

# IGCS BULLETIN

## *From the Editors' Desk*



Dear Readers,

This issue is published by the new editors of the IGCS Bulletin. First and foremost we would like to express our gratitude to our predecessors Prof. Ajit Kolar and Dr. Sasidhar for their long-standing commitment to the bulletin. They have established it as a regular information node for the growing IGCS family. Thank you very much!

Following Prof. Kolar's retirement from IIT Madras, Prof. Krishna Vasudevan has assumed charge as the new IGCS Area Coordinator for Energy. He is a well-known expert in Power Electronics applications in renewable

energy field. A warm welcome!

Our feature article in this issue is co-authored by G. Hörmann, A. Strehmel and P. Fiener. It analyses the sustainability of Pennaiyar catchment through a modeling approach. It discusses the role of irrigation tanks and different precipitation stations on Pennaiyar Catchment Parameters towards its sustainability.

Enjoy reading!

Thanking you,  
**B S Murty and  
Christoph Woiwode**  
Editors

### VOL 3: ISSUE 4 OCT 2014 Contents

IGCS NEWS	2
FEATURE:	
Improving Tools for Sustainability Research	6
UPCOMING IGCS EVENTS	9
FORTHCOMING CONFERENCES	10
CONFERENCE PARTICIPATIONS	11



Prof. B. S. Murty



Prof. Chr. Woiwode

## IGCS NEWS

### IGCS-DST Sub-Projects in the Second Phase

IIT Madras faculty were invited to apply for fast-track funding in the following five challenge areas, with the stipulation that they propose collaborative projects with German counterparts who could be invited to come to IIT Madras:

- *Sustaining urban water bodies and improving public sanitation*
- *Ensuring local air quality*
- *Improving access to energy services*
- *Setting up a framework for sustainable urban and peri-urban land-use*
- *Helping frame sustainable climate policy with emphasis on integrated solutions for climate adaptation*

In the first phase three sub-projects were sanctioned in November 2013. In the second phase, the following two projects have been sanctioned in **September 2013**. The two proposals are:

(i) 'Modeling the effects of land use and climate change upon in-stream hydraulics in mountainous streams in rapidly urbanizing regions (close to Pune) of the western-ghats', is coordinated by Principal Investigator (PI): **Prof B.S.Murty**, Department of Civil Engineering, IIT Madras and Co-PIs: **Dr.**

**Balaji Narasimhan**, Dept. of Civil Engineering, IIT Madras, **Dr. Venu Chandra**, Dept. of Civil Engineering, IIT Madras; German collaborators: **Prof. Dr. Peter Fiener**, Institut für Geographie, Universität Augsburg and **Prof. Dr. Karl Schneider**, Geographisches Institut, Universität zu Köln. This project proposes to develop a process based mathematical model for simulating the effect of the climate change and urbanization on in-stream hydraulics in the Western Ghats, close to Pune and

(ii) 'Design and development of solar thermal energy system for domestic sewage (black water) treatment', is coordinated by Principal Investigator (PI): **Dr. K. Srinivas Reddy**, Dept. of Mechanical Engineering, IIT Madras and Co-PIs: **Dr Ligy Philip**, Dept. of Civil Engineering, IIT Madras, German collaborators: **Dr.-Ing. Martina Scheer**, Engineering Consultants Scheer (Ingenieurbüro Scheer). In this project, it is proposed to treat sewage (black water) from an apartment with 6 houses with solar energy in a sustainable manner such that the treated water can be used for domestic purposes and the sludge as fertilizer for gardening.

### IGCS at DAAD Event "Research in Germany"

On 20th September, the DAAD office in New Delhi together with the Information Centre Chennai organized this one day information seminar for young researchers at IIT Madras. It was inaugurated by Prof Bhaskar Ramamurthi, Director IIT Madras, with a special address by Mr. Achim Fabig, Consul General of Germany in Chennai. The seminar program covered four sessions providing information about research funding, conducting research in Germany, a platform for interaction with invited institutions and a panel discussion with DAAD alumni about their experiences and career paths. DAAD had invited representatives from various German research institutes and universities like Alexander von Humboldt Foun-

dation, German Research Foundation, Forschungszentrum Juelich, and Max-Planck Society. IGCS was represented by Dr. Christoph Woiwode who was leading through this event as Master of Ceremony, while Dr. Franziska Steinbruch, Prof. Murty and IGCS visiting scholars presented IGCS at the information stall, which received great interest by the participants.



