditions of the Mekong delta, ten years of decadal SPOT data contained sufficient valid information to overcome this problem, and were able to produce the rice-cropping pattern map with very high accuracy.

The use of hyper-temporal NDVI data, the ISODATA clustering algorithm and the divergence statistical technique was further investigated in developing a new quantitative method, named LaHMa, to extract land cover heterogeneity. The maps produced from SPOT Vegetation and MODIS NDVI data for the Mekong delta using LaHMa concerned both the spatial and temporal dimensions of the landscape variability. LaHMa can be a useful tool for a landscape analyst, essentially visualizing the complexity of the landscape in question, and indicating the homogeneity of each delineated land cover map unit. The maps produced using LaHMa can serve as valuable sources to guide subsequent studies and sampling methods concerning ecotones.



Dr Ha Nguyen (left) receiving her degree certificate from Prof Eric Smaling

The research also demonstrated the benefit of using the soil-leaf-canopy (SLC) radiative transfer model to estimate the dynamic leaf area index (LAI) for irrigated rice crops. In areas where rice is cultivated extensively, the available MODIS LAI product failed to detect rice LAI evolution with time, whereas the use of the SLC model for dynamic LAI estimation showed promise in overcoming this problem. This was the first study that used SLC on temporal MODIS surface reflectance data to estimate the seasonal variation of LAI for irrigated rice. LAI estimated by inverting the SLC model was much more accurate than the LAI provided by the MOD15A2 product.

Forcing SLC-estimated LAI from MODIS surface reflectance data in the ORYZA2000 crop growth simulation model has shown its great potential for simulating rice yield under sub-optimum conditions, especially when data on nutrient balance and soil characteristics are not available. The use of forcing SLC-estimated LAI allowed ORYZA2000 CGSM state variables to be re-initialized

and rice crop parameters to be recalibrated, which helped ORYZA2000 to explain about 81% of the variation in rice yield in 58 fields across the Mekong delta. This promising approach is recommended for future use to estimate irrigated rice yield at a large scale (such as a region), taking into account the regional variation of the rice cropping calendar and rice varieties that have been captured in the maps presented in our first study.

In summary, this research has proven the value of the new techniques for identifying and mapping both the spatial and temporal heterogeneity of a complex agro-ecosystem that is dominated by rice cultivation. The study also indicates that, by coupling remote-sensing-derived crop parameter LAI with crop growth simulation modelling, highly accurate estimations of rice crop yield and production can be achieved ■

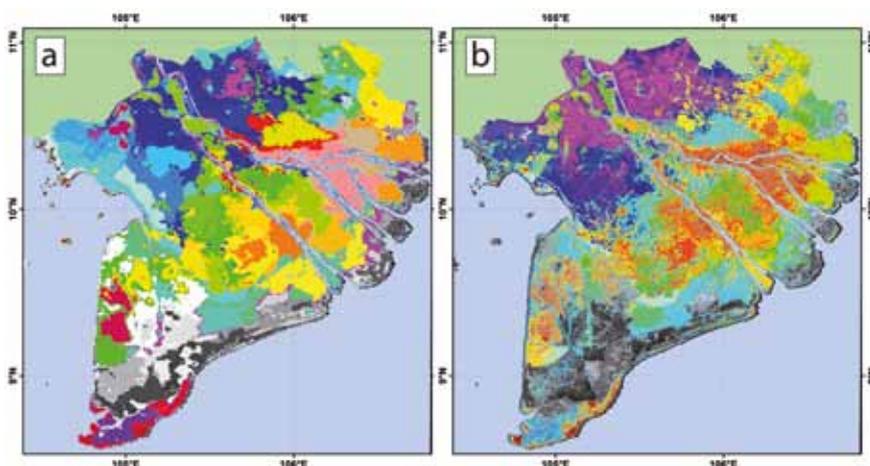
Ms Ha Nguyn successfully defended her thesis on Friday, 25 January 2013, at the University of Twente. The full text of the thesis can be found at: www.itc.nl/library/papers_2013/phd/nguyenha.pdf



On 25 January 2013, ITC PhD student Ha Nguyn successfully defended her PhD thesis



The delta also caters for about 50% of the total domestic rice consumption



Landcover units: (a) SPOT NDVI derived map, (b) MODIS derived map

Special Feature

Health

In the past few years more and more ITC staff members have become active in GIS and Earth Observation activities that relate to the theme 'Health'. Internationally there is a broad interest in health-related subjects for education and research where ITC in collaboration with different partners can make a contribution.

At the moment we have different projects running: From air pollution, modelling of cholera diffusion, and the effective use of spatial data and geo-information tools to address a variety of public health challenges, to programme where ordinary citizens form a human sensor web, reporting problems experienced with their healthcare service. On the following pages you can read all about it.

EO2HEAVEN Project

Rob Lemmens

r.l.g.lemmens@utwente.nl

EO2HEAVEN (Earth observation and environmental modelling for the mitigation of health risk) is a research project co-funded by the European Commission as part of the 7th Framework Programme (FP7) Environment (including climate change) theme. It started on 1 February 2010 and the duration of the project is 3.3 years, with a funding of more than 6 million euros.

EO2HEAVEN contributes to a better understanding of the complex relationships between environmental changes and their impact on human health. The focus of the project is on the development of models to support the analysis of relationships between environmental circumstances and health issues. This is done by deploying a toolbox containing software tools based on an open and standards-based spatial information infrastructure (Klopfer & Simonis, 2013). The work is done in close collaboration with local stakeholders, these being health practitioners, researchers, environmental and health managers, and system administrators.

EO2HEAVEN is active in the following three case studies:

- Environmental effects on allergies and cardiovascular diseases in Dresden and the Free State of Saxony, Germany
- Environmental challenges to health in South Durban, South Africa, due to air pollution
- Investigating the impact of environmental and climatic variables on the cholera outbreaks in Sub-Saharan Africa.

Workshops

In total nine workshops have been held over the period of the project (Pretoria, Durban 2011; Kampala 2012; Dresden 2012; Kampala, Kasese, Pretoria, Kruger, Durban 2013). They all had a specific focus on one or more case studies and were targeted at one or more audience types. All workshops combined the principles of showing project results, inviting feedback from the audience, and training on tools developed within the project. The workshops held in 2013 were obviously more geared towards training and disseminating end results.

