Dear water managers,

In this issue we think about the future. What will be the house of the future, will this be climate neutral? Maybe they are using technologies of astronauts. The recent Dutch elections showed that many people voted for a green view, but the US seems to go in a different direction. Or maybe everything is less severe than it seems. When did we actually hear about climate change in the first time? And how are the international debates regarding climate change a present today? Many questions to ask. We present you an issue to aims to let you think about the future. How do you want the future to be, and what can you do about it yourself?

Career advice from Dr Anonymous

People often ask me why my life after graduation has been such a success. Is it because of my social skills, my superior intelligence, or my startlingly good looks? It is not. I do possess all these qualities, and more, but they are not the key to my success. That is my definition of success.

To me, success is doing what I like and doing it the best I can. I never try to be the best. Some people hold the world record hamburger eating, others can blow the biggest bubble-gum bubble in the world, but I would rather be mediocre in something more meaningful. Not that I ever am mediocre... Moreover, people who try to be the best often just try to look the best. They may for instance use doping or give good presentations. I do not. When I look the best, I really am the best. And I never fail. It may surprise you that I cannot always be the best, but I can always do my best.

It is really easy to follow my advice: just set the right priorities. There is just one little thing: it may not make you popular. People may think you are too independent or lack ambition. In that case you have to work on your image, create for instance an inspiring personal story and believe in it yourself so you will look authentic. If you do that, your career will be as successful as mine!

Odilia Schölvinck
Emilie Buist
Maria Paola Gómez
Martine Rottink
Anna Goense
Anna Waqué

Do you have any comments on the articles? You don’t agree with the contest winner? Or do you just want to share your water story with us? Send in your mail and we can place it in the next Druppel!
THE CONNECTION IS OURS.
CONTACT IS YOURS.
Entrepreneurship in a complex environment but with overview, involvement and understanding of business. Result orientated everyone says it, only a few live up to it. Arcadis: infrastructure – water – environment – buildings. Independently but integral. We shape society by being creative in our solutions and decisive execution.

As an employee of Arcadis you will be an out of the box thinker. You are part of a network that exists of business professionals. Organized around clients who directly will benefit from our knowledge and experience.

WE BRING IDEAS TO LIFE.
ARE YOU INVOLVED?

INDEPENDENT, PROACTIVE AND ENTREPRENEURIAL PROFESSIONALS
WATERMANAGEMENT

When it comes to harbors, hydraulic engineering, water supply, waterlogging, water deficit, water quality, safety and fairway, the division Water and Environment strives for bringing the best results to our clients. A secure life in a delta by a climate-resistant, durable and flexible water system. We connect water to regional development, environment and economy. We create short-term solutions that result in perspectives for the long term. The Netherlands, water country par excellence.

Are you curious about the possibilities in the field of water management at Arcadis? Visit our website: www.werkenbijarcadis.nl. Here you will find our current (internship/graduation) vacancies and you will find additional information about working at Arcadis, movies of our colleagues as well as a list of upcoming events.

Are you curious of learning more about our professional vacancies please contact Ms. Sílvia Wekema, recruiter, via +31 6 2706 0697 or Mr. Thijs Pruissers, campus recruiter, via +31 6 2706 0616, if you want to learn more about (graduation) internship projects at Arcadis.

Will you take the first step?
From the Board

By the time this issue of the Druppel has been published I am no longer a board member of the Dispuut Watermanagement. Board 60 will have become board 61 and three new members will have taken the place of Tara, Chris, and myself, Anna. Anna Luca, Didier, Geerten and Hiddle will stay and this brings the total of board members to seven.

As you can tell, things always keep moving at the Dispuut Watermanagement, and each board is always optimising according to the current wishes and needs from the members. During my time as a board member I have sometimes delved deep into the archive of our association, interested in what has changed over the years and what has stayed the same. For example, there has been a time that we had two fishes as pets, their names were Metcalf and Eddy. I wonder what has ever happened to them, I haven’t found out yet. Also, around five years ago a board wanted more study places in room 4.74, during the last board change we took away one desk and replaced it with a couch. It is actually a comfortable place to chill in between studying. From personal experience I can also tell you it is a great place to take a nap.

But let I stay in the theme of this Druppel issue and have a look at the future instead of the past. At the end of April we will go away for a weekend. I am sure that the Activity Committee has come up with an amazing programme full of fun activities for our members. Of course the Symposium is organised, the theme this year is ‘Virtual Water’. Also the the Fitterij is happening again, I am aiming to break my personal record for the infamous ‘kraantje drukken’. At the end of the semester 27 members of the Dispuut will go to Morocco for ten days and experience what it is to manage water in a water scarce area.

I would like to wish everyone the best with their upcoming exams and report deadlines, but do come by for a cup of coffee or tea at room 4.74 to relax those mental muscles.

Anna Goense
President 60th Board Dispuut Watermanagement

Footprints of the future generations of engineers

As I’m writing this column, I’m looking out over the pretty landscape surrounding Princeton (NJ), covered in a white snow blanket and bright blue sky overhead. The weather treated us to a vigorous snowstorm here last week; dropping almost a half meter of snow at wind speeds over 50 km/h. Schools, shops, and the university closed for much of the day and power outages were reported over the southern part of New Jersey state. Moving here early March, for what I thought was going to be a sunny spring visit, I wasn’t prepared for this at all.

Can you remember when we had our last proper snow storm in the Netherlands? It’s hardly worth buying proper winter gloves anymore. That is what global warming does for you. Fortunately my hosts were kind enough to share their winter gear with me, as well as stories of many winters ago, when snow would cover the region for months, only to disappear by the end of March.

Climate is changing and we’re reminded of it time and time again, by weather anomalies and recurrent extreme weather disasters. That humans are the dominant cause of the change is beyond doubt, as shown by an increasing body of evidence. But, climate change is only one of the impacts humans have on Earth and arguably not even the largest. Recent article in Nature Communications showed that 75% of the planet’s land surface is affected by human impacts. Remaining non-impacted areas mainly consist of uninhabitable deserts and tundras. Only 3% of biodiversity hotspots, representing areas with exceptionally high biodiversity, remain without human pressures. What impacts this degree of intrusion on ecosystems will have on the future of the planet, scientists haven’t even begun to understand. E.O. Wilson, a long-standing advocate of environmental protection, argues that only by committing half of the Earth’s surface to nature, we can hope to save global biodiversity and avoid the sixth mass species extinction (the extinction event that wiped out the dinosaurs was the fifth).

In most of history leading up to the current state of the planet and its climate, engineers have played a major role. They have invented a lot of the machinery and technology, designed much of the infrastructure that allowed humans to take control of the planet’s area and resources. In this perspective, what role do future engineers have to play? They have the inventive minds that can help to exploit the last remaining undeveloped resources in the service of mankind. They also have the capability to bend human development towards high efficiency use of water, energy and food. This in order to invent the solutions that will reduce the human footprint on earth.

Technology has paved the way for mass exploitation in the past, the next generation of engineers could pave the way forward towards high efficiency and low footprint exploitation. There is no technical reason why half the Earth’s surface could not be set aside from humans’ footprint. The eyes of tens of thousands of the Earth’s species are on the future generations of engineers.

“...They also have the capability to bend human development towards high efficiency use of water, energy and food."

Graduates list

<table>
<thead>
<tr>
<th>Water Resources Management and Hydrology</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. J. Prijssen</td>
</tr>
<tr>
<td>K. R. A. Geul</td>
</tr>
<tr>
<td>L. Klingen</td>
</tr>
<tr>
<td>J. Dunnewolt</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sanitary Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eva Nieuwenhuis</td>
</tr>
<tr>
<td>Timon Huijzendveld</td>
</tr>
<tr>
<td>Stefanie Stubbe</td>
</tr>
<tr>
<td>A. Chrysovergi</td>
</tr>
<tr>
<td>Nessa Fausta</td>
</tr>
<tr>
<td>Vanida Salgado</td>
</tr>
</tbody>
</table>

Author

Marie-claire ten Veldhuis


2 http://www.siemadclub.org/siemad2017/1-january-february/feature/biologists-manifesto-for-preserving-life-earth
This year, the Let’s Talk About Water festival was held partly in Delft and partly in Amsterdam. The goal of this festival, according to project coordinator Linda Lilienfeld, is to spark the debate around many water issues that the world is facing. The program lasted for two weeks and consisted of different water-related movies. A lot of the Dispuut’s members went to one or more movies, which were all very inspiring. Also, we had some really nice discussions afterwards while enjoying a beer. For the ones who didn’t manage to go: keep it in mind for next year, it is really worth a visit!