## DFG funded Workshop on Rural Sustainable Tourism and Land Use

From September 29 to October 1st IGCS hosted a workshop on sustainable tourism and land use to identify potentials for research collaboration. Three professors from Germany, Prof. Freyer (TU Dresden), Prof. Rothstein and Prof. Thimm (both from HTWG Konstanz) organised this event in cooperation with Prof. Murty, Acting IGCS Coordinator, and Visiting Prof. Dr. Woiwode. The main objective was to identify common Indo-German interdisciplinary research topics and funding options in the fields of sustainable tourism, sustainable land use, renewable energies, water- and waste management.

A number of scholars contributed to the workshop with their expertise. Among those present were Dr. Ajith, Director, Kerala Institute of Travel and Tourism Studies (KITTS), Gopinath Parayil (The Blue Yonder) and Babu Rengaraj (KITTS), Prof. Ligy Philips (IGCS) and Jay Anand from the Swaminathan Research Foundation. Telephone conferences were held with Dr. Hansen, Director DFG Office in New Delhi, as well as Dr. Leena Sebastian from Saravahita Foundation in Kerala. Mrs. Padmavathi Chandramouli informed about opportunities of Indo-German academic research exchange.

Topics covered theories, concepts and case studies of rural sustainable tourism in Germany and India, and their relation to land use and environmental management in rural areas. The first day saw three presentations about "Theories and Concepts of Sustainable Tourism in Germany" (Prof. Dr. Freyer, TU Dresden), "Sustainable Management Information Systems for Destinations in Germany and Switzerland" (Prof. Dr. Thimm, HTWG Konstanz) and "Sustainable Tourism in India: The case of Kerala" (Dr. Ajith, KITTS-Kerala Institute of Tourism and Sustainability).



Day two continued with presentations by Babu Rengaraj (KITTS) on "The Ecotourism initiatives in Kerala, examples and perspectives", Saroop Roy B. R. (KITTS) about "The Responsible Tourism initiative in Kerala", as well as a report by Gopinath Parayil (Blue Yonder, Pondicherry) "The Blue Yonder Story: Creating Better Places for People to Live & for People to Visit". Dr. Leena Sebastian (Saravahita Foundation) talked about "Emerging Tourism Concerns and Changing Public Attitude towards the Periyar Tiger Reserve, India: Some Reflections".

Several presentations focused on aspects of environmental management. Dr. B. S. Murty spoke on "Water Management and Sustainability", Dr. Ligy Philip on "Wastewater issues related to tourism sector", Jay Anand (Swaminathan Research Foundation) about "Multicriteria screening tool as a decision support system for RWH and Storage", and Prof. Dr. Benno Rothstein, (HTWG Konstanz) reported about "Reduction of cooling water consumption due to photovoltaic and wind electricity feed-in". The workshop provided an interface and opportunity for the participants to meet and discuss possibilities for future research options.

Following the workshop, a two-day exposure visit to Auroville was organised for the German visitors to experience various aspects of sustainability of this model township.

## IGCS Workshop on “Isotopes in our environment – from climate change analysis to contaminant tracking”

An IGCS workshop titled “Isotopes in our environment – from climate change analysis to contaminant tracking” was organized by Franziska Steinbruch, Visiting Associate Professor of the Indo-German Centre for Sustainability (IGCS) at the Indian Institute of Technology Madras (IITM), and Indumathi M. Nambi, Associate Professor at the Environmental and Water Resources Engineering Division (EWRE) of the Department of Civil Engineering at IITM, from 21-24 October 2014 at IIT Madras in Chennai. The workshop centered on the visit of Prof. Dr. Stephan Weise, an expert in isotope techniques and analyses from the Helmholtz Centre for Environment-UFZ in Halle, Germany and the perceived need of Indian researchers to tap the potentials of isotope applications towards solving some of the pressing environmental concerns. The first day was used to exchange ideas with IITM faculty about analytical facilities for isotope studies, the requirements, current developments and potentials in cooperation.

