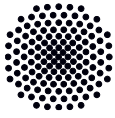


**Universität Stuttgart**

Master of Science Program – WAREM : Water Resource Engineering and Management

**8TH EDITION  
WAREM  
NEWSLETTER**

Let us take you on the journey  
towards some of the experiences  
of the members of the WAREM  
family for the year 2019!



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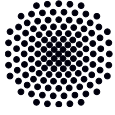
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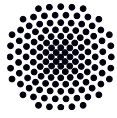
WAREM Newsletter no. 8 tells about WAREM students who were and are at home in the world. WAREM has never been focused on Stuttgart, but last year I had the impression that the world had gotten bigger and bigger. Many exams have been written remotely, but at the same time. A fact that almost drove one or the other crazy.

Many experiences have been made in countries around the world: from internships in Peru to semesters abroad in Australia and Taiwan.

There is not much more to say about newsletter no 8. It is full of stories, full of optimism, full of curiosity and fulfilment. Thus, all I have to do is to wish you: enjoy reading it.

## **Introduction**

By: Weiss, Anne



**Universität Stuttgart**

Master of Science Program – WAREM : Water Resource Engineering and Management

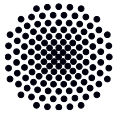
When I started studying the WAREM program in 2018, I was already sure that I wanted to be a candidate for the double degree with Chalmers University of Technology in Sweden. I came across Chalmers already years ago, as it is known to be one of the leading Universities in terms of sustainable engineering in Europe. Since I arrived in Sweden in August 2019, I never regretted my decision to come, even though I did not have a break between the German semester (ending in October) and the Swedish Semester (starting in August). The additional degree I am going to obtain from Chalmers is in Infrastructure and Environmental Engineering with a focus on stormwater and hydraulic modelling. Accordingly, I am taking courses in sustainable urban water engineering, water systems and modelling, contaminated sites and remediation as well as infrastructure and urban systems. The biggest difference between the two universities is the number of students studying at university. While University Stuttgart has many students of around 30,000, Chalmers just has around 10,000 which is completely visible and perceptible at campus and in class. You know personally the Swedish and international students you are studying with as well as the teachers by first name. Thus, I felt the focus is really on the individual carrying and growing.

## **WAREM DOUBLE DEGREE PROGRAM – CHALMERS UNIVERSITY**

Studying and living abroad and  
obtaining a double degree

By: Hövel, Thekla Eleonore

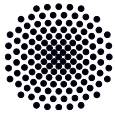




As a German, I assumed that the Swedish culture would not be so different from mine and nevertheless I was positively surprised. In Gothenburg and I assume also in Sweden as a whole, the people are calm and relaxed even though the city has with the surroundings 1,3 million inhabitants. Nowhere else have I had the experience of trams waiting for travellers and commuters to arrive and enter even during the rush hour. The city is embossed by the industrial sector as well as the alternative scene. Thus, you find here a scenery of second hand shops and vegan restaurants in front of cranes used for loading goods on containerships at the harbour. Unlike as in Germany you would not meet your Swedish friends for a beer, for Swedes their 'beer' equivalent is coffee at any time of the day. The so called "fika" is the first Swedish word I learned as it seems to be mandatory for the Swedish to have every two hours a coffee break where you come together with your friends, family or co-workers. Even though the Swedish are slightly quieter than Germans and might seem a little "cold" at the beginning, I must say that I never heard or experienced any unfriendliness here. Once you know each other better, you will always receive a warm greeting and an invitation for a chat during the next "fika".

Despite all these factors the most amazing part of my experience is that I live next to the sea. Within 30 minutes by public transport I can reach one of the many islands laying in the North Sea in front of the harbour of Gothenburg. Normally, every weekend I make a trip to the islands. On these islands you rarely see the inhabitants, and they are car free, as the main part of the landscape is set as nature reservoir. In my opinion the reason why Swedish people seem so calm and happy to me is their closeness to the sea and nature in general.