Mobile Application

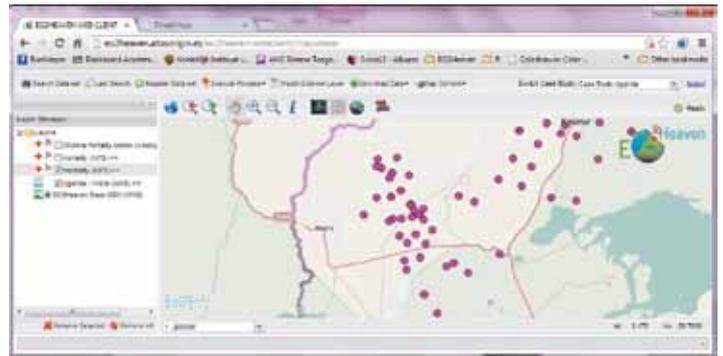
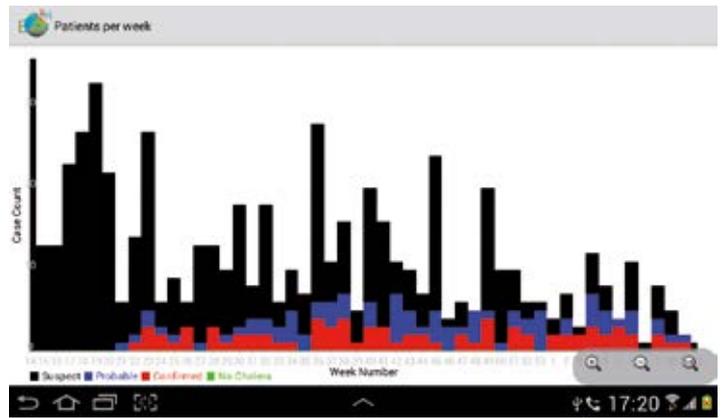
For the purpose of cholera client registration in the abovementioned cholera case study, an application has been developed for use on a tablet computer in the field. It is assumed that each hospital uses one tablet with this application installed. The application runs on any android-based tablet or mobile phone and aims to provide the benefits of mobile registration in the field (i.e. avoidance of duplicate registration, avoidance of spelling mistakes by auto-filling village names from a stored list, and reminding the health practitioner to

register the most critical patient information). Figure 1a shows the part of the user interface of the application in which patient data is entered. For privacy purposes, the list of patients and their data is fictitious.

The mobile application allows the data collector to carry out a basic analysis in the field for the purpose of an early assessment and follow-up data collection. Figures 1b and 1c show the built-in facility to show recorded patient information, respectively in the form of a graph and on a map. The tablet application facilitates the upload of the data to a server, which stores the data for further use by health managers at the Ministry of Health. They interact with the data via a standards-based client/server mechanism. The functionality of the end-user (client) software is tailored according to the needs and skills of the end user. An example is shown in figure 1d.

Training and Local Uptake

Stakeholders were trained to use the mobile application during a series of workshops in Kampala and Kasese (Uganda). Modern technology still poses challenges to the participants as they need to acquaint themselves with the basics of tablet interaction and software use. Clearly there is a need for error-free data collection methods and increased practitioner awareness of what is done with the collected information. The local situation also demands the embedding of the new technology in the current legal setting, following reporting hierarchies and archiving prescriptions of



(a, top-left): Mobile application: data entry page; (b, top-right): Graph of patient diagnoses aggregated per week; (c, bottom-left): Patient location information presented in a spatio-temporal context; (d, bottom-right): Web client for data dissemination and analysis



REFERENCES

Foster, R. (2012), Review of Developing Country Health Information Systems [online]. Available from: http://www.hiwiki.org/PHTF/images/e/e2/R_Foster_HEA_Review.pdf.
 Klopfer, M. and I. Simonis (Eds.) (2013), E02HEAVEN: Mitigating Environmental Health Risks, E02HEAVEN Consortium.

Hands-on training during the workshops in Uganda

the District Health Office, and striving for compatibility with the existing health information infrastructure in Uganda, which embraces the mTrac system among others (Foster, 2012). Despite these conditions, the mobile application was applauded and was considered a candidate for reporting other diseases besides cholera.

During work meetings and field visits, efforts were also made to support local

stakeholders with the uptake of project methods and system software for the longer term. As much as possible, this was done by demonstrating the implemented methods in the local environment. In the cholera case study, a semi-operational system was installed at the Ministry of Health in Kampala. This comprised android tablets running the cholera client registration app, a fully functional server with data services running in a virtual machine

environment, and a printer with wireless printing functionality for the purpose of archiving paper. This local set-up served as an intermediate testing phase towards an operational system at the Ministry of Health and the regional health centres in Uganda ■

High Tech Human Touch: Air Pollution and the Healthy City

Nicholas Hamm

n.hamm@utwente.nl

Air pollution is an ongoing concern for human health in many cities around the world. In the first half of the 20th century major sources of air pollution were heavy industry, coal-fired power stations, coal burning for domestic heating, and diesel vehicle emissions. Particulates, sulphur dioxide (SO₂), oxides of nitrogen (NO_x) and ozone were among the major pollutants. Health effects include respiratory disease, cardiovascular disease and cancer.

In the early 21st century the above-mentioned air pollution sources remain a problem in many parts of the world, although elsewhere there has been a shift away from heavy industry as well as coal burning. We also see increasingly stricter regulation of vehicle emissions. Nevertheless, air pollution continues to be a major problem – for Dutch and other European cities too.

When considering air pollution, a strong focus has been placed on PM₁₀. These are particulates less than 10 µm in diameter. This focus is reflected in international legislation. For example, the European Union has set a limit of 40 µg/m³ over a one-year period. More recently interest has moved towards fine particles, first PM_{2.5} and, more recently, ultrafine particles (<1 µm). In Europe there is an extensive network of instruments for measuring PM₁₀, whereas the network for measuring PM_{2.5} is much more limited. There are very few locations where ultrafine particles are measured. Nevertheless, the fine and ultrafine particles are thought to be highly damaging to human health. The spatio-temporal pattern of fine and ultrafine particles and the link to both pollution sources and health outcomes need to be better understood.

At ITC we (Dr Hamm, Professor Stein) are involved in the AiREAS network. This involves instrumentation expertise (Philips, ECN), information technology and project management (Imtech ICT), local municipalities (Eindhoven) and Utrecht University. We have a project in Eindhoven where instrumentation specialists are currently busy developing a so-called “Airbox” that contains sensors to measure NO/NO₂, PM₁₀, PM_{2.5}, ozone and ultrafine particulates. This will be coupled with a data collection, storage and serving platform. The precise specification of the different sensors varies, but they will allow sub-hourly measurements at 35 locations around the city. To put this in context, the current network concentrates mainly on NO₂ and lacks the data support infrastructure. The new network will hence be far more extensive, in terms of both the range of pollutants that will be measured and the data infrastructure. It will allow us (ITC) to bring modern spatio-temporal statistical techniques to the data with the aim of exploring, analysing and modelling the temporal and spatial



Instrumentation specialists are currently busy developing a so-called “Airbox” that contains sensors to measure NO/NO₂, PM₁₀, PM_{2.5}, ozone and ultrafine particulates

variation in the different pollutants. This analysis is necessary for two reasons. First, we need to characterize exposure and link this to health surveys provided by the municipal health authority. Second, this information is required if steps are to be taken to reduce emissions and exposure.