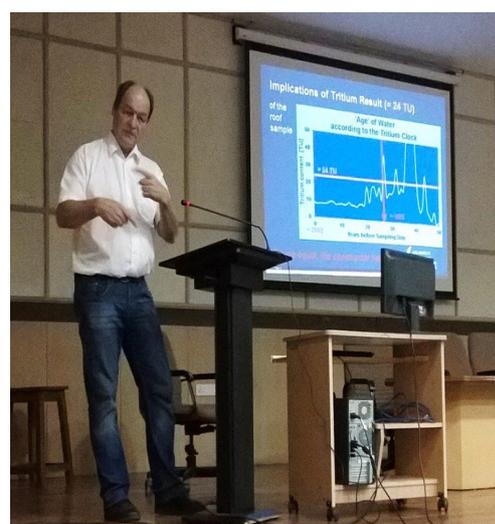
A guest lecture was delivered by Prof. Dr. Weise with the topic “Isotopes – Forensic Tool in the Environment”. It was attended by students and faculty of IIT Madras, Department of Civil Engineering and Department of Biotechnology. The lecture gave an exciting overview of isotope applications ranging from hydro-

logical studies and reconstructions of earth’s palaeoclimates to inputs into forensic analyses in crime and disaster-related insurance cases.

An excursion to discuss potential isotope applications was offered to students who are currently involved in environmental research projects in the EWRE Division. The opportunity was mainly used by PhD students. The excursion covered issues of water and land use management, water and soil pollution, contaminant remediation, and the restoration of water bodies and aquifers in the southern part of the Chennai basin. The visiting expert, Prof. Stephan Weise was able to gain some insight into the complexity of water infrastructures in Southern India, such as the open wells, tanks belonging to temples, check dams, system tanks, natural lakes, backwaters and wetlands. The excursion included a visit to the historical town of Mamallapuram with its seashore temple. This 7<sup>th</sup> Century-temple was unearthed by the disastrous Tsunami in 2004. Remarkable are the building materials of this temple originating from a variety of geological source areas (e.g., sandstone, granites, gabbro, gneisses, granulites, marble) as well as the preservation of various marks in the building (at least two) representing past changes in sea levels.



Prof. B.S. Murty, IGCS Area Coordinator for Water and IGCS Centre Coordinator (Acting) delivering the opening speech.



Prof. Dr. S. Weise presenting his guest lecture and responding to questions from the floor.

## IGCS Short-term Professor for Waste Management

The Indo-German Centre for Sustainability (IGCS) granted Prof. Dr. rer. nat. habil. Satyanarayana Narra the short-term fellowship to visit the Indian Institute of Technology Madras (IITM) in Chennai as professor for waste management. In Germany he is a professor for "Technical Environment- and Climate Protection" at the University of Applied Sciences Lübeck. As he was a born Indian, a sustainable development of India is of special interest to him. He was very happy that he was able to make new contacts and meet new colleagues in order to attempt to make an environmental-friendly India happen.

He has been at the IIT Madras from mid-August to mid-September 2014, and his main focus of the short

-term fellowship was to carry out feasibility studies and develop an active collaboration with universities, colleges, institutes etc. under the project IGCS. During the course of the fellowship he has visited four different cities and five universities in India. The discussions carried out with various institutes / universities showed positive results for collaboration possibilities. Presently they are looking for funding programs which fund both the institutes in India and in Germany.



## Research Students at IGCS



Manuel Murawski, a master student in Urban and Regional Development from the Department of Geography at Christian-Albrechts-University of Kiel,

spent the two months of August and September as a research student at IGCS.

Mentored by Dr. Christoph Woiwode, his study entitled "Sustainable development in the peri-urban regions of Chennai – spatial analysis using remote sensing data" aims to investigate the spatio-temporal development of the peri-urban regions of Chennai, especially Sriperumbudur, using optical remote sensing data and GIS. By preparing land use classifications it is possible to visualize the changes for different dates over the last decades.

Manuel used the time in Chennai to obtain important ground data and to collect more information of the urban development. His work involved visiting local authorities and talking to researchers to access useful data and maps as well as doing various field trips in Chennai, the hinterland and Sriperumbudur. As a result he can provide maps that show the changes from rural to urban in the Chennai metropolitan area, including Sriperumbudur.