This year, the dispuut’s weekend will be organised during the weekend of 22-23 April. It is still a surprise what we are going to do, but it is going to be a lot of fun for sure, so make sure you save the date!

This year, the study trip will go to Morocco. 27 students will leave at the 9th of July for a trip that they will never forget!

As every year, the fitterij will be organised! The event will take place on the 9th of June. Have you always wanted to know how soon you are in “kraantje drukken”? Or do you want to make sure you improve year last year’s record? Find a buddy and subscribe for the Fitterij as soon as possible!

This year, the 69th Vakantiecursus was held. This year the day was all about the different advantages and disadvantages of water. There were twelve speakers in total, of which two students from the Water management Dispuut! Anna Goense gave a presentation about the study trip to Ethiopia last summer and Anna Waque presented the results of her multidisciplinary project in South Africa. Apart from a lot of professionals from the field of sanitary engineering there were also quite some students attending, mostly from Water Management and also from the new master Environmental Engineering.

A week to create awareness about water, organised by several water partners, themed ‘Clean water’. Several activities will be organised, and museums and treatment plants open their doors for the public.

As every year, this year on the 22nd of March it was World Water Day. This day about addressing attention to many water issues all over the world. At our faculty, it is always a good moment to think for a moment about the many people around the world who don’t have access to safe drinking water yet. To gain some attention during this day, Unesco IHE performed a flash mob at the big market square in Delft. We from the Druppel really liked this initiative and propose something similar for the Water management Dispuut next year!

In order to introduce this issue of the Druppel, the committee organised a movie night to watch Leonardo di Caprio’s movie about climate change: Before the flood. Quite some people came and it was a really nice evening. While enjoying some beers and snacks, we watched the movie and had a really nice discussion afterwards. Because it was such a nice evening, we plan on organizing these kind of things more often.

Druppel Film viewing - Before the flood

Let’s talk about water Film Festival

This year, the Let’s Talk About Water festival was held partly in Delft and partly in Amsterdam. The goal of this festival, according to project coordinator Linda Lilienfeld, is to spark the debate around many water issues that the world is facing. The program lasted for two weeks and consisted of different water-related movies. A lot of the Dispuut’s members went to one or more movies, which were all very inspiring. Also, we had some really nice discussions afterwards while enjoying a beer. For the ones who didn’t manage to go: keep it in mind for next year, it is really worth a visit!

Dispuut Weekend

This year, the dispuut’s weekend will be organised during the weekend of 22-23 April. It is still a surprise what we are going to do, but it is going to be a lot of fun for sure, so make sure you save the date!

Morocco Trip

This year, the study trip will go to Morocco. 27 students will leave at the 9th of July for a trip that they will never forget!
Energy transition is all over the news these days. However, what is the energy transition exactly? It turns out not to be a term so easily defined. Different actors view the concept differently. They all have a different understanding of both the technical and social aspects related to the energy transition. Shannon Spruit, a post-doc in the philosophy section of Shell, explains about the upcoming technology of Aquifer Thermal Energy Storage.

It is interesting to see that even though these respondents come from totally different backgrounds, there are also similarities in their visions. For example, it can be seen that most of the respondents see citizens as groups of people that are gaining more and more momentum in the energy transition. We present you the energy transition from different people, that may have more similar views than you think.

**Interview Shannon Spruit**

**Text by Odilia Schölvinck**

Shannon Spruit is a post-doc at the philosophy section of the faculty of TBM, studying the responsible implementation of energy technologies. She has a background in biomedical sciences and medical anthropology. In this interview we discuss how the energy transition can be enhanced by looking at the related social factors and values, instead of merely looking at the technological challenges.

**What are you currently working on?**

I’m part of a project called RESPONSE, which tries to foster socially and ethically responsive technological development in The Netherlands. The idea of the program is that technology should not only have a small set of values (as cost efficiency, safety, etc.) in mind, but should incorporate wider societal values to make product development more inclusive. These values could be the well-being of all people, sustainability, inclusiveness, etc.

**In the project we focus on the implementation of controversial energy technologies. For instance, the wind park development in Katwijk. The people oppose the construction of wind parks in their living area. We study why and how such opposition arises. What you see is that a lot of these people tend to agree with the fact that we should change society, to make energy more sustainable or to be less dependent on countries like Russia. However, they contest the way the wind park proposal is made. Often this is explained with the fact that people agree with sustainable goals in general, but do not want the projects to be in their own backyard.**

**What do you mean with regarding the public opposition as a source of knowledge?**

Many organizations seem to regard the energy transition as a technological problem. However, most of the technologies are already available. A large part of the transition is a social challenge. For example, how the rights and well-being of citizens can be ensured plays an important role. The challenge of getting a long-term energy policy in a political system that has elections every four years is also major. Luckily, more and more organizations and companies seem to realize they need to learn more about the social side of a technological project. Some organizations see the benefits to include citizens to get projects accepted locally. Others have a more intrinsic motivation, they feel responsible for the shaping of society and surroundings and therefore want to include citizens. However, sometimes projects can be even initiatives of local communities themselves.

**How would you describe the energy transition?**

We experience multiple transitions. From a technological per-
Ewald Breunesse is the Energy transition director at Shell, he works on implementing new energy technologies in the market. We spoke about the vision of Shell on the energy transition, the need for an energy law, the role of companies and universities and much more.

What is energy transition according to Shell?
We might have a broader vision than the general public. For many people energy transition is the change in energy supply from fossil fuels to renewable energy. We would focus more on the entire climate question. Let me give you an example, the large industry of steel, plastics, synthetic material etc. cannot yet be fully dependent on solar or wind energy in the next decennia, many changes need to be made at first. The energy transition in the industry is not about the use of renewables per se, but about how efficient they are used.

“If you buy a table at IKEA it says nowhere how much energy you have used.”

Furthermore, we see a growth in demand, with minimal or zero climate change. If we can achieve this, it is of course fantastic.

What is the role of Shell in the energy transition?
In our book ‘a better life and a healthier planet’ we describe different guidelines about which energy sources could and should be used to have a world sound energy policy. Solar energy is needed in the future in large quantities, but in combination with gas, oil and coal. Furthermore, we need to do something about the negative consequences of these fossil fuels, such as capturing the CO2. It is not a problem to use these fossil fuels for a while more, the full change to renewable energy sources will most likely be after 2100. This is because many upcoming economies will at first instance make more use of their energy supply close to home. Even if solar will be very cheap, not everything can work on electricity and you would still need different energy sources. It would be a mission impossible to build all factories in 20 or 30 years fully on solar. It’s not real to tell people that this would be possible. It only could happen if
Several companies, including Shell, came together in the Hague pleading for an energy law etc. Could you tell a bit more about this?

A EU directive for climate regulation is already made targeting 2030, however these directives are not always translated in local regulation. It’s difficult for the EU to force the member states to keep to the agreement. Therefore, sometimes EU member states can get away with not reaching the targets from the EU directive.

If a national energy law is made, the targets can be set for a longer time, for example up to 2050, and the parliament can control whether the government reaches all targets. Several European countries already have such a law. Interestingly, a couple years ago the NGO Urgenda won a court case against the Dutch government. I think that what they did was very impressive. Even though the appeal is still happening, the judge stated that the government already had to take actions. This shows that laws and court cases are needed to make steps in the energy transition. We also need to make somebody responsible for the climate or energy in the Netherlands. This could be a minister or commissioner, somebody with a mandate and budget to perform the tasks of the law.

With these measures companies can have stability for a longer time duration, so they know if it’s profitable to invest. Also, it will give CO2 regulations that are equal for all companies, and therefore make an equal level of playing field. It would also be unfair if in one country companies do not have to pay for CO2 while companies in other countries have to. In this way they lose all their competitive powers.

Now President Trump is in power, do you think your American competitors could have an advantage on you?

It’s too early to say this. Even though you hear a lot of stories about this, it’s unclear how it will be in reality. Actually, the US has become much more clean over the last 10 years. Not because of governmental policy, but due to the discovery of shale gas, lowering of the CO2 production. Also, the coast states, where most production takes place, have said they will follow the climate agreements anyway. The only problem is that the coals of the US are used now in the Netherlands and Germany. Only with a climate law such a thing could be stopped.