Beyond the science and engineering, there is a programme to build awareness and encourage citizen participation through communication specialists and links to community groups. This will be extended to other Dutch cities (Den Bosch), with the possibility of working with other European cities (Copenhagen, Madrid) ■

FURTHER INFORMATION is available at www.aireas.com and www.aireas.com/air (Dutch only). An early video is available at www.youtube.com/watch?v=Ju2wX114hPs Or contact Dr Nicholas Hamm (hamm@itc.nl).

Agent-Based Modelling of Cholera Diffusion in Ghana

Ellen-Wien Augustijn

p.w.m.augustijn@utwente.nl

During 2005 the city of Kumasi Metropolis, capital of the Ashanti region in Ghana, was confronted with an outbreak of cholera. Approximately 1600 cholera cases were reported within a short timeframe. A spatial statistical analysis of these cases has been conducted by Frank Osei, a former ITC PhD student, and his studies revealed that diffusion of the disease was influenced by demographic factors such as urbanization and overcrowding. In particular the distance to dumpsites and the density of these dumpsites seem to play an important role in the diffusion process. Based on his findings, we decided to build an agent-based simulation model in Netlogo that allows us to study the relationship between the settlements, dumpsites and spatial pattern of disease cases. The ultimate aim is to gain understanding of the transmission mechanisms and the potential effect of different types of interventions.

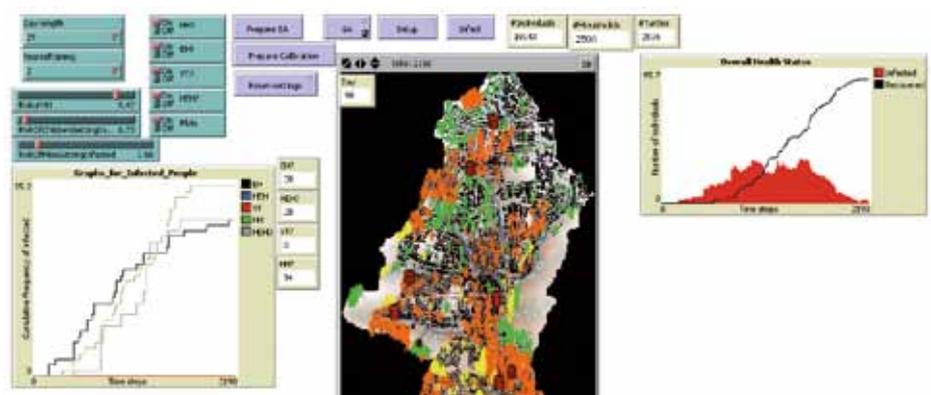
This project is conducted as a collaboration between teaching staff and students, and illustrates the way ITC collaborates with other UT faculties (CTW). The initial disease diffusion part of the model was created by Juliana Useya, a Geoinformatics student, during her MSc research in 2011. But as cholera is a water-borne disease and transmission is assumed to take place via run-off from dumpsites to the river, it is important to ensure that the hydrological part of this model is representative of the actual process. The improvement and validation of the hydrological model are currently being undertaken by Tom Doldersum (a UT student from CTW).

This project is still ongoing but there have been some initial results. A paper was presented at the Geocomputation 2011 conference in London, and following this presentation we were approached by the editor of the book *GeoSpatial Analysis*, requesting permission to use the model (as it was at that time) as an illustration in the

next version of this book. We hope to test the improved model over the summer, and in particular compare the simulated spatial patterns with the disease diffusion pattern as it occurred in the 2005 outbreak. We hope that this will reveal the role that dumpsites and river play in the diffusion process, and that this knowledge will make future interventions in similar outbreaks possible.

The work on this model fits in with similar initiatives that all aim to use spatial patterns in combination with agent-based models. Besides cholera, infectious diseases such as pertussis (whooping cough) and measles are also being modelled. However, as we have no active surveillance

and reporting system for disease data, and have no particular medical expertise, we are constantly on the lookout for disease datasets and interesting case studies to further test our models and analysis techniques. If you are working in a medical domain and are willing to collaborate, feel free to contact me ■



Sensors, Empowerment and Accountability in Tanzania (SEMA)

Jeroen Verplanke

j.j.verplanke@utwente.nl

SEMA is an integrated research programme of the University of Dar es Salaam and the University of Twente in the Netherlands. The programme is funded by the Netherlands Organisation for Scientific Research under the WOTRO-Global Science for Development Programme. It started in April 2012 and is expected to run until 2016.



The research focuses on how ordinary citizens in Tanzania can directly exact accountability from public health and water providers with a human sensor web. In this research, a human sensor web is an assembly of citizens with mobile phones ("human sensors") that report, share and publicize problems on the internet using geographical web services. Citizens will report their healthcare service problems in combinations of traditional and new media to service providers, responsible authorities, community leaders and other service users.

The applications provide access to public service locations, such as water taps and health care. If the level of service is below

standard, ordinary citizens can issue a complaint using their mobile phone. The caller goes through a digital menu, after which the application displays the complaint as an icon on the map, at the place where the public service is located. It is now visible to everyone when a supplier is in default. The icon remains visible until the problem has been solved.

The extent to which such an approach can enhance empowerment and accountability is a main focus of the research. The programme therefore entails collaboration with healthcare providers, stakeholders from government, community-based organizations, and NGOs.



By making failures visible, it is intended to force companies to accept their social responsibilities. A comparable project in Tanzania, TWAVEZA, is a good example. The standing of public services is assessed on a weekly basis from panels of individuals using their mobile phones. They publish the results in comprehensible language in the regular media, such as newspapers and radio stations. Failing policy thus becomes immediately visible. As a consequence of this approach, for instance, water pumps are repaired more often and exorbitant prices for water have been normalized.

The context is, however, very important. This research is designed to understand its parameters: which aspects of communication between humans and the application, between the web and the supplier, are crucial and why. Whether and where a monitoring application is effective depends on the scalability of the various elements: the problems relevant to health care, the participation of respondents, the cooperation of the media and open-source geographical web services. We therefore integrate all disciplines, from software engineering, geo-visualization, sociology and politicalology to public administration and the Geoweb. The idea is to involve local communities in the development and implementation, to study the behaviour of users, ordinary citizens and the government.

At the launch of the project, we organized a competition for talented and socially engaged programmers and young ICT entrepreneurs. A group of young Tanzanian programmers in Dar es Salaam were given the task of building a tangible contribution to the SEMA project. This enabled us to make interesting contacts and strengthen the local networks. Our aim is for the project to lead to win-win partnerships with healthcare organizations and the water sector on the one hand, and communities of ordinary citizens and the ICT community on the other ■

FOR MORE INFORMATION

please visit www.sema-research.net or contact Professor Yola Georgiadou of the University of Twente and Dr Juma Hemed Lungo of the University of Dar es Salaam (sema@itc.nl).