Thea-Lina Müller, a student at the Christian-Albrechts-University of Kiel in the Master course "Environmental Geography and Management" joined the Environmental and Water Research Engineering Division at IITM as a research scholar under the IGCS project for the period

of August to end of September 2014. She was supervised by Franziska Steinbruch, Visiting Associate Professor of the Indo-German Centre for Sustainability (IGCS) at the Indian Institute of Technology Madras (IITM), and Indumathi M. Nambi, Associate Professor at the Environmental and Water Resources Engineering Division (EWRE) of the Department of Civil Engineering at IITM.

Her main interest in coming to IIT Madras is to contribute to research in the fields of sustainable management of water resources in Chennai, specifically on water quality improvements and the restoration of the Pallikaranai wetland. The objective is to achieve new insights to addressing water pollution and remediation by combining her capabilities in remote sensing, geographical information systems (GIS) analysis and hydrologic modelling (e.g. the Soil and Water Assessment Tool 'SWAT') with research outcomes from other science disciplines.



## FEATURE

# Improving tools for sustainability research: the simulation quality of the Pennaiyar catchment

G. Hörmann\*, A. Strehmel\*, P. Fiener\*\*

\*Institute for Natural Resource Conservation, Hydrology and Water Resources Management, Kiel University, Germany, ghoermann@hydrology.uni-kiel.de

\*\*Inst. Geography, Working Group Water Resources Research, Augsburg University,

### 1. Introduction

Models are possibly the most common tools in research for studying the sustainability of water resources. They facilitate the test of different scenarios without doing harm to the environment and the population. P. Fiener had initiated studies on The Krishnagiri catchment during his tenure at IGCS, IIT Madras as a test case for a model-based analysis of water resources and water resource management options. However, due to limited data access the model based analysis of the catchment (P. Fiener, A. Strehmel) could not be finalized. The research grant of three weeks for G. Hörmann in summer 2014 was intended to close some of the gaps in the earlier study of his co-workers. Compared to the earlier modelling ap-

proach based on the Soil and Water Assessment Tool (SWAT), G. Hörmann focused on more parsimonious model requiring less time to set-up and run. The aim of the study was to check different parameters and methods to improve the simulations results of the Pennaiyar catchment with a special focus on the effect of the use of different precipitation stations and the inclusion of irrigation tanks.

### 2. Data base, models and methods

#### 2.1. Data base

The data base of this project is based on data sets collected by P. Fiener earlier. Potential evaporation (Etp) was taken from the SWAT model runs. Fig. 1 summarizes the climate of the catchment.

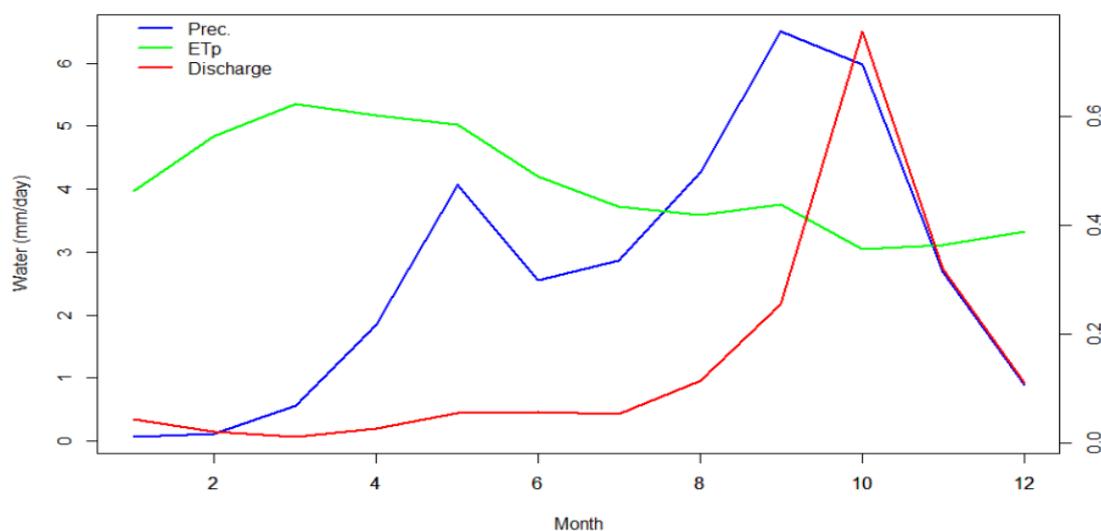


Fig. 1: Water balance of the catchment (Prec.: Precipitation from Bangalore station, Etp: potential Evaporation computed with the SWAT model, Discharge: measured discharge)