Is the ‘Energie Akkoord’ of the Dutch government good enough?

I think that the ‘Energie Akkoord’ is a good first step, but the question arises what to do with the Energy Treaty 2.0? What will happen to the treaty of Paris after the elections? Looking at the current economy with low unemployment, a growing economy and low interest, money should be available for investments in renewable energies. People might think ‘energy transition, such a major head of expenditure’. But you should see it as an investment project of 200 billion euros. It will lead to many new jobs due to the construction of wind parks, and many more related industries. Furthermore, we could sell off technologies abroad, like you see happening in the water industry. We should try to quantify this as much as possible to have an idea of the return in environmental and financial winning.

Are universities doing enough for the energy transition?

I believe the technical universities in the Netherlands are doing well, also the students. However, apart from the technical universities the non-technical universities are also important. They can give insights on questions as ‘how will technologies be accepted by civilians?’, and why protests against, for example, windmills occur. These ‘gamma’ capacities should be used on a technical university as well.

Water Ambition and Imagination

We live in a complex world, shaped and challenged by water: Royal HaskoningDHV understands these challenges and works with our clients to create solutions.

- Connecting to achieve economic growth in changing times, using water as a driver for growth and resilient communities
- Designing our cities of the future to be Water Smart, with the hydro-social environment in balance
- Creating Water Security and Resilience through integrated management of extreme events to deal with both floods and droughts
- More efficient use of agriculture through technical and institutional solutions, to provide "more crop per drop"

Contact us about helping to deliver your water challenges and visions.
What can (geo)hydrologists and water managers do in the energy transition?

**Text by Anna Waqué**

Martin Bloemendaal is doing research on how to make efficient use of the ground as storage medium. The application of Aquifer Thermal Energy Storage grows rapidly in the Netherlands. However, the theoretical savings are not met and in cities with a high demand for ATES the risk of negative interaction is likely to occur. In order to solve these problems Martin works together with researchers from the faculties of EWI, 3ME, Applied Physics and Technology, Policy and Management. Martin Bloemendaal is approached by many students that are concerned about our energy system and want to help improving it. So, if you are interested in this field, don’t hesitate to contact him!

An example of how water managers could be part of the energy transition is by improving and implementing technologies that make use of the ground or groundwater to store energy in the form of heat or cold. An example of such a technique is the application of Aquifer Thermal Energy Storage (ATES). According to researcher Martin Bloemendaal there is still much to gain in this field. Around 50% of the energy that we use in the Netherlands is used in the form of heat. Half of this amount is used for the cooling or heating of buildings. Conventionally, this was done by heating (in a boiler) or cooling water and pumping it around the building. As you can imagine, this is not very efficient because a lot of energy is needed to heat or cool the water. By for example storing water that was heated up during the summer in the ground, you can use this water during the winter to heat a building. In that way, you only need energy to pump the water around (and no energy to heat the water anymore). However, to successfully implement such a technique a multidisciplinary team is needed, that should also contain some water managers.

How I became a climate activist

**Author Maarten Duijnsveld**

A large part of my life I have been interested and inspired by nature; My interest in environmentalism, energy and climate science arose from an ecological voluntary service that I did after completing High School in my home city Hannover, Germany. The insights into the influence that humans have on planet Earth were confronting. I realised that a lot of our daily activities are pushing our planet towards its boundaries.

I think over the past years my two main conclusions regarding sustainability are that 1) it is valuable to be aware of how one’s consumer choices affect the environment, and 2) it is important to understand the bigger picture one’s consumption is taking place in. To address the first conclusion, it is important that you try to make conscious choices in your daily life. This could be ‘simple things’ such as the choices whether you need new stuff as frequently as you buy it, could you adjust your diet or could you switch to a new type of energy. All of these choices are related to a footprint in terms of water resources and emissions, and I think that realizing this is key to environmental awareness. You should not underestimate the power you have as a consumer in our society!

Regarding the second conclusion, it is important that one is critical towards the choices that large companies, industries and politicians make relating to their policies of climate and energy. Many decisions are made on a higher level, often by politicians. It is something we can only influence very little as consumers and citizens, unless we clearly take a position. Meaning that we are stronger if we unite: we are working on hydrogen and in the form of heat or cold. An example of such a technique is the application of Aquifer Thermal Energy Storage (ATES). According to researcher Martin Bloemendaal there is still much to gain in this field. Around 50% of the energy that we use in the Netherlands is used in the form of heat. Half of this amount is used for the cooling or heating of buildings. Conventionally, this was done by heating (in a boiler) or cooling water and pumping it around the building. As you can imagine, this is not very efficient because a lot of energy is needed to heat or cool the water. By for example storing water that was heated up during the summer in the ground, you can use this water during the winter to heat a building. In that way, you only need energy to pump the water around (and no energy to heat the water anymore). However, to successfully implement such a technique a multidisciplinary team is needed, that should also contain some water managers.

“A lot of our daily activities are pushing our planet towards its boundaries.”

After some time in the Netherlands, I had the chance to meet the right people at the right time. I got involved into the so-called Dutch Climate Movement. It feels very empowering to be part of this movement; you stay up to date on environmental, political and social issues and stand strong as a collective. It has been my starting point for climate activism; something that I think plays an important role in addressing energy and climate issues in a bottom-up manner. Since being involved, I have taken part in different forms of protest against the fossil fuel industry or free trade agreements like TTIP or CETA. Our climate movement is a group that is very open towards anyone that wants to get engaged; be it through activism, science, art or any other way.

In my studies I am working on human-climate change impacts on water management, especially in developing countries; on how they can be mitigated, or adapted via measures. For example, increasing water availability for agriculture during more extreme droughts.

I believe that environmental awareness and activism can play an important role in addressing energy and climate issues, especially in the 21st century.

If you are interested in getting involved in the Dutch climate movement, you can contact me via: Maarten.Duijnsveld@t-online.de
"Are you guys civil engineers? Then you will be happy about how this work came about."

Text by Emilie Buist

Researcher and proud to be engineer, professor Ashish Sharma from UNSW in Sydney, presented his research at the Water Resource Management colloquium in December. Anna and Emilie spoke to him about how the impact of flood risk might change in the future.

Climate change and floods

“The number of people impacted by floods is likely to grow from 15-18 million at present to 50 million in 2050... a tremendous increase. This can be explained by two factors. The first factor is that people are more and more converging to the flood plains, because that is where the jobs are. The second is the likely change in our climate. And the climate is what we have focused on in our research.”

How will climate change affect flood risk? The research by Professor Sharma shows us that temporal patterns of storms are getting a higher peak, which means a significant increase in the magnitude of floods. These temporal patterns are changing in a consistent manner for all climate zones, all around the world.

“What is happening you can have rain from cold weather events and warm weather events. The cold weather events are more flat and uniform, but the warmer ones are peakier, like thunderstorms. So suppose you have a 50-50 mix, what is happening—the cold storms are becoming 40% and the warm storms are becoming 60% of all events. This is changing the overall pattern, so more rain—fall at one single point of time. Though the volumes are not the same, the peak flow is likely to increase. That is something that nobody had spotted before.”

Civil engineers

"Are you guys civil engineers? Then you will be happy about how this work came about. The thing that we did, nobody had done before, because they did not have the civil engineering background that all of us had!" Ashish Sharma is an engineering-trained researcher and happy to open up about how this background has contributed to his unique view on the topic.

The approach for the research is derived from the way we approach the calculation of our design floods: “Like the 3-4 step procedure, you have your intensity frequency curve, then you take spatial temporal patterns for your duration and then you take this entire storm that is coming out as an input into a model that will give you the peak flow. And that is your design flood”. Focusing on the change in the temporal pattern had not been done before and proved the increased peakiness of rainfall clearly.

Proof

“The proof was staring at you. There was this clear change that everybody has missed out. We used data from all the places we could find in Australia that had at least 30 years of data. It is a big continent with all climate zones, so I guess that if you take out the arctic and the Antarctic we have all the climate zones. The quality of the measurements is really high. Then we looked at the change in temporal patterns with temperature and it became clear that the pattern is becoming peakier when the temperature increases.” Since the temperatures are likely to increase because of climate change, so will the rainfall patterns.