Putting Health on the Map: Addressing Public Health Challenges Using Spatial Data and Geo-information Tools

Sherif Amer

s.amer@utwente.nl

Improving health and healthcare services and reducing health inequities – which in many cases are gender related – represents a key theme within the Millennium Development Goals and remains at the forefront of government priorities throughout Sub-Saharan Africa. Increasingly in recent years government agencies and NGOs have started to use spatial data and geo-information tools for such purposes as analysing access to primary health products and services, identifying areas of poor programme coverage, delineating catchments of service delivery points, tracking infectious disease, and more generally monitoring and mapping health trends. The pace of GIS adoption in the health sphere continues to accelerate.



The GIS and health professionals and teachers who participated in the refresher course (photo E. Rood)

At the same time, the application of geo-information tools to public health, epidemiology and healthcare planning is generally found to be underutilized. Yet the use of spatial data and geo-information methods and techniques can generate information vital to the development of effective intervention strategies, optimizing resource allocation, analysing spatial clustering of health events, and monitoring disease risk and vulnerability. Enhancing the ability of professionals to actively engage in health and GIS applications represents an important step that can, in future, lead towards reducing health inequities and improving the effectiveness and efficiency of health services delivery.

As a response ITC developed a tailor-made refresher course, which was conducted in Rwanda in November 2012. The course was financed by Nuffic and represented a collaborative effort of ITC with the Royal Tropical Institute, the Centre of GIS and Remote Sensing of the National University of Rwanda (CGIS-NUR), the Ifakara Health Institute of Tanzania and the Human Sciences Research Council of South Africa.

The primary aim of the refresher course was to enable participants to more effectively use spatial information and geo-information tools in dealing with a variety of public health issues. The course did not only highlight important public health

challenges but also linked these to concrete possibilities that geo-information-based health applications offer in terms of data capture, analysis, mapping, monitoring and spatio-temporal modelling in support of planning and decision making. In this way, course participants were exposed to contemporary scientific approaches and methods of spatial data handling and use of geo-information tools and earth observation techniques in the public health field.

The target group for this refresher course was multidisciplinary in nature. On the one hand, it aimed at NFP alumni with a background in geo-information science who work in a public health, or related, organization, programme or project and wished to update their knowledge with respect to the growing use of geo-information tools in the public health field. On the other hand, the course targeted NFP alumni with a background in public health who wished to learn more about how spatial data, mapping, and geo-information tools can be used to address pressing public health issues. Bringing together participants from varying professional backgrounds proved to be a very fruitful approach, leading to lively discussions and active exchange of professional experiences. Equally valuable is the fact that the refresher course has further strengthened the working relations between the participating institutions. For CGIS-NUR, the refresher course also provided a point of entry for collaboration with the Rwandan Ministry of Health.

In conclusion, bringing together different academic partners and opting for a mixed group of GIS and health professionals represented an excellent opportunity for ITC to strengthen inter-institutional and interdisciplinary collaboration and extend its expertise in GIS and health settings in the future ■

EDUCATION NEWS

Tailor-made Training: Climate Change and Food Security in Indonesia

Janneke Ettema

j.ettema@utwente.nl

Tom Loran

t.m.loran@utwente.nl

In January 2013, ITC offered a four-week tailor-made training programme entitled “Climate Change and Food Security in Indonesia”. The course was organized at the request of Badan Meteorologi, Klimatologi dan Geofisika (BMKG), the Indonesian Agency of Meteorology, Climatology and Geophysics.

In the wake of an increasing number of enquiries about global climate change, the occurrence of extreme meteorological events, and their impact on such issues relevant to society as food security, BMKG has broadened its mission on the provision of climate services to the public. Against this background, BMKG decided that upgrading the skills and knowledge of its staff on climate change in relation to agricultural productivity was essential.

The training took place at ITC in the Netherlands in cooperation with the Royal Netherlands Meteorological Institute (KNMI), and involved staff from the Departments of Earth System Analysis, Natural Resources Science and Water Resources Science. The training programme consisted of three modules, dealing with the following three subject areas:
climate change assessment for Indonesia
importance of climate/weather information for agricultural production estimation
impact assessment of climate change on agricultural production.

The course participants were BMKG staff from the central office in Jakarta and from



The training took place at ITC in the Netherlands in cooperation with the Royal Netherlands Meteorological Institute (KNMI), and involved staff from the Departments of Earth System Analysis, Natural Resources Science and Water Resources Science. (photos J.Ettema)

regional offices in several parts of Indonesia. During the programme a number of methods, models and tools were introduced that dealt with applications for climate and agriculture. Besides an introduction to theory concerning a set of relevant issues, a great deal of practical

work was included that involved the various models and tools, leading to lively discussions with the participants.

The programme was highly successful and will be followed up by a one-week workshop at BMKG in Indonesia ■

Building Capacity for Sustainable Urban Management at Thimphu Municipality in Bhutan

Arbind Tuladhar

a.m.tuladhar@utwente.nl

Sonam Tashi

sonamtashbt@googlemail.com

Thimphu Municipality and Faculty ITC of University of Twente jointly organized a tailor-made training (TMT) course, which started in September 2012, under the sponsorship of the Netherlands Fellowship Programme (NFP-TM). The project was directly applicable to managing city development, as well as to providing municipal services to the citizens of Thimphu, using a municipal information system (MIS) via the Customer Service Centre.

As part of the municipality's capacity building plan, the project has delivered four main products. In consultation with the mayor and senior staff members of Thimphu Municipality and after assessing the needs for city management, the project created a tailored-made training programme, including training materials that can be reused for in-house training of other municipality staff.

For six weeks the 20 staff members of Thimphu Municipality were trained in Enschede in the management of municipal tasks, using MIS for urban management. The training covered basic GIS theory and tools for land record management, urban planning and the issue of building permits, and utility management. The participants brought their own geospatial data and associated non-spatial data concerning the spatial plan, land ownership and utilities regarding Thimphu city. These data were used to develop and test a Thimphu MIS using worldwide recognized GIS and database software (i.e. ESRI ArcGIS and open-source software PostgreSQL). Using further theoretical knowledge on e-government and urban governance, the participants also developed a conceptual framework for the MIS that relates to the products and services for the users (i.e. citizens and other external organizations). To learn more about the uses of GIS, the participants also visited four well-known Dutch institutions during the training course: the Cadastre, Land Registry and Mapping Agency, the Municipality of Amsterdam and the Municipality of Enschede, and Vitens Water Supply Company. The training course and framework for MIS have strengthened Thimphu Municipality in its pursuit of improved management of information resources for better products and services in urban management.



The project is directly applicable to managing city development, as well as to providing municipal services to the citizens of Thimphu, using a municipal information system (MIS) via the Customer Service Centre.