### ...about learning German:

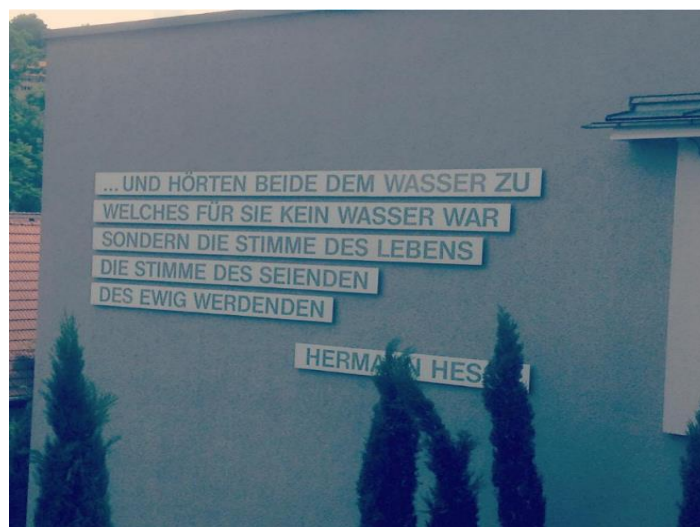
I wasn't sure I'd survive in Germany if I didn't speak any German. I learned as much as I could in the 9 months before moving here and made it directly into the C1 class during the intensive German course. As it turns out, you can survive in Germany without having to put in all that effort...but knowing enough of it landed me a few HiWi jobs early on, which are helpful to learn "how to work in Germany".

Whichever language you choose to learn, whether it's for a job, for your studies, or for personal reasons, keep your motivation in mind. Enjoy the process of exploring different learning techniques, find what works best for you, and modify your learning technique as your skills improve. The courses at the university might be enough for you, but you might also want to check out various resources available online. There are plenty of options, and a lot for free! The Deutsche Welle podcasts and learning materials, Duolingo, Memrise/Decks, Easy German on Youtube...I'm sure you'll find something that's right for you. Next, consistency is key. In the summer before moving to Germany, I didn't have a job, so I made learning German my full-time occupation. But what really helped with learning was that I spent at least 5-15 minutes on it every day. Even on days where I was "too busy", I still made sure to listen to a 15-minute podcast while falling asleep, and that was my (very lazy) learning for the day. I must finally also thank my mother, who studied German as a foreign language in university, and supported my learning efforts, so that we can now argue about German grammar with each other. I wish you a lot of fun while learning German!

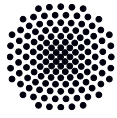
### LIFE AFTER WAREM

Christène started her WAREM studies in 2015. After completing her studies, she did a short internship at the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), after which she started working at the Deutscher Wetterdienst. Here is what she has to say...

By: Razafimaharo, Christene Sylvia







### **...about the Master's thesis:**

It can be overwhelming to choose a research topic to commit to for half a year, on which you'll have to work with minimal supervision, and document everything at the end. The master's thesis is one of the few opportunities where you get to work on something that really interests you, maybe on what brought you to WAREM in the first place - of course you want to make the best of it!

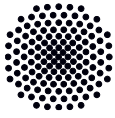
I had been interested in hydrology from the beginning, and eventually thought of incorporating snowmelt. After a not-so-pleasant experience during my bachelor's thesis, I also made it a priority to have a responsive supervisor I could easily communicate with. When I contacted Dr. Seidel from the LHG and he told me they had an ongoing project in Peru, and I could explore the idea of hydrological modelling for a tropical glacier, I couldn't ask for a better thesis topic. As a result, I not only learned to program in Python, but I also played around with satellite data and GIS, I learned about the physics of energy balance, and I learned to manipulate hydroclimatic data. I must thank Dr. Seidel for his various suggestions and ideas. I was always motivated to keep digging into this topic, despite the limitations due to data quality, despite the long simulations that wouldn't yield better results, despite the 6-year old laptop that died on me during crunch time. This knowledge and experience formed the basis for my current work as a research scientist at the Deutscher Wetterdienst (DWD; Germany's National Meteorological Service).

Whatever your thesis topic, you can make an enriching experience of it by learning as much as you can about it. Be curious about what you don't know/understand, and explore knowledge beyond what you learned in your classes. With the help of your supervisor, find some exciting new ideas you can explore and play around with, even if in the end they don't succeed. If you can integrate a bit of programming into your project, it's a skill worth learning, e.g. to analyse data and produce aesthetically pleasing plots. If you want to learn programming, Python is a very accessible and intuitive language to start learning how to "think like a programmer". I wish you a master's thesis filled with valuable learning opportunities!