What is the mechanism behind the temporal change? According to Sharma “nothing really is known, except the basic logic that we follow in engineering to construct these temporal patterns, and the long-standing observation that colder climates tend to have uniform patterns while warmer climates have more non-uniform ones.”

The result is independent of an increase of the total volume. Other researchers have concluded earlier that there will be an increase of extreme rainfall warmer temperatures can hold up to 7% more water vapour; therefore increasing rainfall volumes. However, there are negative feedbacks as well, such as a dry soil that can take up less water. But in urban spaces the soil is not able to compensate for the increase in rainfall, and this might create even bigger problems.

Measures

The message is pretty clear: if we want to prevent future disasters, measures should be taken. In Australia, new guidelines for design flood estimations were made last year. However, there is no strict policy to increase the design flood because of climate change, solely recommendations. We ask Sharma whether he is satisfied, or if more bold action is needed.

“I think, that is a tricky one. As a researcher I would have probably liked a bolder initiative by the government. But as an engineer, I would have been scared of that. When you’re an engineer you are responsible for all of your designs, so if you’re changing something that is wasting people’s money, it gets a little bit tricky. We have to be sure that the science is strong so that people can buy your arguments without any question.”

The doubt is in contrast with his earlier confidence about the research. It seems like there is a fear of the negative public opinion about the topic. We wonder whether he isn’t afraid that measurements will be implemented too late: “when a disaster is the harsh way people find out the severity of the change.”

Our talk moves into the topic of communications how to make sure that there is public acceptance? “I’ve been thinking about that, and that is a very legitimate fear; but then you have to think about winning the argument about actually making a change. So if you rush the argument too soon, you will actually be worsening your chances of winning the final argument. I think it takes a generation for these types of changes to make their way into policy. And then you see that happen.”

“If you can advise all future engineering designs to take this into consideration, you may reduce a lot of the inconvenience that flood brings to you. Like what happens if you cannot go into your car to buy bread or drop your kids to school, because of flooding. And in the worst case the lifesaving opportunities that we can have. As civil engineers, we are trying to improve the functioning of society, to be able to manage life with a minimal amount of discomfort.”

Lessons

What lesson can we take from this? “I am trained as an engineer and this is something that I pride myself with. My training is that if you give me a problem, I should be able to think out the most practical solution to the problem. And this is also the way I approach research. In research we are given a problem, and then you just break it out into components. I think your generation is being confronted by the biggest challenges humanity is facing in a very very long time. And those challenges are an opportunity. And I very strongly believe that those challenges will be solved by engineers.”

Passionate about these type of problems, you can send an email to discuss possibilities for thesis topics to a.sharma@unsw.edu.au
Google Trends is a tool that helps to explore what people around the world search for and gives a perspective on what we are currently interested in. If you take climate change as a topic, Google's data suggests that over the past 12 months, world-wide, we were most interested in climate change during the period of 6 to 12 November. This was just one week after National Geographic made Leonardo DiCaprio’s climate documentary available and the same week it became apparent that Donald Trump would become the new leader of the free world. I imagine everyone was trying to find out if it was true that Trump is a ‘climate denier’, a topic that suddenly felt of great importance after watching Leo walking around on melting polar ice. As the chart suggests, between 25 December and 31 December we were not so interested in the future of our planet and possibly looking for the best Christmas recipes by Jamie Oliver.

The Ngram Viewer, another Google tool, shows you the amount of times a word has appeared in sources printed between 1500 and 2008. Another fun tool to play around with, which can give you a perspective on the long term interest into a certain topic.

From the above chart you can tell that interest in climate change and other related topics surged during the 80s, but, already before that the greenhouse effect, global warming, and climate change were identified as topics worth publishing about. If we talk about climate change, we often think about the future and view it as a the crisis of our time. But concerns about the atmosphere, the emission of carbon dioxide, and the impact of fossil fuels on our planet’s climate have a long history.

The Industrial Revolution was the start of the use of vast quantities of fossil fuels; petroleum, coal, and gas were seen as an ideal energy source to power the economy. This also prompted the first research towards the effect of human behaviour on the climate. The French mathematician and physicist Joseph Fourier was the first to realize in 1824 that the Earth’s atmosphere retains heat radiation. With a leap of physical intuition and no possibility to test his theory, he realized that the Earth would be significantly colder without an atmosphere. Around 1860, John Tyndall discovered that certain gases, such as water vapour and carbon dioxide, interfere with escaping radiation and that, high in the air, these gases work as a barrier, producing a local increase of the temperature at the Earth’s surface. At the end of the 19th century, Nobel Laureate Arrhenius was the first to calculate estimates of the increase of the Earth’s temperature caused by carbon dioxide emissions. Ten years later Royal Dutch Shell was founded, driven by the increasing demand for petroleum for the oil-fuelled inventions that were rapidly transforming our world.

Decades passed by and research showed more correlations between global temperature rise and the use of fossil fuels. In the meantime world population, consumption, and production experienced an explosive growth facilitated by fossil fuels. Around the 90s, the earlier discoveries by scientists started to alarm governments around the world. In 1988, the Intergovernmental Panel on Climate Change was founded with the goal to provide the world with an objective view of climate change. Their first assessment report stated a best estimate of global mean temperature warming of 1.8 degrees Celsius by 2030, in their business as usual scenario. Two years later the Earth Summit was held in Rio de Janeiro, establishing the UN convention on climate change, with the objective to ’prevent dangerous anthropogenic interference with the climate system’.

Twenty-five years later climate change has not been brought to a halt and, according to NASA, the Earth’s temperature has risen by 0.9 degrees Celsius on average. At the moment we face a global environmental crisis with global climate change as the most important and potentially catastrophic symptom. The energy transition towards renewable sources can stop the emissions of greenhouse gases and mitigate the effects of climate change. But will the system that created climate change in the first place, while all along possessing the knowledge of inevitable disaster, also lead the energy transition?
It's all about water: stagnant, fresh, brackish, polluted, clean, cold, warm...

Waternet works with the entire water cycle. This enables us to make the most of the water around us.

Wonen in het rivierengebied betekent wonen in een mooi maar kwetsbaar gebied. Kwetsbaar voor de gevolgen van de klimaatsverandering. Ook in de toekomst werken wij aan een veilig rivierengebied met sterke dijken en schoon water.

Ook een spetterende baan?

Check het: www.wsrl.nl/jongeren

- ontdek de wereld van het water(schap)
- overzicht van wateropleidingen
- stage of afstudeeropdrachten
- kennismaken met onze waterambassadeur
- links naar film en wetenswaardigheden over water
HKV, de kennisondernemer voor water en veiligheid

✓ Stage
✓ Afstuderen
✓ Promotiestudie
✓ Grensverleggend onderzoek

HKV doet onderzoek naar water en veiligheid en adviseert de Nederlandse overheid, provincies en waterschappen.

Onze opdrachtgevers zitten niet alleen in Nederland, maar in toenemende mate ook in het buitenland, met name in Duitsland, Oost-Europa, Afrika en Zuidoost-Azië.

HKV opereert vanuit de adviesgroepen:
- veiligheid en crisisbeheersing
- rivieren, kusten en delta's
- waterbeheer en informatie

Kijk voor de mogelijkheden die wij studenten bieden op www.hkv.nl
Je krijgt de kans om aan praktische oplossingen te werken met onze experts als volwaardig lid van het team. De sfeer is open en gericht op samenwerken. We hebben vestigingen in Utrecht en Delft en er werken hier 32 nationaliteiten.

Bij Deltares werk je mee aan het oplossen van maatschappelijk relevante vragen op het gebied van waterveiligheid, ecosystemen en milieukwaliteit, water en grondstoffen, bouwen in de delta en het duurzaam inrichten van deltagebieden. Tijdens je stage of afstuderen bouw je tegelijk aan een professioneel netwerk waar je nog lang plezier van zult hebben.


Is je belangstelling gewekt? Kijk voor je stage of afstuderopdracht op https://www.deltares.nl/nl/werken-bij/

Author
Maria Paola Gomez

What better way to put our studies on water resources into context than going out on an excursion? Even better when the final destination is a research facility where the future of wastewater treatment is, very unpretentiously, being written. As students of the Water Treatment course, we headed towards the RINEW facility on a sunny December day. RINEW: Rotterdam Innovative Nutrients, Energy and Water Management, is a collaboration between the municipality of Rotterdam, Evides Water, Water Board Hollandse, Delta, Water Board Schieland & Krimpenerwaard, and Delfland.