There were 29 participants, including the 20 participants (already) trained in Enschede, and additional staff from Thimphu Municipality, five other municipalities and the Ministry of Work and Human Settlement

The last part of the project was a follow-up mission in Thimphu, where two UT/ITC staff members, together with the mayor of Thimphu Municipality and the Bhutanese team leader, conducted the workshop Strategy for GIS Capacity Building and Knowledge Enhancement. There were 29 participants, including the 20 participants (already) trained in Enschede, and additional staff from Thimphu municipality, five other municipalities and the Ministry of Work and Human Settlement. The workshop discussed capacity requirements in terms of management, IT, GIS and human resources, and finally led to recommendations regarding Thimphu Municipality's additional training needs (both immediate and long-term) at individual, organizational and environmental levels.

The project was successfully completed in December 2012 ■



The 20 staff members from Thimphu Municipality were trained for six weeks in Enschede



GIMA

Geographical Information Management and Applications

Master of Science in

Geographical Information Management and Applications (GIMA)

What is it and for whom?

GIMA is a Masters' degree programme of four cooperating Dutch universities: University of Twente, Delft University of Technology, University Utrecht and Wageningen University. Students have therefore access to a large pool of experts in complementary knowledge fields. The programme is designed for those who want to become specialists in GI-management and applications and for GI-researchers. Its modular structure is clear and easy-to-understand (see figure).

Enschede	Utrecht	Wageningen	Delft	Full time	part time
0 1. methods & techniques	2. basic applications	3. management in organisations		year 1	year 1
4. project management	5. advanced methods & techniques	6. advanced applications		year 2	year 2
7. internship				year 3	year 3
8. thesis				year 4	year 4

GIMA is a blended learning programme. It means that there are a limited number of contact days, at each of the above mentioned universities in turn, but the main part of the programme is distance learning. This makes the programme suitable and attractive for mid-career professionals who hold a BSc and for

recent Bachelors. There are two options: full-time (2 years) or part-time (4 years). Participants with relevant working experience may request an internship exemption, equivalent to (full-time) 0.5 to (part-time) 1 year.

What are the jobs?

Our alumni are highly appreciated by the professional field. They work as managers, specialist or scientists in companies, consultancy firms, governmental organizations and research institutes. There is still demand for GIMA alumni on the professional GI market!

What does it cost?

Dutch statutory tuition fees for 2013-2014 are:
full-time: € 1,835; part-time € 1,628.

These fees are applicable for Holders of a Bachelors' degree with a Dutch or EU nationality who have not previously obtained a doctoral or Masters' degree from a government-funded Dutch university or university of applied sciences since September 1991. If you do not meet the requirements for statutory fees, institutional fees apply.

More information

Do you want to learn more about GIMA, or do you want to apply for the programme? Please visit our website: www.msc-gima.nl or contact us by e-mail: gima.geo@uu.nl.

Register before June 1st.



Universiteit Utrecht



WAGENINGEN UNIVERSITY
WAGENINGEN UR



Delft University of Technology



UNIVERSITEIT TWENTE. ITC

Mapping the world

Stay informed with GIM International – anytime, anywhere

GIM International, the independent and high-quality information source for the geomatics industry, focuses on worldwide issues to bring you the latest insights and developments in both technology and management.

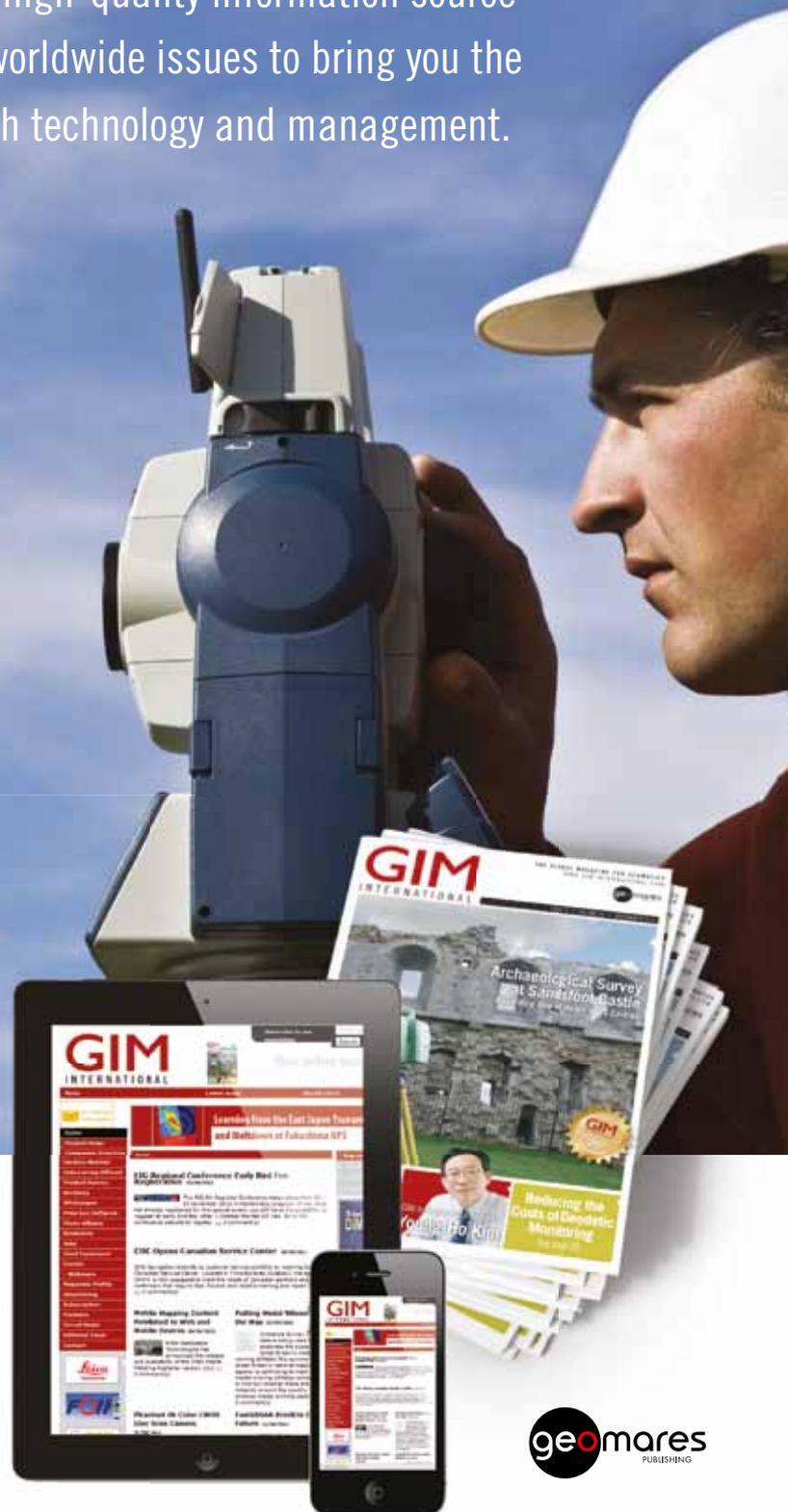
- Topical overviews
- News and developments
- Expert opinions
- Technology