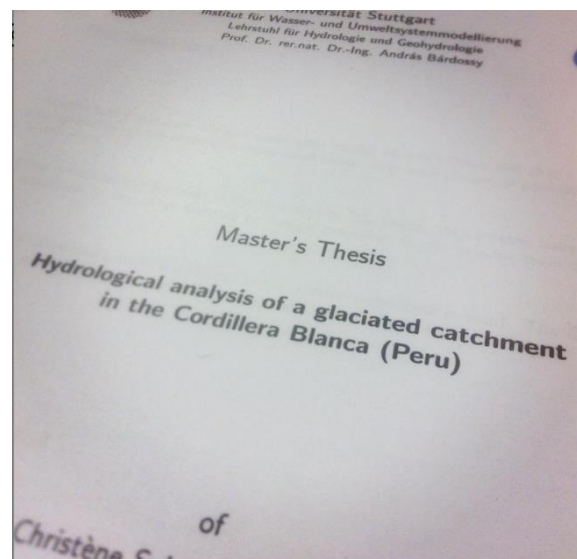
### **...about working at the DWD and living in Germany after WAREM:**

I have been working at the DWD since August 2018 on a multi-disciplinary project looking at how to adapt the German federal transport system to climate change (<https://www.bmvi-expertennetzwerk.de/>). Our team produces hydroclimatic data (historical and projected), which we analyse and transmit to project partners. I'm specifically in charge of a historical data set, which I validate and analyse. The core of my work consists of programming, and I have also redacted multiple reports and given presentations on my results.

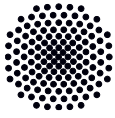
All of my work is done in German (report-writing, presentations,...). I must thank my supervisor and my director for taking the time to proofread what I produce, and to understand what I mean with some of my more awkward formulations. German is the working language at the DWD, but what's more important is that co-workers understand each other, and thus using English is welcome if necessary. My general impression is that if you show you are willing to do the work, to learn, and to communicate (especially when in doubt!), language does not have to be a barrier, but rather a "tool" that is continuously being "sharpened".



Working on this project allowed me to gain a better understanding of Germany in general – how does Germany “function”, what are some important (socio-)economic issues, how are decisions made...When we’re in the “university bubble”, we don’t necessarily learn everything about how Germany’s society and economy are run, how they are evolving, and how these affect our daily lives. This is even more important if you are planning on settling here for the medium to long-term. Gather some knowledge about the tax system, the welfare system, insurances, what your rights and entitlements are – knowing about them, and how to manage them, makes life a little bit easier. Even as I’m preparing to move back to Canada, some of my knowledge gap regarding retirement pensions is catching up on me...clearly, the learning never ends!







Part of a master program "Water Resources Engineering and Management", the University of Stuttgart provides opportunities for studying and training abroad. The ERASMUS program organises these opportunities, which not only offers the best possible exchange experiences but also supports required necessities. As such, I went to a voluntary internship program at the International Hydropower Association - IHA in the United Kingdom.

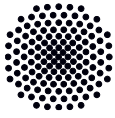
The International Hydropower Association is, located in the diverse city of London, in the core of England. They offered me an opportunity as a Knowledge building intern at the Research and Policy team of the company. As an international student, the requirements of a visa, the visa process and formalities are inevitable. With the excellent support of the Erasmus Team and WAREM program, I was able to get a visa on time for the start of the exchange program. Therefore, I could successfully finish the five-months internship at IHA.

The company welcomed me warmly since the beginning of the traineeship. The team offered me many learning opportunities throughout the journey. Having two supervisors had enormously contributed to the quality of my work. Daily conversations across the organisations and working groups of IHA had positively impacted my ability to communicate in the professional working environment.

### UK INTERNSHIP EXPERIENCE

By: Ei Phyo, Pann Ei





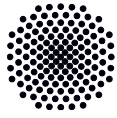
Furthermore, I attained the professional relationships and international network through this internship. International Hydropower Association holds the biennial conference of Hydropower Sector. And this year (2019), it conducted the "7th World Hydropower Congress" at the beautiful city of Paris, France. The preparation of the congress, the events itself and the post-congress reports, enforced my inter-communicational, organisational skills, and flexibility while working together with various professionals coming from diverse backgrounds. Moreover, the biannual board meetings of the company taught me the importance of international organisational structure.

Beside the professional working environment, I had successfully built the community relationship and friendship with both local and international residents. Because of the long history between the United Kingdom and my home-country Myanmar, I was able to meet the Burmese communities who reside in London. Through this network, I celebrated the Myanmar New Year traditionally as in Myanmar. Furthermore, I was invited to visit the headquarters of BBC Broadcasting Centre. On the other hand, many of my friends are living across the United Kingdom, and I had a chance to reunite with them. Similarly, I paid a visit to the headquarter of the "Prospect Burma" organisation, which supported my educational journey in Germany. Through the provision of this Erasmus program, I could reinforce a stronger relationship with different communities.