Author
Maria Paola Gomez

Recovered, shiny and new.

EXCURSION WATER TREATMENT
As a pilot initiative, the RINEW-project has shined some light on the possibilities in resource recovery from wastewater, especially as a clear and exciting example for closing the water circle at a micro-scale.

However, the challenges ahead certainly lay in upscaling resource recovery as a commercially feasible wastewater treatment technology, in the context of ever-expanding megacities where wastewater generation may well exceed 1 million m3/day, considering domestic consumption only.

Although the reuse of recovered humic acids, phosphate, cellulose and energy is well accepted and relatively straightforward, reuse of wastewater tends to be much more restricted. Even when current technological development in wastewater treatment may indeed achieve recovery of clean water with a quality that is adequate for human consumption and other potable water uses, are we ready to drink recycled wastewater? Some people might think we are not. But do the more than 300,000 people who have visited the RINEW’s yard and restaurant since its opening in 2013 think otherwise?

The RINEW pilot project will come to an end this year, leaving great insight and expertise behind. The next steps for the industry and, yes, us, as the future workforce facing these challenges, lay in finding ways to further expand the possibilities for application of these fantastic recovered materials.

As a pilot initiative, the RINEW-project has shined some light on the possibilities in resource recovery from wastewater, especially as a clear and exciting example for closing the water circle at a micro-scale.

However, the challenges ahead certainly lay in upscaling resource recovery as a commercially feasible wastewater treatment technology, in the context of ever-expanding megacities where wastewater generation may well exceed 1 million m3/day, considering domestic consumption only.

Although the reuse of recovered humic acids, phosphate, cellulose and energy is well accepted and relatively straightforward, reuse of wastewater tends to be much more restricted. Even when current technological development in wastewater treatment may indeed achieve recovery of clean water with a quality that is adequate for human consumption and other potable water uses, are we ready to drink recycled wastewater? Some people might think we are not. But do the more than 300,000 people who have visited the RINEW’s yard and restaurant since its opening in 2013 think otherwise?

The RINEW pilot project will come to an end this year, leaving great insight and expertise behind. The next steps for the industry and, yes, us, as the future workforce facing these challenges, lay in finding ways to further expand the possibilities for application of these fantastic recovered materials.
IS THERE LIFE AFTER GRADUATION?

MARIJ ZWART - GRADUATED IN 2015

What is your current employment?
Evides Waterbedrijf, management trainee

What is the most important lesson that you learned about working life?
In ‘real life’ everybody is just randomly doing stuff on a trial-and-error modus, just like I did when I was at the TU. I expected the professional reality to be way more organized and structured, but in fact it doesn’t differ much.

How was life shortly after graduation?
Perfect, I took a long holiday and I bought a museum-jaarckaart and a cinneville card and I had the best time.

Do you have any recommendations for nearly graduates?
Don’t hurry yourself into your first job, just because you are nervous that you won’t find one! It doesn’t matter if you spend 2 or 4 months finding your first job, what matters is that you find a nice one that will allow you to develop yourself. It is easy to get contracted into a dull job. Practice shows that after being hired, people tend to stay (out of comfort?). Therefore it is better to be critical about what you want to do, in spite of the stress and insecurity of being unemployed.

ANDRES VARGAS LUNA – PHD GRADUATE IN 2016

What is your current employment?
I’m Associate Professor at the Civil Engineering Department of the Pontificia Universidad Javeriana, at Bogota (Colombia).

What is the most important lesson that you learned about working life?
Finishing a PhD is a very challenging task, but is totally worth the trouble. This is because you are part of increasing the knowledge system and transmission of this knowledge to new generations. In my field, academics one can be a facilitator of new developments and scientific grow. I also learnt, that each end is a new start. The end of my thesis inspires new generations about my passion, the understanding of our rivers.

How do you look back on your study time at TU Delft?
Beautiful memories appear always that I look back at that time; I consider it a great period of my life, I should say. I enjoyed learning about new cultures and meeting people from everywhere. For me, it was very sad to leave because of the people that I left behind. In 5 years I’ve made very good friends and this is with no doubt what I miss the most.

How was life shortly after graduation?
As the preparation of the graduation was a very stressful period for me, it was a relief. It was very difficult to put in beautiful memories of the last years. Definitely my friends and this is with no doubt what I miss the most.

RUTGER HOFSTE - GRADUATED IN 2015

What is your current employment?
Research Analyst in the Aqueduct team at the World Resources Institute (WRI). We build online water risk analysis tools for private and public sector. I am concerned with the data behind these tools.

What is the most important lesson that you learned about working life?
Having set targets such as exams, assignments and even a thesis makes life easier. After graduation the only person in charge is you. With this amount of freedom comes an incredible amount of responsibility. All of a sudden you are expected to stop worrying about the next few weeks and think about the next few years.

How do you look back on your study time?
I was part of the double degree program with the national university of Singapore. These years were probably one of the best in my life. The combination of technical challenges combined with a societal angle and great student life is fantastic.

How was life shortly after graduation?
The couple of weeks after graduation were a bit crazy. Right after graduation I was asked to do a project to calculate water balances using remote sensing in North Africa. Part of this project was to do capacity building. Before long I found myself teaching a group of approximately thirty senior water managers in Tunisia. Everything I said was being translated in Arabic and French and thirty senior water managers in Tunisia. Everything I said was being translated in Arabic and French and there were no other people to assist me.

Do you have any recommendations for nearly graduates?
Unfortunately applying for jobs still relies on networks and connection. I wish that in the future the job application process will move towards an anonymous “merit system”.

Are you curious, optimistic or excited about what the future may look like in a couple of years from now? Several graduates, Both recent and old, have shared what life after graduation feels like. We would like to present you their heartfelt experiences and their words of wisdom.
PRADEEP RATHORE - GRADUATED IN 2015

What is your current employment?
I have started my own company called Spacegrid Pvt. Ltd. (www.spacegrid.com) where I am a full time director.

What is the most important lesson that you learned about working life?
Experience matters much more than education. Practical applications are different from what we study in the class!

How was life shortly after graduation?
At the one hand a big relief. Finally graduated (FYI the thesis took me more than 2 years). At the same time a big black hole. All my big gracious fantasies were changed, disappeared or seemed unreachable. My over-ambitious self had to refocus. It felt as one of the most uncertain periods in my life ever. Ask me one year ago and I would never ever thought about applying on this particular job, but you know what; I strongly believe that I have ended up at exactly the right place to me now and that way more unexpected and enjoyable things are about to happen.

Do you have any recommendations for nearly graduates?

Do you have any recommendations for nearly graduates?

JOIN THE NEW WATER MANAGEMENT ALUMNI NETWORK
CONTACT | INSPIRE | INFORM

Find us on LinkedIn: search for ‘Watermanagement Delft Alumni Network’.

The network is open to all, both former and current, however exclusively restricted to the department Water Management TU Delft. Make sure for a clear link to Department Watermanagement TU Delft on your LinkedIn profile.

In need of more advise? Also check out the career advise from Dr. Anonymous on page 2.

PRADEEP RATHORE - GRADUATED IN 2015

What is your current employment?
At this moment, I work at Inter Delta Nederland (IDN), one of the companies (luxery shop) within the holding (shopping mall) Inter Groep Bouw & Infra (IGBI). IDN focusses (amongst other things) on urban and rural water management. However, this is not my first job. Before I started my masters, I have worked for 4 years as junior expert urban and rural water management at Royal Haskoning. I owe them a lot. Being so, I now am both medior expert and consultant (and may expand IDNs network).

What is the most important lesson that you learned about working life?
Life does not end after graduation. Though, it does change. I haven’t decided which one I prefer more, never to old to … 🙂. What for me became clear is that it is not about what I am or what I have reached but about who I am and who I have become. And the latter is a continuous process; only now in a new environment. For me, I had to relax, become quiet, pray, unite my endless ambitions, listen to the whispers of (within) my heart, dare to act boldly and unexpected, sometimes even in a direction I never had chosen before and trust. It is scary but enriching, and you can always start again. I had to try this multiple times before I was really able to relax and listen.

How do you look back on your study time?
Very happy and grateful that I had and took the opportunity to challenge myself to the max. To give up my comfortable working life and became a student 2.0.