## 2.2. Models

Three models were used for this catchment: SWAT (Arnold *et al.* 1998), PC-Raster (Karszenberg *et al.* 2010) and SIMPEL (Hörmann 1997). SWAT is a complex, eco-hydrological model. PC-Raster is a spatial modelling system and SIMPEL is a set of worksheets. The setup and the calculation of scenarios with SWAT are quite complex and the model runs take long time. All modelling activities with SWAT up to now did not lead to a satisfying quality of the model setup and made it difficult to use it as tool for sustainable management. This is why it was planned to test different theories with less complex models and eventually transfer the results to the SWAT model. Another advantage of this approach is the possibility to adapt not only the model parameters, but also the model structure.

This approach was successfully applied to a catchment with similar problems in China (Hörmann *et al.* 2009).

## 2.3. SIMPEL

From different versions of the SIMPEL models we used the wetland version for this project. Here, a wetland is defined as a part of the land where water for evaporation (ET) is taken directly from groundwater - even if the soil is already dry. This is exactly the situation we encounter in the catchment, where water for irrigation is taken from tanks or groundwater. To estimate the fraction of irrigated area and other parameters we used the built-in optimisation function (Solver), thus SIMPEL can also be used for inverted modelling.

## 2.4. PC-Raster

PC-Raster is a simple raster GIS with a built-in spatial modelling language to compute fluxes in a landscape. This is used in University of Kiel to teach spatial modelling from scratch. The model of this course was the base model for this project.

## 2.5. Statistical methods

All analyses of this project were carried out with the

statistical package R. Due to the limited time, we restricted the analyses to correlations, Nash-Sutcliffe coefficients and visual comparison. In addition to the normal comparison of the whole data set we used also monthly coefficients to get an impression of seasonal variations.

## 3. Results

Due to the different time spans of the data sets, the model runs were divided into several groups:

- Bangalore precipitation data from 1987 to 2011
- Bangalore precipitation data from 1995 to 2011
- Precipitation data from rain gauge stations inside catchment from 1996 to 2011

combined data from the Bangalore station and the rain gauges inside the catchment.

### 3.1. SIMPEL

Figure 2 shows the results of the SIMPEL simulations for different precipitation data sets. For the Bangalore precipitation (last line), a NS of nearly 0.5 could be achieved after optimisation. However, the parameter combinations for this result were not very realistic: the required soil water capacity was as high as 850mm. A reduction of the input data set the range available for the lower catchment dropped the NS to -0.05. The replacement of the Bangalore precipitation by the data from the lower catchment increased NS to 0.15, the subsequent optimisation achieved a very good value of 0.5 (first line).

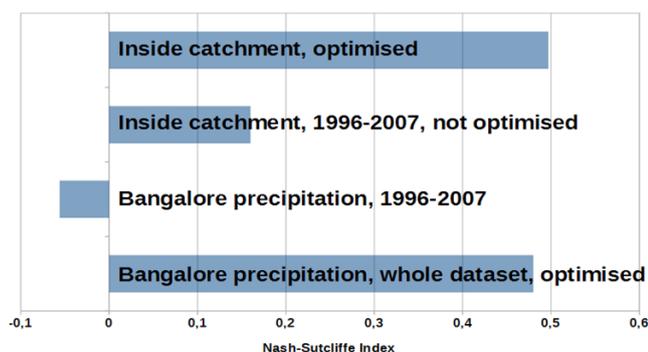


Fig. 2: Nash-Sutcliffe indices of the SIMPEL simulation

The computed parameters show some interesting values (Table 1). The combination of field capacity and root depth corresponds roughly of a loamy soil with a 1 m depth. The computed “wetland fraction” corresponds to a mean value of 10% irrigated area and a groundwater store of 90 mm corresponds roughly to 4% area of tanks and ponds with a depth of 4 m. The ETp values seem to be too low, the highest NS was achieved when the original values were multiplied by factor 2.44.