During the holiday, I could experience the natural beauty of the United Kingdom through travelling. As my internship fell upon the summer period, the blossoming of flowers in the countryside of England is cultivating. Witnessing different colour patterns and the natural beauty of English countryside during summer reminded me of my childhood - reading the English literature with the longing of experiencing them. Seeing the highlands of Scotland and hiking the mountainous Snowdonia in Wales filled my heart with excitement and happiness. Similarly, the Giant Causeways and the beauty of Northern Ireland gave a lifetime memory of having witnessed the edge of the Atlantic Ocean. The diverse culture in the United Kingdom has further uplifted my cultural understanding to be a global citizen.

To conclude, this internship impacted me both professional and my personal growth. This joyful and exhilarating experience had delighted me to enjoy life while learning. I would love to recommend and encourage everyone to sign up for the Erasmus Exchange or Internship during their educational journey.





I am from Dhaka Bangladesh. I have studied civil engineering in my bachelors and by the grace of almighty I was selected to be a lecturer in the same institute from where I have completed my studies and that is Military Institute of Science and Technology (MIST). Germany is said to be the land of education and engineers. I was fortunate enough to get the admission in the University of Stuttgart in WAREM. My husband is also a WAREM student and he is from generation 16.

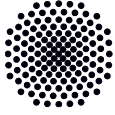
After getting admission in this subject, I found myself to be the most fortuitous person. I would say WAREM is just not a subject, it's a family. The experiences and proficiency which I have gathered from WAREM is incomparable. Starting from the course work to the field excursions, all seemed to be knowledgeable, well-informed and sophisticated. WAREM is a multicultural course. People from all around the world are in this course. I must say that within a very brief period I have got to know a lot of people and could make a lot of new friends. Our course coordinator Anne Weiss is one of the cordial people I have ever met in my life. She is a guardian to all of us.

The courses of WAREM program are leading subjects. It has three main parts and those are "Ground water resource management and geohydrology", "Sanitary engineering" and "Hydraulic engineering and river basin management". My course selection was mostly on sanitary engineering and hydraulic engineering parts. My point of interest was more in sanitary engineering and finally my master thesis was in this field. I have worked with Herr Dr. rer. nat. Bertram Kuch on the topic of removal of dye material from textile industry wastewater by activated carbon. This is a fascinating topic in the present world and it is also a vital topic for the country like Bangladesh. I have worked in Institute for Sanitary Engineering, Water Quality and Solid Waste Management (ISWA) with my thesis. This department is really popular for the wastewater treatment and it is also responsible to clean wastewater from some of the dormitory of the university. In the University of Stuttgart, I have also worked as a research student in the Institute of Geotechnical Engineering (IGS) and in the department of Hydrology and Geohydrology, Institute for Water and Environmental Systems Modeling (IWS). In Germany research student (assistant) is known as HIWI. I was also fortunate to get a scholarship from Zweckverband Landeswasserversorgung. This is a water utility company in Stuttgart, Baden-Württemberg which has collaboration with WAREM.



### My WAREM Journey

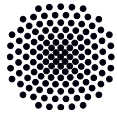
By: Wohab Onnesha, Washi Binte



**Universität Stuttgart**

Master of Science Program – WAREM : Water Resource Engineering and Management

My WAREM journey almost came to the end now. I barely remember how these two years have passed. This place and Stuttgart has a lot to offer and helped me to construct myself in a better way. I would say for my future carrier I have achieved a lot. I can use all the knowledge in my professional life, which I have gathered from here. The rewards and achievements from WAREM are precious and cherished.



I was always fond of working for the development of my Country. I wished to determine how effective I would be once I returned to work for India. The right opportunity came by as I applied to work for at an NGO named ATREE under the guidance of Dr. Sharachchandra Lele. The project idea fascinated me as it looked at many facets of the water sector. The knowledge gained will help me through the journey of contributing towards the water sector.