I will never regret that decision and am grateful for the persons who supported me. And of course, to the shared memories, stories and pranks with my fellow students and staff.

How was life shortly after graduation?
At the one hand a big relief. Finally graduated (FYI the thesis took me more than 2 years). At the same time a big black hole. All my big gracious fantasies were changed, disappeared or seemed unreachable. My over-ambitious self had to refocus. It felt as one of the most uncertain periods in my life ever. Ask me one year ago and I would never ever thought about applying on this particular job, but you know what; I strongly believe that I have ended up at exactly the right place to me now and that way more unexpected and enjoyable things are about to happen.

Do you have any recommendations for nearly graduates?

What is the most important lesson that you learned about working life?
Enjoy being a civil engineer serving mankind, while being innovative, cooperative and industrious, pursuing permanent education; and learning to accept that there may be (long) lapses of time between being right and being proved right. And get yourself a lifelong partner to share your joys and problems.

How do you look back on your study time?
It is the civil engineering curriculum which guides you on the first steps to become either a “specialized generalist” or a “generalized specialist”, resulting in very satisfying study time; further practice and experience will do the rest. Moreover, it leaves you ample time (at low cost) for your social and cultural formation. Ultimate score: very positive.

PROF. IR. JAN KOP - GRADUATED IN 1957

What is your current employment?
Irrigation and Flood Control Project under the inspiring

What is the most important lesson that you learned about working life?
Enjoy being a civil engineer serving mankind, while being innovative, cooperative and industrious, pursuing permanent education; and learning to accept that there may be (long) lapses of time between being right and being proved right. And get yourself a lifelong partner to share your joys and problems.

How do you look back on your study time?
It is the civil engineering curriculum which guides you on the first steps to become either a “specialized generalist” or a “generalized specialist”, resulting in very satisfying study time; further practice and experience will do the rest. Moreover, it leaves you ample time (at low cost) for your social and cultural formation. Ultimate score: very positive.

In a certain way, it is unfortunate that not everyone may- be given the privilege of a comparable study time.

How was life shortly after graduation?
Adventurous, challenging and educational, while I started as a UN (FAO) Assistant Expert on the Ganges-Kobadak Irrigation and Flood Control Project under the inspiring leadership of its team leader Prof. dr ir WJ, van Bloem- mestein.

Do you have any recommendations for nearly gradu- ateS?

“Nearly” means that there is little time left. I do hope that the “nearly graduates” have profited from the education- al excursions, the possibilities to do so called practical work (preferably abroad), the programmes to widen their horizons (e.g. “Studium Generale”) in the fields of philosophy, or a new foreign language, and the sporting facilities offered by the TUD.

And, last but not least, I do hope they were all active members of student organizations (in their working fields and leisure time) in order to become socially well balanced individuals and getting friends for life.

What is your current employment?

What is the most important lesson that you learned about working life?

How do you look back on your study time?

In need of more advise? Also check out the career advise from Dr. Anonymous on page 2.

JOIN THE NEW WATER MANAGEMENT ALUMNI NETWORK
CONTACT | INSPIRE | INFORM

Find us on LinkedIn: search for ‘Watermanagement Delft Alumni Network’.

The network is open to all, both former and current, however exclusively restricted to the department Water Management TU Delft. Make sure for a clear link to Department Watermanagement TU Delft on your LinkedIn profile.

In need of more advise? Also check out the career advise from Dr. Anonymous on page 2.

JOIN THE NEW WATER MANAGEMENT ALUMNI NETWORK
CONTACT | INSPIRE | INFORM

Find us on LinkedIn: search for ‘Watermanagement Delft Alumni Network’.

The network is open to all, both former and current, however exclusively restricted to the department Water Management TU Delft. Make sure for a clear link to Department Watermanagement TU Delft on your LinkedIn profile.

In need of more advise? Also check out the career advise from Dr. Anonymous on page 2.

JOIN THE NEW WATER MANAGEMENT ALUMNI NETWORK
CONTACT | INSPIRE | INFORM

Find us on LinkedIn: search for ‘Watermanagement Delft Alumni Network’.

The network is open to all, both former and current, however exclusively restricted to the department Water Management TU Delft. Make sure for a clear link to Department Watermanagement TU Delft on your LinkedIn profile.

In need of more advise? Also check out the career advise from Dr. Anonymous on page 2.
Climate change, politics and policies, in sunny Marrakesh

Past November I had the opportunity to attend the yearly UN climate change conference, the COP. These are the conferences from which we got the Kyoto Protocol and last year’s Paris Agreement. I was there as a delegate for the political youth organization IFLRY and its Dutch member organization Jonge Democraten. Drupel magazine asked me to share my experiences here.

To start with, I can’t express how overwhelming this conference was at first. Not only all countries came together in delegations existing of a handful to hundreds, but also over 200 organizations, companies, universities and journalists. On the day before the conference, some streets were still getting newly asphalted and flags with COP22 were everywhere around the city. About 20.000 people from all over the world were arriving to attend the conference from outside the event site. The cafés and restaurants were filled with people working on climate change or sustainability from all over the world.

This conference was nicknamed the COP of Action, meaning that it was time to bring last year’s Paris Agreement into action. The Agreement states that global temperature rise should be limited to 2 degrees with respect to preindustrial levels and that all countries will “pursue efforts” to keep it under 1.5 degrees. Indeed, quite vague and not very binding.

The discussions concerned negotiating the details of agreements made the year before, mainly related to finance. One of these was what percentage of the promised support from developed nations to developing nations should be spend on adaptation (mainly in the interest of developing nations) or mitigation (preference of the developed nations). Also, whether this money should come from public or private funds and if it could be donated bilaterally or through a central agency. At first, these may seem minor details, but these decisions have large impact on who receives money for what type of projects and are often very political.

My days at the conference started at 8 am with the YOUNGO meeting, the constituency to the UN, representing all Youth non-governmental organizations. Other constituencies also have funny names such as BINGO (Business and industry), RINGO (Research), and TUNGO (Trade unions). These constituencies follow the negotiations closely and try to lobby for their interests. I joined the group within YOUNGO lobbying for more education, training and public awareness on Climate Change. During the two weeks we spoke to the people in their country delegations responsible for this topic in their countries. For many countries this topic has no high priority and the people responsible were often junior policy officers. We noted that many of them were eager to hear how other countries had organized their climate education and awareness raising efforts.

No formal meeting to exchange these ideas was planned at all during the COP22 in Marrakesh. We initiated a brainstorm session for which over 10 initiatives were planned for us, water management students, to work on! Getting some insight in the politics and policies being formed on this topic was really cool, as well as meeting so many people who are working with climate mitigation and adaptation. Especially in the latter, water management plays an important role. Being in Marrakesh helped me to see water management in a broader context. There are many future challenges for us, water management students, to work on!

The Paris Agreement entered into force on November 4th, a few days before the start of the conference. This was much earlier than expected, as it took the Kyoto Protocol 8 years to enter into force. The Paris Agreement entered into force after at least 55% of the countries had ratified the agreement. Obama and other governments with him had pushed their ratifications, fearing a Trump presidency. Apparently, fear can be a good advisor after all.

This unexpected early ratification, made that some of the discussions in Marrakesh took place a bit late. For example, a point of discussion was: how should the implementation of the Paris Agreement be discussed in the coming years? Yes, you should probably read that sentence once again. The nickname COP of Action sounds more resolute than it was, but this is probably no surprise in the world of international negotiations.

The cafés and restaurants were filled with people working on climate change or sustainability from all over the world.

The discussions concerned negotiating the details of agreements made the year before, mainly related to finance. One of these was what percentage of the promised support from developed nations to developing nations should be spend on adaptation (mainly in the interest of developing nations) or mitigation (preference of the developed nations). Also, whether this money should come from public or private funds and if it could be donated bilaterally or through a central agency. At first, these may seem minor details, but these decisions have large impact on who receives money for what type of projects and are often very political.

My days at the conference started at 8 am with the YOUNGO meeting, the constituency to the UN, representing all Youth non-governmental organizations. Other constituencies also have funny names such as BINGO (Business and industry), RINGO (Research), and TUNGO (Trade unions). These constituencies follow the negotiations closely and try to lobby for their interests. I joined the group within YOUNGO lobbying for more education, training and public awareness on Climate Change. During the two weeks we spoke to the people in their country delegations responsible for this topic in their countries. For many countries this topic has no high priority and the people responsible were often junior policy officers. We noted that many of them were eager to hear how other countries had organized their climate education and awareness raising efforts.