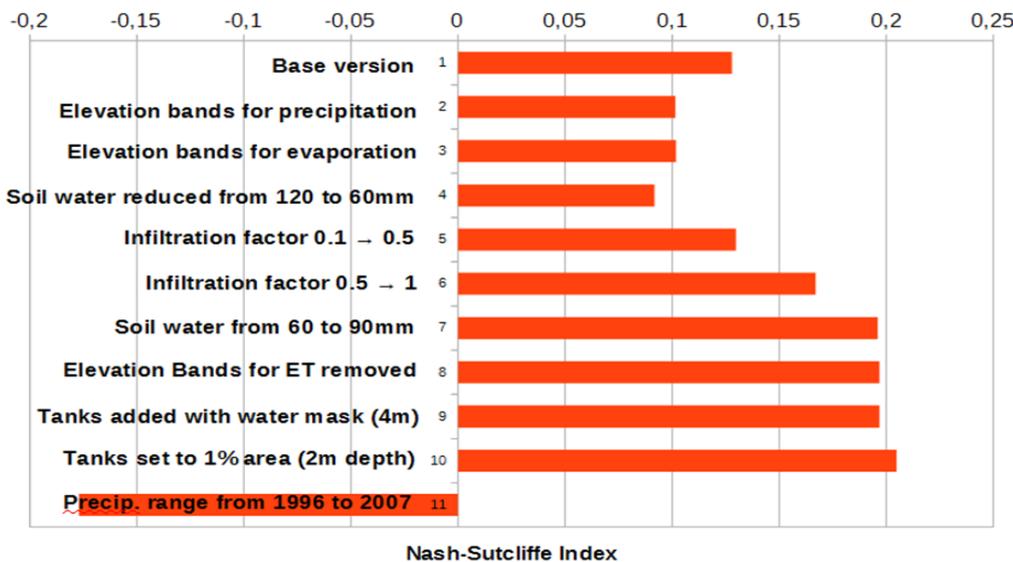
**Table 1: Computed catchment parameters, computed with precipitation stations inside the catchment (MIN and MAX define the range for the optimisation procedure)**

	Value	Min	Max
Field capacity (mm)	69,36	20,00	70,00
Groundwater cap. (mm)	89,49	10,00	500,00
Wetland (fraction)	0,10	0,00	0,50
Root Depth (cm)	61,17	10,00	250,00
ET Factor	2,44	0,80	3,00
r <sup>2</sup>	0,50	0,02	0,00
<b>Nash-Sutcliffe</b>	<b>0,50</b>	-42,46	-0,07
RMSE	0,13	1149,40	0,28

**3.2. PC-Raster**

The procedure for the PC-Raster simulation followed the one described above. In addition we implemented different spatial algorithms not possible with the one dimensional SIMPEL approach. Figure 3 shows a

part of the results with the PC-Raster model, simulated with the precipitation from Bangalore. The use of the precipitation stations downstream decreased the simulation quality to NS values around 0. First, precipitation and evaporation were changed depending on different elevation, i.e. an increase of precipitation with elevation and a decrease of ET (no. 2-3). Both changes had a negative impact on the simulation quality. The next parameter changes reflect the soils and the land use of the region: soils are partly shallow and there on the steeper slopes rock outcrops can be found. A decrease of the soil water storage capacity (SWC) also decreased the NS. In the next steps we left the SWC, but increased the amount of water which infiltrate into the soil. The infiltration factor separates the infiltration into the soil and surface runoff. A low infiltration factor would generate more runoff and vice versa. The simulations 5-7 show a clear effect: NS increases to the highest value. The addition of the irrigation tanks based on the remote sensing images (no. 9) and based on the 1% area in flat pixels (no. 10) had not the expected effect. The last simulation run (11) limits the input values to the time span of the new precipitation data and lead to a dramatic decrease of the simulation quality. The subsequent runs with precipitation data lead to NS values between -0.1 and 0 and thus did not bring the expected increase of simulation quality.