I worked as a Research assistant in ATREE (Ashoka Trust for Research in Ecology and Environment) and Divecha Center for Climate Change, IISc (Indian Institute of science), Bengaluru. The project I was working on was a collaboration between the two institutions. The Integrated Urban Water Management (IUWM) pilot project had its main objective of dealing with water scarcity in the growing city like Bengaluru by supplementing the centralized water resources with sustainable alternative water resources. To assess these alternative resources, a fundamental determination of all Urban water components was required. This was the task given to me of identifying the different components and determining the values and its basic statistics.

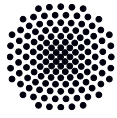
The pilot project was conducted in the Kaikondrahalli and Halanayakahalli lake series which lies in the outskirts of the city. The tasks that could be accomplished during the internship were establishing the elements of the catchment in QGIS. Ex: wards (urban components) and villages associated with the catchment, area estimation, population estimation etc. Then extracting Census 2011 data sets for the study area and interpolating different water aspects such as drinking water sources, sanitary facilities available etc. An interesting theme of estimating domestic water consumption, CII (Commercial, Industrial and Institutional) water consumption and surface runoff was also executed.

The learning process was rigorous during the two-month internship, but the outcomes were fruitful and fulfilling. The success was in collaborating with a motivated team - MSc. Karthik Madhyastha – Project Scientist DCCC and MSc. Linitha Matthews – Research Assistant DCCC and a determined guide Dr. Sharachchandra Lele to arrive at useful research results. The interactions for collecting data included establishing contact with other water experts and water related institutes. Biome environmental solutions were one of the first contacts and by interacting with them, relevant data could be taken. BWSSB (Bangalore Water Supply and Sewerage Board) is a premier government agency supplying centralized water supply to the city and in charge of managing the sewage. Dependency on Piped water supply, Wastewater treatment plants etc. are some of the data that was useful for the research. The process of collecting data was quite remarkable as I had to interact with many to absorb the relevant information.

## INTERNSHIP - INDIA

By: Bangalore Lakshmiprasad,  
Radhakrishna





The possibilities of employment in my home country was also one of the reasons for this internship. I was fortunate to attend two international events namely: Water future conference and IFAT Mumbai 2019. The water future conference was organized by Divecha Center for Climate Change, IISc Bangalore. It took place from September 24 – 27, 2019. The main aim of the event was to tackle SDG 6 by allowing partnerships across academia, governments, intergovernmental, development organizations, foundations, and the private sector. The event hosted 30 internationally reputed speakers and as many as 700 participants. The event gave me access to real-time knowledge under the present context along with exploring job opportunities by listening and interacting with distinguished individuals. The 2nd event I attended was IFAT Mumbai 2019. It is the leading environmental technologies trade fair organized by Messe München. The trade fair provides a platform to display and discuss all issues related to water, wastewater, holistic waste management, recycling solutions and environment focused subjects. On participating in this event, I could get in touch with several companies of my domain and discuss with them of any likely job offers. The DAAD-sponsored stalls had representatives and Alumni's from German institutions. This was a great opportunity to discuss about my career with them. Scholarships offered, collaborative projects of India and Germany, GIZ – initiatives are some of the noted points discussed during this event.

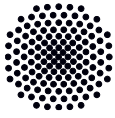
Overall, the two-month internship went by swiftly and each day I had something new to learn. The discussions, presentations and interactions with distinguished water experts will go a long way in my career.

I would like to thank all the relevant institutions, namely ATREE and DCCC for hosting me during the two-month time period, STUBE – BW for its financial support and the WAREM department for providing the necessary assistance.



Photo of the Research Team – Project IUWM. From L to R. MSc. Linitha Matthews, MSc. Karthik Madhyastha, B.L.Radhakrishna, Dr. Sharachandra Lele





The three main pillars of Integrated Water Resources Management are science, government and society. During the WAREM September Week Project we had the opportunity to understand how these three actors are put in work and how they are closely related to our professional life as Water Resources Engineers. As students, our scientific thinking is developed in the university, where we learn in detail the aspects of water infrastructure. Nevertheless, by visiting Stuttgart's water facilities we gained a broad insight into the governmental and social issues in a more factual way. We recognized the importance of communication between authorities and the public and how it plays an enormous role in project adequacy and acceptance. Our goal was to raise public awareness by developing informative videos about Stuttgart Water Infrastructure. For that, we worked in groups and assigned task to design a poster so that any person could scan QR Codes for watching these videos, which are available at WAREM's Youtube Channel. What specially marveled me was to see my colleagues taking responsibility for challenging tasks and we organized ourselves with synergy and teamwork. We would like to thank the companies and associations who supported and supervised us in the field visits, the WAREM's course staff, specially Mrs. Anne Weiß and the special dedication Mr. Rüdiger Heidebrecht, from the German Association for Water, Wastewater and Waste. Finally, I would like to say that this project is proof that teamwork pushes us to greater results and thus, I send my best compliments to all participants.