No formal meeting to exchange these ideas was planned at all during the COP22 in Marrakesh. We initiated a brainstorm session for which over 10 initiatives were planned for us, water management students, to work on! Getting some insight in the politics and policies being formed on this topic was really cool, as well as meeting so many people who are working with climate mitigation and adaptation. Especially in the latter, water management plays an important role. Being in Marrakesh helped me to see water management in a broader context. There are many future challenges for us, water management students, to work on!

Between the activities with the youth constituency, the days were filled with attending negotiations, which are often too technical to be interesting, and side events devoted to various topics. There was no lack of talks related to water. Especially during the thematic Day on Water, I realized even more how big the role of future water managers is in dealing with climate change. A big part of the adaptation measures taken are related to water. 99% of the African countries mentioned water in their National Determined Contributions (NDCs), in which they state how they are planning to contribute to the goals in the Paris Agreement. The Moroccan Minister of Water, Charafat Afaial, said it in a nice way: “Water is not only a problem but it is part of the solution.”

Getting some insight in the politics and policies being formed on this topic was really cool, as well as meeting so many people who are working with climate mitigation and adaptation. Especially in the latter, water management plays an important role. Being in Marrakesh helped me to see water management in a broader context. There are many future challenges for us, water management students, to work on!
The bubble slowly moves upward in the absence of gravity. It’s actually quite relaxing to have a look at the morning rituals of astronaut Sunita Williams. Just type in ‘water in space’ in YouTube and you will have your afternoon filled with some hypnotising videos.

As I watch more videos, I see how astronaut Karen Nyberg washes her hair by “squirting some tiny bubbles of hot water onto her scalp” from a little aluminium bag. Bad hair day guaranteed.

But, while her hair dries and the water evaporates, the air collect system collects the vapour and the water processing system converts it to drinking water. Adding up to the 93% that is reclaimed. And yes, also from their own urine.

As I read into this topic I discover that it’s only the Americans though. The Russians refuse. Apparently, NASA astronauts will sometimes go over to the Russian side of the ISS to fetch some Russian urine.

The costs to bring one kilo of water into space are around 25000 euros. No wonder that water is being recycled as much as possible, but it’s only since 2009 that distilled urine is on the menu. Also that of the rats.

The Water Processor Assembly that receives the water from the UPA as well as condensate first removes gases from the wastewater. Next, the water is pumped through a Particulate Filter followed by two Multifiltration (MF) Beds (where dissolved contaminants are removed). Finally, the Ion Exchange Bed removes dissolved products of oxidation and adds iodine for residual microbial control.

All the separate steps are Orbital Replacement Units (units that can be readily replaced after the unit passes its design life or fails). A modular wastewater system. The two main conditions for the treatment plant is that it should be able to operate in weightlessness of space and has to fit in the area of about two phone booths.

According to NASA, “is starting to drive innovation and advancements in the state-of-the-art terrestrial water recycling.” I wasn’t able to find proof of this statement. It would be great though, if us human beings could also benefit a little. Meanwhile, I watch an astronaut play water Ping-Pong with two hydrophobic panels, that’s already one advantage that we can get out of it.
Prêt à loger

The house with a skin, Faculty of Architecture

This project, that won several prizes at the Europe Solar Decathlon in 2014, was carried out at the Faculty of Architecture at the TU Delft by a team of students with different backgrounds. They were inspired by the typical post-war houses, of which there are many in the Netherlands. From an energy point of view these houses are very outdated, consuming around 175 euros of energy each month. The “easy” way would be to just demolish and replace these houses. However, this is expensive and takes a lot of time. Also, the students recognized that these post-war houses contain a lot of valuable memories which should be preserved. Therefore, they suggest an alternative: improving your house, while preserving it. Their solution was to add a skin to the house. This skin consists of different components that all aim to improve both the spatial and climate performance of the existing house. The skin consists among others of solar panels and a green roof. The glass panels can be opened during the summer, in order to allow the wind to cool the house. During the winter they are closed, so the house is heated by incoming heat from the sun. The skin can be adapted to the specific house it is built for. A prototype of a house with a skin was actually built at the campus of the TU Delft and is open to visitors. So, if you are interested, you should definitely pop by some time! Also, more information about the project can be found at www.pretaloger.nl.

Huisje Boompje Beter

Sara Reijnders, Faculty of Industrial Ecology

In a world that is becoming more and more digital, people are also more and more relying on digital tools to help them. So why not come up with a digital app that helps you to make your house more sustainable? This is the idea behind the Huisje Boompje Beter app, developed by Sara Reijnders. In the app you can click on different parts of the house and, if you have one, garden. The app comes up with different measures that you could implement in order to make your house more sustainable. The measures are aimed at making the house and garden more climate change-proof, for example by improving the infiltration capacity or increasing the heat absorption capacity. There is also a game-element to it: for each measure that you implement you gain points and you can compare yourself with other users of the app.

Pressurized sewer systems for transporting black water

Adithya Thota Radhakrishnan, Faculty of Watermanagement

Currently, there is a lot of interest in the recycling of the raw materials and energy that are present in our waste water. From this perspective, it could be efficient to transport the so-called black water (the water from our toilets) separately from the rest of our waste water, because this water contains most of the nutrients and energy. However, this is not that straightforward. The properties of this water are different from our normal wastewater due to the high amount of solid particles. Currently, Adithya Thota Radhakrishnan is doing his PhD-research on the properties of black water. It is important to know more about these properties in order to come up with a good design for a system to transport this water. And maybe, in our future houses, we will have separate pressurized pipelines to transport our black water.

THE HOUSE OF THE FUTURE

All the different things that are going on around climate change, will probably also affect our houses. So, what will the house of the future look like? At the TU Delft, there are a lot of students working on projects that can help to make our houses more sustainable. Here some of these projects are described in more detail. A practical example of a project in which some of these ideas are really implemented in practice, is the Motown Movement in Detroit. The idea behind this practical project is making sustainability more affordable and treating your own waste streams. But is a decentralizing strategy also sustainable in the Netherlands? Jeroen Langeveld, associate professor at the TU Delft, provides us with some food for thought.

Text by Martine Rottink
Illustrated by Anna Goense
Interview Jeroen Langeveld

Text by Martine Rottink

There have been many different trends in the field of drainage systems, drinking and wastewater treatment in the Netherlands. Most recent trends are focusing on decentralizing the treatment system: recycling water at the house-level. According to Jeroen Langeveld, associate professor at the TU Delft, this is not a sustainable trend.

He recognizes that there have been a lot of different trends in our way of thinking about treatment over the past years. The problem is that our technology, and therefore the different trends in our way of thinking, changes faster than our current system ever could.

Over the last 30 years, there have been several different trends in the treatment of rainwater. At first, rainwater was considered clean and was therefore directly infiltrated. After some researches showed that rainwater could contain dangerous elements that could be disadvantageous to the environment, a new trend developed: rainwater was transported to and cleaned at a treatment plant. Some years later, this changed again. Research showed that rainwater is very clean compared to other water sources (e.g. deep groundwater or water from agricultural uses).

Therefore, it was again locally infiltrated. So, in a period of only 30 years the general trend, influencing the lay-out of our treatment system drastically changed twice. However, the system changes at a much slower pace. The result is that the drainage map of the Netherlands looks like a giant patchwork. From the type of drainage system you can tell in which period a neighborhood was built. In some areas in the Netherlands the drainage system even differs from street to street. From a communication and management point of view this is very unpractical. Also, because the trend changes every few years, there is no general line of improvement in the development of our drainage and treatment systems.

So then, how should it be done? According to Jeroen Langeveld, a more sustainable approach to development would be to focus on large-scale treatment plants instead of on the small-scale recycling and treatment of water. First of all, this has a big economic advantage: if you want to market the products recovered from wastewater (e.g. energy phosphates), it is much more efficient to produce them on a large scale. On the individual household scale, recovery of raw materials from wastewater is not feasible.

Also, it is more efficient in terms of space needed for treatment. If you would treat wastewater on the scale of one household, you need much more buffer space than when you would treat it on a larger scale. This is caused by the peak factor, which increases for smaller scales. This buffer space is located in people’s homes, which costs a lot of money if you would relate it to the prices of these houses.