Sign up for your free subscription to the online magazine and weekly newsletter today!

www.gim-international.com

GIM
INTERNATIONAL

Supporting geoprofessionals in mapping the world



geomares
PUBLISHING

ANNOUNCEMENT

ITC and Beijing Normal University Sign MoU

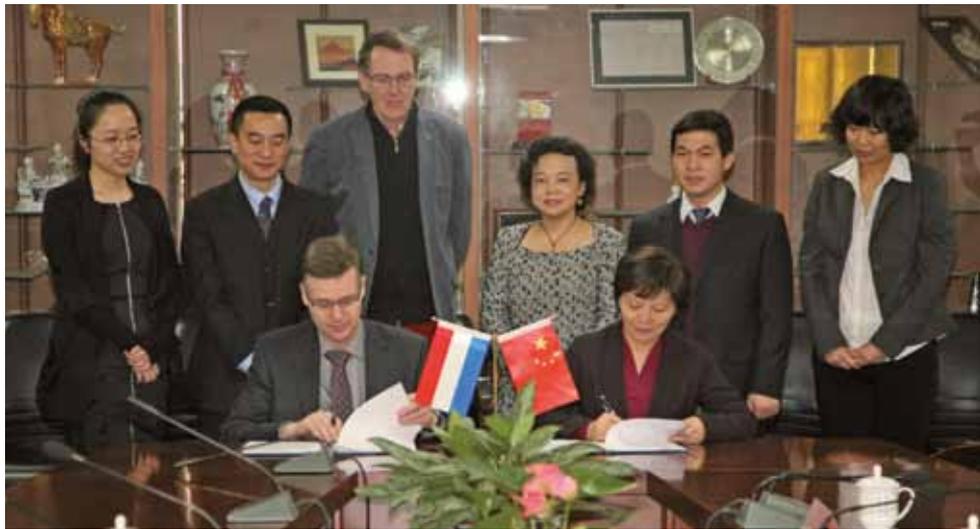
Tiejun Wang

t.wang@utwente.nl

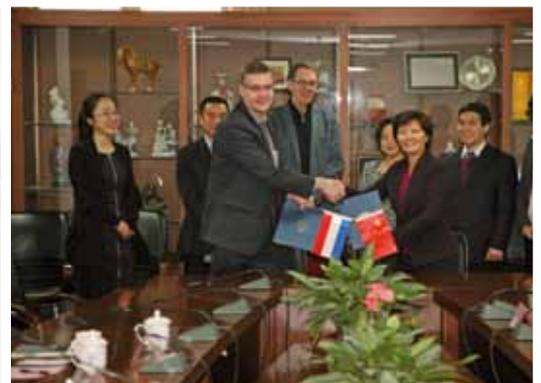
On 14 March 2013 Professor Tom Veldkamp, dean of the Faculty of Geo-Information Science and Earth Observation (ITC) of the University of Twente, and Professor Fanghua Hao, vice-president of Beijing Normal University, signed a Memorandum of Understanding (MoU) and an agreement at Beijing Normal University (BNU). The two partners agreed to focus on an MSc Double Degree Programme in Geo-Information Science and Earth Observation for Natural Resources Management.

Cooperation between ITC and BNU began in 2006, during a period of rapid advancement in geographical research, especially in GIS and earth observation technology. Both ITC and BNU are consortium members of the EU Erasmus Mundus External Cooperation Window Lot 14, which is coordinated by Lund University, Sweden ■

BNU is a public research university with a strong emphasis on the basic disciplines of humanities and sciences. BNU was founded in 1902 and is therefore one of the oldest universities in China. Today BNU is a renowned institution of higher learning and, according to the latest assessment published by the Ministry of Education of the People's Republic of China, the university is ranked number one in five disciplines, namely Geography, Ecology, Education, Psychology and Chinese History



Professor Tom Veldkamp and Professor Fanghua Hao, signed a Memorandum of Understanding (MoU) and an agreement at Beijing Normal University (BNU).



Towards Entrepreneurial Skills in ITC Curricula

Rolf de By

r.a.deby@utwente.nl

Lyande Eelderink

l.eelderink@utwente.nl

Tom Loran

t.m.loran@utwente.nl

In a touch-and-go visit to the Netherlands in January 2013, Bill Gates expressed his disappointment with current Dutch government policy of no longer guaranteeing the 0.7% of GDP threshold for international development cooperation funding. The government has decided to let this threshold slip for the first time in decades. This is political reality in 2013.

Changing Times

Economic reality in many Sub-Saharan nations is the continued growth of GDP over the last decade. Many believe that further development of the various private sectors will eventually help to sustain this growth, and also provide chances for that part of the population known as bottom-of-the-pyramid.

At ITC we have for a number of years seen a gradual change in the origins of our student intake. Whereas historically most of our students had jobs in government agencies and parastatals, to an increasing extent they now also originate from companies and other non-government organizations. We are also witnessing the growing awareness of the new economic reality of fellowship donors, which is often expressed as support for public/private partnerships and the private sector as such.

Private Sector in the Global South

In Africa too, the information and mobile revolutions especially have become important drivers, leading to genuine African innovations – with Safaricom's M-PESA mobile money system as a prototypical example. Many nations are on the curve upwards, and Kenya and Ghana appear to be leading the way.

It is for these reasons that at ITC we started to believe some years ago that paying attention to entrepreneurial skills in our curricula makes a lot of sense. Students want it, national economies want it, fellowship donors want it, and so do we.

Curriculum Formats

Entrepreneurial skills can be defined as those that allow our alumnus or alumna to be successful in the private sector, either as a business(wo)man or as an aptly equipped professional in such business. It requires fundamental understanding of business models and the entrepreneurial process, perhaps even technological innovation. For us at ITC, the fundamental question is how best to prepare our alumni for that private sector career. There is little doubt that some preparation in-course is useful, but also that quite some talent development needs to take place outside the education context. We are presently elaborating a number of options, and the initial MSc curriculum deserves mention within this context.

Outreach to Our Alumni

Understanding the game of earth observation or geo-information business is quite a challenge indeed – among other reasons, because the parameters for the enterprise differ so much from one place to the next. We would just love to be in touch with those of our alumni who have first-hand experience in the game of the private sector in their home country, whether as entrepreneur or as professional already active in the sector. We would like to get in touch with you and hear about business opportunities that you are chasing, and about professional skills that are needed and which you would hire if possible. We also want to understand better what you are doing to fight brain- and labour-drains ■

To stimulate the current discussions at ITC on the matter of entrepreneurship in the Global South, we are collecting brief descriptions of tell-tale business cases that illustrate the ideas described above. If you have any ideas on these, or you are working in the private sector in ITC's target countries and have observations on private sector training needs, please get in touch with us! Your communications please to: l.eelderink@utwente.nl



VISITS

Directorate Visit to China

Paul Schoonackers

p.e.schoonackers@utwente.nl

The directorate visited China in the period 11 to 17 March 2013. He was a member of a Dutch delegation whose aim was to explore cooperation opportunities in the geo-sector in China.