### September week Project

By: Negreiros, Beatriz

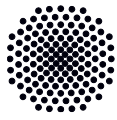


Photo of the Team – Project September week

## WATER INFRASTRUCTURE IN STUTTGART TECHNOLOGY & COMMUNICATION



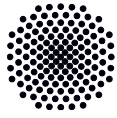
### Scan & Explore!

- Mühhlhausen WWTP**  
Heavy solids screening pollutants to protect biological treatment, quality control and clean water discharge into the river (L&M link)
- Max-Eyth See**  
Recreational lake that with heavy IT support and a live weather display, creates the perfect mirage.
- Drinking wells Bad Cannstatt**  
22 drilled fountains of healthy water are bubbling up every day from over 200 wells in the urban area.
- Nesenbach Channel CSO**  
High volume overflow (10,000 m³/s) from precipitation and flood stage of swollen river into the river.
- EnBW Drinking Water Tank**  
Clean and drinking water storage and supply from pipelines, for high reliability of service.
- Areal Neckarpark**  
Capturing rainwater with green roofs and biocells, increasing infiltration along permeable pavements, and smart flood recovery.
- Landeswasserversorgung Drinking Water Tank**  
Advanced drinking water storage and supply from Danube river and Danube reservoirs.
- Adiro Automatisierungstechnik GmbH**  
Development of heating arrangements and industrial applications for energy engineering.
- Scharnhäuser Park**  
Thinking infiltration and bio-retention in urban water spaces (Landscape) model land use.

Student Project Week September 2019



Project September week - Poster



The 20<sup>th</sup> Annual Colloquium of IAHR YPN, BW was held on the 29<sup>th</sup> of November 2019. The motivation for the colloquium was derived from Prof. Weiprecht; the committee consisting of 7 members (Falko Dietz, Geoff Rahe, Matthieu Aoud, Beatriz Negrarios, Italo Lima, Radhakrishna B L, and myself Veethahavya K S) was shepherded by Dr. Haun; while Mr. Mouris and Mr. Mester brought in a sense of ease in all the tasks; while Ms. Weiß helped stich the show together.

The first half consisted of six presentations by young professionals (Mohamed Tarek, Siddharth Seshan, Jessica Hespen, Eduardo Acuña, Andrea Campoverde, and Radhakrishna Bangalore). Eduardo Acuña was awarded for his presentation on *Operating model for the channel network of the Arenal Tempisque Irrigation District*.

The second half of the Colloquium held within it four presentations from industry professionals – Mr. Patrick Bracken from AHT, Mr. Arslan Tahir from BAW, Dr. Martin Schletterer from TIWAG, and Mr. Berhon Dibrani from Tractabel.

This was followed by an international potluck dinner from our volunteers that staged a platform for everyone to communicate better personally.

More details on the course of the event can be found at: [shorturl.at/ACDN3](http://shorturl.at/ACDN3).

The following train of thought is my take on what the Colloquium invoked in me:

As impactful as Climate Change has proved to be for our future, and having seen all the feats we have achieved as a collective, I often wonder as to why it is taking us so long for us to acknowledge that the path we are on right now is not sustainable and hence make efforts to move towards a collective sustainable lifestyle.

A few reasons for this staggering hindrance were enumerated by the speakers at this colloquium.

As Mr. Bracken debated, it is indeed a logistical chaos; most often with either political or social institutions aiming to derive short-term profits by putting our long-term development at stake.

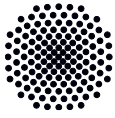
As Mr. Tahir argued, we base a lot of our decisions on something inherently arbitrary compared to development – Money – something that lasts for only one human lifetime thus making our views on development myopic.

As Mr. Schletterer pointed out, we seldom take into account the other life-forms when planning developmental activities; life-forms whose mere existence or extinction can drastically change life on earth as we know it over longer periods of time.

Mr. Dibrani brought in with him the train of thought that quantification of water availability locally is plays a very crucial role in shaping that local community and went on to elaborate the plethora of uncertainties that keep such crucial knowledge at an arm's length from us.