Lastly, the improvement that we could make on a short term is much bigger when you focus on large-scale treatment facilities. The state-of-the-art treatment techniques are really advanced and it is expected that they will develop very fast in the near future. This enables us to improve the current system in a relatively short period. While if you would focus on the small scale, it would first take a 100 years or so before we even arrive at such a system on a national level.

According to Jeroen Langeveld, the future lay-out of our drainage system will probably be a separated drainage system with local infiltration of rainwater. Due to climate change, the rainfall in the Netherlands will intensify during the summers. The current drainage system is not designed to handle the expected future amounts of rainfall, so you cannot transport all the rainwater. That means that you have to solve this problem locally by smart solutions in the lay-out of your city. This is one of the biggest future challenges regarding water drainage and treatment.

The future house of Detroit

Text by Anna Goense

Some weeks ago three TU Delft architecture students and a civil engineering student took to Detroit to start the renovation of a previously bought house. They will use affordable and do-it-yourself techniques that will make the house more sustainable. The students are doing this under the name: The Motown Movement, they consider this to be the first house of many and want to create a movement of affordable sustainable housing in Detroit.

The Druppel interviewed one of the founders Bob Hendrikx, and one of the civil engineering students who worked on the design of the water system, Sjoerd van Hoof.

Bob explained that ‘The house will be a showcase of affordable menu of things that you can do to make your home more sustainable. It offers 5 dollar items but also fifteen thousand dollar solar panels. We offer many inexpensive items that the people of Detroit can implement. If you look at the Netherlands you see that the upper segment of the menu of options is more relevant.’ Sjoerd told ‘For me the Motown Movement is about showing how easy it is to make your house sustainable, especially creating awareness is an important element. For example, water is worth a lot more than people think, through reusing wastewater we show how waste can be valuable.’

The purchased house is a broken-down, brick, two-family home. The ground floor and basement will house a training and resource centre, where free workshops on sustainable building will be given, neighbours can meet and most menu items will be on display. The second floor will be rented out to a family; the rent will be used to maintain the house and all of its functions. An empty plot located next to the house will be used as an urban farming area.

When the students first went to Detroit to find a house, they were very careful to incorporate the neighbourhood into the project, with the final functional division of the house established with input from the community. Bob states that ‘Our first idea was to only rent out the house, but by talking to the community we found that there is a need for a place in the neighbourhood where people can come together and feel safe, that is how the idea for the training centre developed.’ Also, the items of the menu changed through talking to the people in

The future house of Detroit

Text by Anna Goense

Some weeks ago three TU Delft architecture students and a civil engineering student took to Detroit to start the renovation of a previously bought house. They will use affordable and do-it-yourself techniques that will make the house more sustainable. The students are doing this under the name: The Motown Movement, they consider this to be the first house of many and want to create a movement of affordable sustainable housing in Detroit.

The Druppel interviewed one of the founders Bob Hendrikx, and one of the civil engineering students who worked on the design of the water system, Sjoerd van Hoof.

Bob explained that ‘The house will be a showcase of an affordable menu of things that you can do to make your home more sustainable. It offers 5 dollar items but also fifteen thousand dollar solar panels. We offer many inexpensive items that the people of Detroit can implement. If you look at the Netherlands you see that the upper segment of the menu of options is more relevant.’ Sjoerd told ‘For me the Motown Movement is about showing how easy it is to make your house sustainable, especially creating awareness is an important element. For example, water is worth a lot more than people think, through reusing wastewater we show how waste can be valuable.’

The purchased house is a broken-down, brick, two-family home. The ground floor and basement will house a training and resource centre, where free workshops on sustainable building will be given, neighbours can meet and most menu items will be on display. The second floor will be rented out to a family; the rent will be used to maintain the house and all of its functions. An empty plot located next to the house will be used as an urban farming area.

When the students first went to Detroit to find a house, they were very careful to incorporate the neighbourhood into the project, with the final functional division of the house established with input from the community. Bob states that ‘Our first idea was to only rent out the house, but by talking to the community we found that there is a need for a place in the neighbourhood where people can come together and feel safe, that is how the idea for the training centre developed.’ Also, the items of the menu changed through talking to the people in
It is important to be conscious about your water use to keep it liveable, the city’s drainage capacity is simply not sufficient. Sjoerd does not think that all houses should have systems such as these. In the Netherlands we don’t have a lot of space in your house and a large wastewater treatment plant is often more efficient. It can be more efficient though, waste streams get diluted and resource recovery is hardly applied. The Motown Movement is about creating awareness and choosing the elements that fit you, that is why the menu is so important.

At the moment the group is busy renovating the house and hope to finish at the beginning of the summer and start the first workshops for the neighbours. The Motown Movement is not planning to stop here, the idea is to add a new Motown house in Detroit every two years and expand like an oil stain of sustainable and affordable houses.

Do you like this initiative? The Motown Movement has started a crowdfunding campaign so you can contribute to making sustainable technology available for everyone. https://www.patronicity.com/themotownmovement
Voor 2,5 miljoen consumenten en bedrijven in ons werkgebied Zuidwest-Nederland is de beschikbaarheid van betrouwbare drinkwater de normaalste zaak van de wereld. Het leveren daarvan is voor de kleine 700 medewerkers van Evides Waterbedrijf elke dag weer een mooie uitdaging.

In Nederland zijn wij met ruim 160 miljoen m³ per jaar een van de sterkste spelers op het gebied van drinkwater en behoren we tot de top van industriewaterleveranciers. Het is dan ook niet verwonderlijk dat je bij Evides uitdagingen treft in allerlei soorten techniek en op alle denkbare niveaus. Waar je ook begint, één ding staat als een paal boven water: Evides Waterbedrijf biedt je riante mogelijkheden voor ontwikkeling en ontplooiing.

Kansen in techniek

Dynamische werkomgeving
Doordat wij zowel drinkwater als industrie- water leveren, mag je er vanuit gaan dat innovatie bij Evides met hoofdletters wordt geschreven. Wij verdiepen ons voortdurend in vernieuwende technologieën om zowel onze waterkwaliteit als onze dienstverlening op het allerhoogste niveau te houden. Als je alleen al denkt aan het zuiveren van water, dan beseft je dat wij bij Evides inmiddels een hoop kennis opdoen om dat te houden. Wij bouwen bijvoorbeeld zelf specifieke installaties die het water bij de bron of op locatie zuiveren tot de gewenste kwaliteit. Tegelijkertijd scoren we hoog op het gebied van efficiency. Dat resulteert in lage operationele kosten en relatief lage drinkwaterprijzen. Werken bij Evides betekent werken in een dynamische én professionele omgeving waar je het beste uit jezelf kunt halen.

Traineeship
Met een technische HBO- of WO-opleiding kun je bij Evides kiezen voor een traineeship. Wij punten dan over een intensief leertraject van drie jaar, waarin we je meevoeren langs verschillende multidisciplinaire, internationale projecten. Als trainee krijg je zo een unieke kans om de verschillende aspecten van Evides te leren kennen en tegelijkertijd je inhoudelijke en persoonlijke kwaliteiten verder te ontwikkelen. Je wordt als het ware in het diepe geplongen, waarbij je altijd kunt terugvallen op een interne coach. Ongekend uitdagend!

Dit alles maakt Evides Waterbedrijf als werkgever ongekend veelzijdig. Dat we daarbij een mooi salaris en goede arbeidsvoorwaarden bieden, maakt het alleen nog maar aantrekkelijker. Ga er maar voor! Kijk voor meer informatie en actuele vacatures op www.evides.nl/werkenbij.

2,5 miljoen consumenten en bedrijven 24/7 van betrouwbare water voorzien. Ga er maar voor.

We would like to apologize for the mistakes in the previous puzzle, luckily there were still people that got the answer right. And the winner of the is Margot Haitsma Mulier! Margot, you can pick up your prize at room 4.74!
Dear Water Managers,

Once more there is a Big Puzzle. I hope there are no complaints of it being too hard this time, as that would mean you just are not trying hard enough.

Take a look at the pictures, read the text and come up with a word with the right number of letters. The answers are all related to the theme International Water.

If you have the solution, send it to druppel@dispuutwatermanagement.nl

If you are the first one to answer correctly, you can win a prize!

Good luck!