**Fig. 3. Nash-Sutcliffe indices for the PC-Raster scenarios (explanations**

#### 4. Conclusions and Summary

The aim of this study was to increase the simulation quality for the Pennaiyar catchment with a special focus on the integration of irrigation tanks in the models and the addition of new values for precipitation in the downstream part of the catchment. To achieve the aims in the limited time of the research stay of G. Hörmann, we used the parsimonious models, the spreadsheet model SIMPEL and the spatially distributed model PC-Raster system. The inclusion of the new precipitation data sets did not increase the modelling quality, possibly because the time span covered by the data set was not long enough and not representative. The inverse modelling with the SIMPEL system achieved NS values near 0.5 – the highest of all simulations. However, the parameter values needed for the data set were not realistic. With the additional precipitation data, a reasonable tank volume, irrigation area and soil storage was computed. Results from PC-Raster system were best using only the rainfall data from the station Bangalore. The new precipitation data and the inclusion of the irrigation tanks did not increase the simulation quality. The SWAT simulations with tanks included by A. Strehmel did also not exceed NS values of 0.08. The final recommendation can be summarised as “back to the

roots”: to verify and model the sustainability of a project we need good and long term data sets of climate and discharge. This does not necessarily require high tech solutions: ground water and water level in rivers can be easily measured with simple devices.

#### 5. References

- Arnold, J.G., Srinivasan, R., Muttiah, R.S., and Williams, J.R., 1998. Large area hydrologic modeling and assessment - Part 1: Model development. *Journal of the American Water Resources Association*, 34 (1), 73–89.
- Hörmann, G., 1997. SIMPEL - Ein einfaches, benutzerfreundliches Bodenwassermodell zum Einsatz in der Ausbildung. *Dt. Gewässerkundliche Mitteilungen*, 41 (2), 67–72.
- Hörmann, G., Köplin, N., Cai, Q., and Fohrer, N., 2009. Using a simple model as a tool to parameterise the SWAT model of the Xiangxi river in China. *Quaternary International*, 208 (1–2), 116–120.
- Karssenbergh, D., Schmitz, O., Salamon, P., Jong, K. de, and Bierkens, M.F.P., 2010. A software framework for construction of process-based stochastic spatio-temporal models and data assimilation. *Environmental Modelling and Software*, 489–502.

## Upcoming IGCS Events

### IGCS DAAD– Alumni Workshop

From Nov. 6-7, 2014, IGCS organizes a workshop exclusively for DAAD Alumni on the topic “**Globalization, Sustainability, Lifestyles—Think globally, act locally**”. The workshop is funded by DAAD with the objective to facilitate sharing and exchange of ideas of DAAD Alumni on the workshop themes. This will be a highly interactive two-day event with speakers and facilitators from India, an expert from Germany, and IGCS faculty. Further information available at <http://www.igcs-chennai.org>

### IGCS Winter School 2015

“**Sustainable Water Management in Urban Areas**” will take place at the Indian Institute of Technology Madras from 2 – 15 March, 2015. The aim of this winter school is to learn how to sustainably develop and manage the water resources infrastructure in urban areas. The winter school comprising of lectures, excursions and student projects, will cover all aspects of urban water management including water treatment, water distribution, wastewater management, source protection, adaptation to climate change, the role of public private partnership and equitability in water supply. For further information regarding your involvement as lecturer or participant visit: <http://www.igcs-chennai.org>

## Forthcoming Conferences

### Fifth National Research Conference on Climate Change

Indian Institute of Technology Delhi  
December 19-20, 2014

Indian Institute of Technology Delhi, Indian Institute of Technology Madras, Indian Institute of Science Bangalore and Centre for Science and Environment, under the banner **Indian Climate Research Network**, are organizing the **Fifth National Research Conference on Climate Change**, to be held at IIT-Delhi on **December 19-20, 2014**.

The conference will cover topics related to the scientific, technical, economic and policy aspects of climate change in South Asian countries, with a special emphasis on renewable energy. This event, the fifth in the series, intends to nurture and enhance a dedicated network of climate researchers.

Abstracts are invited from faculty, students, civil society organizations and practitioners in the areas of **climate science, impacts, mitigation, adaptation, disaster risk reduction and renewable energy**. Abstracts should provide evidence of independent research and be of direct relevance to the South Asian context. Selected abstracts will receive a slot for **presentation or poster session**. There will also be panel discussions involving invited speakers from a range of different backgrounds.