The delegation consisted of participants from Kadaster Netherlands, Geo-Information Netherlands (GIN), ESRI Netherlands and ITC, representing respectively government, business, and education and research. The visit was facilitated in an excellent manner by the Netherlands Office for Science and Technology (NOST) of the embassy in Beijing. The delegation had an intensive programme of meetings with Chinese organizations and businesses, culminating in a well-attended closing seminar with the title "Geo-Information: Where China and The Netherlands Meet". The key meeting was with Li Pengde of the National Administration of Surveying, Mapping and Geo-Information (NASG). During this meeting, both Kadaster and ITC signed a Memorandum of Understanding with NASG for continued cooperation.

The dean participated in the programme of the delegation as far as possible but also had some side meetings. He visited Beijing Normal University (BNU) and signed the Memorandum of Understanding and the agreement for the MSc Double Degree Pro-

gramme in Geo-Information Science and Earth Observation for Natural Resources Management that will be implemented jointly with BNU. He also visited the China Meteorological Administration (CMA). Our present framework agreement with CMA runs out later this year. CMA intends to send a delegation to the Netherlands in June to sign a new agreement. The dean discussed how we can broaden the cooperation and include training for the management staff and PhD research as well.

Finally the dean visited the Institute of Remote Sensing and Digital Earth (RADI), where he was given a presentation and an extensive tour of the building and facilities. RADI is the result of a merger of the Institute of Remote Sensing Applications and the Center for Earth Observation and Digital Earth. As the name implies, RADI is a natural partner for ITC ■



Visit to the Institute of Remote Sensing and Digital Earth (RADI), Chinese Academy of Sciences (CAS). Introduction by Prof WANG Changlin, Director of RADI's International Academic Division.



Dutch delegation visit National Administration of Surveying, Mapping and Geoinformation (NASG)



Li Pengde of NASG signed MoU with ITC

Greetings from...

NAME:

Frank Meins

PURPOSE:

Data Collection and Fieldwork in

Kenya as part of the following

research project:

An earth observation and inte-

grated assessment (EOIA)

approach to the governance of

Lake Naivasha.



On 17 April I will defend my MSc research and thesis at ITC. As part of my MSc graduation project I went to Lake Naivasha, Kenya, to perform fieldwork and collect data to support my research. I went together with Pieter van Oel and joined up with Vincent Odongo and Dawit Mulatu, who are all members of the EOIA Naivasha project at ITC. My topic is about scale issues in modelling the hydrology of the Lake Naivasha watershed.



I stayed in Naivasha town, from where I travelled through the watershed to gauge rivers. Flow current meters were used for smaller rivers and more advanced devices such as the ADCP for larger rivers. Most of the gauging was done together with the local water resources management authority (WRMA Naivasha), which also provided me with a place to work.



Travelling through the basin was a challenge at times, especially during heavy rainfalls when the roads themselves turned into rivers. Many of the river gauging stations were hard to reach, even with a four-wheel drive, but in the end we managed to visit all stations within the watershed. The incredible nature and beautiful panoramic views were great compensation for the long and bumpy rides.

Aside from river gauging, I had to obtain daily gauge readings. Two local students helped me to complement and update the database that was available at WRMA, using hardcopy data which in some cases was over 60 years old. We finished entering the data right before I had to return to the Netherlands.



Overall, the first three months of this internship have been a very valuable experience, and I can't wait for the three months to come!



LIFE AFTER ITC

Light Detection And Ranging (LiDAR) Monitors Forests from Space

Irfan Akhtar Iqbal

iqbal18725@alumni.itc.nl

Forests cover about one-third of the land area on Earth: an area large enough to have a significant impact on the global climate. A hectare of forest can absorb about 6 tons of carbon annually. Forests clean our environment by absorbing from the atmosphere carbon dioxide that is released as a result of various human activities and natural processes.

Continuous monitoring of carbon would help us in the sustainable management of our forest resources and the global climate. Several field-based methods have been used to calculate the amount of carbon in forested ecosystems. These methods, however, are time consuming, involve high financial inputs and have limited temporal and spatial scales. The advent of satellite remote sensing has greatly aided the estimation of carbon in forests. Since the direct estimation of carbon from satellite data is challenging, aboveground biomass (AGB) has long been used as a proxy for the amount of carbon in forests, which is further derived from the height of a tree or the so-called "canopy height".

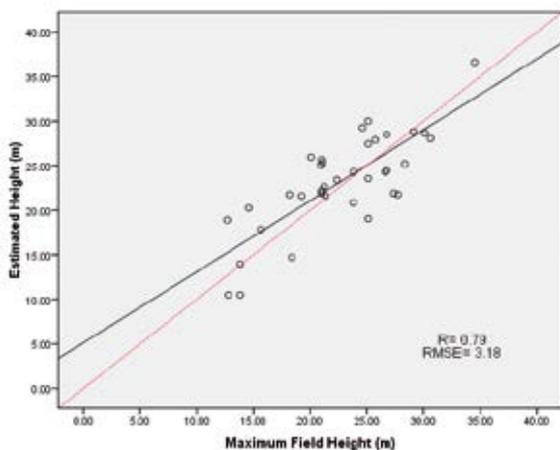
In 2003 the launch of the Geoscience Laser Altimeter System (GLAS) aboard the Ice, Cloud and Elevation Satellite (ICESat) revolutionized the satellite-based estimates of global phenomena – more particularly the canopy height, AGB and carbon stocks. GLAS was the first spaceborne LiDAR instrument with near-global coverage that could map the vertical component of vegetation using a continuous waveform. Statistical models, specifically the Gaussian model, have been used to process the GLAS data. Although a goodly number of

methodological approaches already exist in the literature, there is always room for improvement and innovation.

In our research we introduced a novel approach of processing the ICESat/GLAS waveforms using the Fourier Transform technique of waveform decomposition. The method was tested over the New Forest National Park, UK, for canopy height estimation. Results indicated that the canopy heights estimated from ICESat/GLAS data using our method closely matched the canopy heights calculated in the field with an accuracy of 79% ■

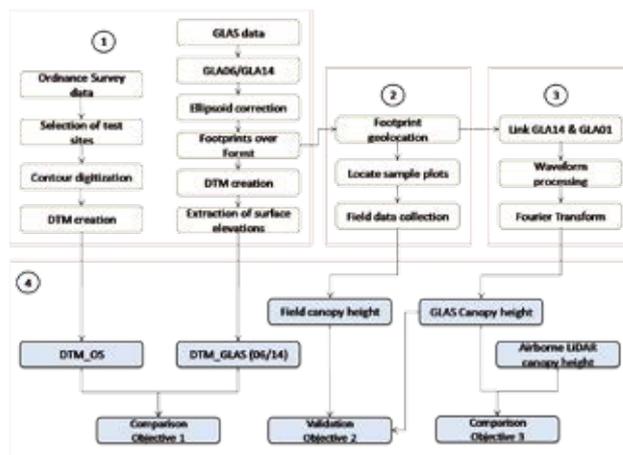


IRFAN GRADUATED FROM ITC in 2010 after participating in the Erasmus Mundus MSc course Geo-information Science and Earth Observation for Environmental Modelling and Management (GEM). He graduated with a thesis entitled "Evaluating the potential of ICESat_ GLAS data to estimate canopy height in the New Forest National Park, UK". Full text: www.itc.nl/library/papers_2010/msc/gem/iqbal.pdf