### 20<sup>th</sup> Annual Colloquium of IAHR-YPN, BW

By: Kootanoor Sheshadrivasan,  
Veethahavya



To stress on the problems we face is of justified importance as one can solve a problem only when one acknowledges it and had the motivation to do so.

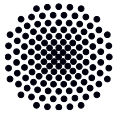
And with Climate Change, the hindrances keeping us away from a sustainable lifestyle are worth pondering over as they are often entangled together.

As for the motivation, the collective mass, if not the scientific community look into our tumultuous trouble with Climate Change as a battle to *Save the Earth, Save Nature*, and the likes thereof. And herein I see a weak link for us to take Anthropogenic Climate Change seriously. The Earth has been around for billions of years before us, and life had flourished for millions of years before us. And should we choose to eradicate ourselves by staying on this trajectory we are on, making similar lifestyle choices, the Earth shall stay and life shall flourish; arguably with better symbiosis.

Now, I wish to argue for a better motivation – *Let us save Ourselves*. Let us keep passing more unimaginable and unforeseeable milestones. And to this end, let us make more conscious lifestyle choices and be aware of the consequences of our choices.

And to this end, I urge myself and each one of you to have more discussions centred around the lifestyle choices we make as a society. Let us ponder and day-dream of a future world, the world of our sons and grandsons and let us then work towards it.

Talk to your friends, talk to your family and most importantly, talk to yourself.



The DAAD Prize is awarded nationwide, with the amount of 1,000 € per university.

We are honoured to announce that one of our students Aron Asfaha Negusse is the winner of the prestigious DAAD Award 2019 for his outstanding performances of foreign students. The award winner was selected based on his excellent study achievements and his social commitment at the University of Stuttgart. Aron Asfaha completed his master's thesis with the title "Optimal Design of Pressure Measurement for Stochastic Calibration of Water Distribution Hydraulic Models" with Priv.-Doz. Dr.-Ing. Sergey Oladyshkin.

We congratulate Aron on his achievements and wish him good luck on his future endeavours.

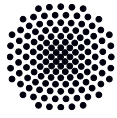
### DAAD Prize Winner 2019

Asfaha, Aron Negusse



Photo - L to R. Priv.-Doz. Dr.-Ing. Sergey Oladyshkin, MSc. Aron Negusse Asfaha, MSc. Anne Weiß



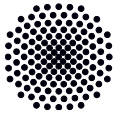


Master Thesis Abstract of Aron Negusse Asfaha:

**Topic - Optimal Design of Pressure Measurement for Stochastic Calibration of Water Distribution Hydraulic Models**

This thesis focuses on establishing a meaningful relationship between information gain and the required acceptable model calibration. The calibration of water Distribution (WD) models is key to any analysis, design evaluation or assessment to be carried out on the WD pipe networks. Several calibration procedures have been developed through the years but still much progress needs to be made, to tackle the challenges in water distribution. The extensive costs and time wasted in acquiring measurement (pressure) data for calibration has made the company RBS-wave doubtful of its efficiency since no hard and fast rule exist to govern measurements. According to the German standards for gas and water works (DVGW) regulation only a minimum recommended use of pressure measuring instruments are provided. In reference to this number the RBS-wave uses four times as much measuring instruments. This boosted the motivation of this thesis to aim at optimizing the number and location of pressure measuring instruments sufficient to provided calibration within acceptable limits. A tool for probabilistic assessment, within the Bayesian framework was adopted from a previous thesis on which this thesis is based. Hence an assessment on calibrated project of the RBS-wave was carried out to achieve similar calibration results but with less measurement information. This guided the second phase of the thesis where a synthetic distribution network was developed to calibrate and identifying the intentional installed network errors by systematically placing the loggers at nodes where high values of coefficient of variation were expressed. Four scenarios were created and analysed to narrow the gap between the recommended DVGW number of measuring instruments, and the number of instruments used by the RBS-wave to achieve optimal use of instrumentation for measurement.





We would like to extend our sincere gratitude to all the authors of the 8<sup>th</sup> edition WAREM Newsletter and highly appreciate the time, love and effort put in to make this happen.

We are open to hear from you any new ideas on the upcoming WAREM Newsletter.

Stay tuned for more updates on the WAREM journey!

**CONCEPT AND DESIGN:**

**Weiss, Anne (Course director,  
WAREM)**

**B.L. Radhakrishna (Student  
Administrator, 2018-20)**