**Abstracts should be submitted online by October 30, 2014 at: <http://www.icrn.in/abstractsubmission>**

For more information, contact:

#### Arjuna Srinidhi

Programme Manager, Climate Change  
41, Tughlakabad Institutional Area  
New Delhi 110062  
Email: [arjuna@cseindia.org](mailto:arjuna@cseindia.org)  
Tel: +011 29955124, 29956394, 29956399 (Ext: 307)

### First National Conference on Sustainable and Smart Cities (SSC-15)

S.V. National Institute of Technology, Surat,  
16-17 January, 2015

Website: [www.svnit.ac.in](http://www.svnit.ac.in)

At present Government of India has declared to design and create 100 smart cities therefore the purpose of this conference is to present and exchange advanced knowledge and practices in the field of smart cities. The conference will create a platform for the researchers, policy makers and consultants to deliberate various issues pertaining to sustainable smart cities.

For All Correspondence Contact :

Mr. Ravin M. Tailor  
Asst. Professor & Organizing Secretary  
Urban Planning  
Civil Engineering Department,  
SVNIT, Surat – 395 007, Gujarat.  
Mob: +91 9825426592  
Email id.: [ravin@ced.svnit.ac](mailto:ravin@ced.svnit.ac).

### International Conference on Climate Change and the Developing World

Kottayam and Nilackal in Kerala, India

21-25 January 2015

Organised by CMS College , Kottayam, CSI (Church of South India) Synod Department of Ecology and Nilackal Ecological Commission.

The cumulative effect of self-centered human activities in the wake of neo-liberal globalization, has led to an uncontrolled increase in Green House Gas (GHG) emissions leading to global warming and Climate change. The conference visualizes a low-carbon society, a resource-circulating society, and a society in harmony with nature as its end result. It also offers the participants a field visit and stay at Nilackal situated in the heart of the biodiversity rich Gavi, in addition to a platform for discussions and deliberations on Climate change issues.

#### Organising Secretary:

Dr. Mini Chacko, Associate Professor, Dept of Botany, CMS College, Kottayam  
Email: [drminichacko@gmail.com](mailto:drminichacko@gmail.com)

## Conference Participations

**Franziska Steinbruch**, Visiting Associate Professor of the Indo-German Centre for Sustainability at the Indian Institute of Technology Madras in Chennai, participated in the International Conference on “Geostatistical and geospatial approaches for the characterization of natural resources in the environment: Challenges, processes and strategies” of the International Association for Mathematical Geosciences. The conference was organized by the Hydro and Environmental Geology Laboratory, School of Environmental Sciences of Jawaharlal Nehru University in New Delhi, India from 17-20th October 2014. She gave an oral presentation during the isotope hydrology session titled “Characterization of the rainfall of Central Mozambique based on isotopes of water”. Her extended abstract co-authored by Stephan Weise was included in the book “Geostatistical and geospatial approaches for the characterization of natural resources in the environment: Challenges, processes and strategies” published by Capital Publishing Company, India and co-published with Springer Germany (ISBN 978-93-81891-25-4, pp. 187). The conference provided a platform for scientists coming from a variety of fields such as from climate and environmental research, sedimentology, mineral exploration, hydrological modeling and predictions,

as well as applications of isotopes and hydrogeochemistry. Though participants came from all over the world, a remarkable number was from Indian and German academic and research institutions which offered a great opportunity to look for potential future linkages within the frame of the Indo-German Centre for Sustainability.



**Christoph Woiwode** received a DAAD conference grant to participate in the International Conference on “Urban Futures-Squaring Circles: Europe, China and the World in 2050”, 10-11 October, Lisbon, Portugal. This conference explored advances in long-term thinking for sustainability, futures studies and strategic planning. Christoph presented a paper on “Practical Spirituality and the contemporary City: awakening the transformative power for sustainable living”. Conference proceedings are available at <http://hdl.handle.net/10451/12210>

## EDITORS

**Prof. B. S. Murty**  
+91 44 2257 4262  
[bsm@iitm.ac.in](mailto:bsm@iitm.ac.in)

**Prof. Christoph Woiwode**  
+91 44 2257 8446  
[woiwode@igcs-chennai.org](mailto:woiwode@igcs-chennai.org)



### Postal address:

Indo-German Centre for Sustainability,  
MSRC Building, IIT Madras,  
Chennai 600 036, India  
Website [www.igcs-chennai.org](http://www.igcs-chennai.org)

The IGCS Bulletin appears quarterly in the months of January/April/July/October.  
Please contribute news items or features at least 15 days in advance of publication.