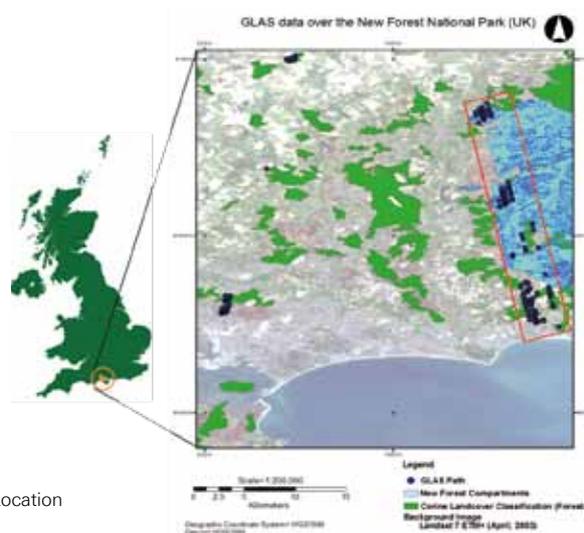


Correlation between GLAS Estimated Canopy Height and Field Calculated Canopy Heights

The study succeeded in an attempt to reduce the errors in canopy height estimation using ICESat/GLAS data. As a matter of fact, minute errors at the basic (canopy height) level cumulate to propagate significant and magnified errors at upper (AGB and carbon estimation) levels. This in turn adversely affects the decision-making process for the sustainable management of our forested ecosystems. The method introduced in this study would ultimately reduce the inaccuracies in estimating our carbon stocks ■



Research Methodology



Study Area Location

ITC Alumni Reception in Beijing

Chang Zheng

changzheng2004@gmail.com

During its mission to China, ITC, together with the Netherlands Office for Science and Technology (NOST), organized an alumni reception on Saturday, 16 March 2013, at the Netherlands Embassy in Beijing.

The event was honoured by the presence of Deputy Ambassador Mr André Driessen of the Netherlands Embassy in Beijing, and numbered representatives from Kadaster Netherlands and Geo-Information Netherlands (GIN) and NOST. About 30 ITC alumni attended the event, together with a few children – the next generation of ITC.

Following the short speech of welcome given by Mr Driessen, Mr Paul Schoonackers (ITC project officer) reviewed the history of ITC in China stretching back over



Group picture

more than 30 years, and Professor Tom Veldkamp (ITC rector/dean) reported on the recent developments at ITC. Finally Dr Pu Shi (ITC PhD alumnus) shared his life and study experiences in the Netherlands, and explained the role these had played in starting his own business in the geomatics industry ■

Listening to the speeches on ITC history in China and ITC development, and a personal story



Moving Ahead: ITC Alumni Association Bangladesh

Md Billal Hossain

mdbhossain@yahoo.com

Professionals from ITC are working in a range of positions in the government development ministries and non-government organizations in Bangladesh.

Since the rejuvenation of the association in September 2009, the ITC Alumni Association Bangladesh has been moving ahead, with regular meetings scheduled. The association has already had a couple of meetings that have greatly contributed to strengthening the forum, and has also updated the list of members. Not only were ways of further strengthening the activities of the organization discussed at these meetings, but presentations were also made on contemporary environmental issues and resource management with the application of GIS and remote sensing. The following topics were addressed:

- Geo-information for urban development and adaptation of climate change in major cities of Bangladesh
- GIS-based salt industries information system
- Detailed area plan of Dhaka City.

After each presentation there was huge member interaction on the issues.

The way forward for the association is to further strengthen its organizational capability and build a strong network of professional ITC alumni, who are spread widely both at home and abroad ■



Since the rejuvenation of the association in September 2009, the ITC Alumni Association Bangladesh has been moving ahead, with regular meetings scheduled



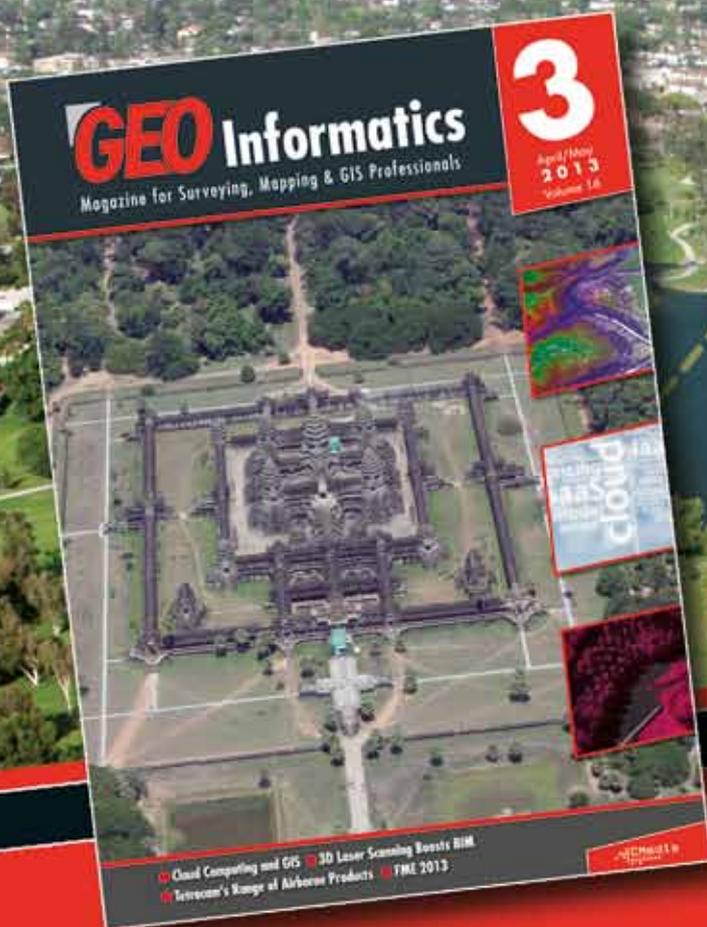
FOR MORE INFORMATION on the ITC Alumni Association Bangladesh, please contact Md Billal Hossain (mdbhossain@yahoo.com)

GEO Informatics

Magazine for Surveying, Mapping & GIS Professionals



The independent and high-quality information source
for Geospatial articles and news.



Sign up for your free subscription at

www.geoinformatics.com

Tel.: +31 (0)527-619000

