

Nr.	Titel	Land	Contact person
1	Operationlizing community-driven multiple use water service (MUS0 in South Africa	South Africa	Bolding
2	Operationlizing community-driven multiple use water service (MUS0 in South Africa - 02	South Africa	Bolding
3	Campfire academie - Research Internship placement 2017	South Africa	Bolding
4	Exploring irrigation & water knowledge and "mainstream"expert thinking	Mozambique	Bolding
5	Mapping of irrigation and water use with remote sensing in Central Mozambique	Mozambique	Liebrand; Beekman
6	Studying grassroots irrigation initiatives by farmers in Mozambique	Mozambique	Liebrand; Beekman
7	Water system design for water use from multiple sources	India	Ritzema
8	Testing the Hydroluis Drainage Pipe System	Turkey	Ritzema
9	Opstellen onderzoekagenda "Water en zout schade in de landbouw	Nederland	Ritzema; Nikkels
10	Water Management in Nickerie, Surinam	Surinam	Ritzema
11	Knowledge management in Rio Santa river basin, Peru	Peru	Vos
12	Regional effect of windbreaks on evapotranspiration New Zealand	New Zealand	Boesveld
13	"modernization" in Santia del Estero, Argentina	Argentina	Boesveld
14	Effectief water gebruik - Druppelirrigatie Spaarwater II, Nederland	Nederland	Boesveld
15	Thesis opportunities with banana producing company NEH Philippines	Philippines	Boesveld
16	Groundwater storage in sand rivers. A case study in Tigray, Ethiopia	Ethiopia	Boesveld
17	Assesing water productivity of maize in a seme-arid environment in Argentina	Argentia	Halsema, van
18	MSc Internship at Akvo: smartphone-based soil and water monitoring	Nederland	Boesveld; Peters
19	MSc Thesis Farmer-led Irrigation Development	Mozambique; Tanzania; Kenya	Veldwisch
20	Minor MSc Theses on Irrigation in Africa	Africa	Veldwisch
21	MSc Thesis "Smart Water for Agriculture"	Kenya	Veldwisch
22	Mapping groundwater contamination with Arsenic and Fluoride in San Miguel de Allende, Mexico	Mexico	Hoogesteger
23	Integrated management of the Laja Watershed from the grassroots, Guanajuato, Mexico	Mexico	Hoogesteger
24	Labeling and the water question in imported vegetables: insights from the Dutch organic sector	Nederland	Hoogesteger
25	Irrigation modernization and agricultural change in the Módulo la Purísima, Guanajuato, Mexico	Mexico	Hoogesteger
26	Thesis and Internship Opportunities _IDE_ Mozambique_ Women empowerment through agriculture	Mozambique	Shah
27	Conjunctive water use in irrigation to alleviate drought impacts in the Jaguaribe basin, Brazil	Brazil	Oel, van
28	Improving of groundwater resources management in NE Brazil	Brazil	Oel, van
29	Testing a technology to manage Eutrophication in Brazillian lakes	Brazil	Oel, van
30	Re-establishing yield-reliability relationships for strategic reservoirs in the Jaguaribe basin, Brazil	Brazil	Oel, van
31	Water-energy nexus effect of São Francisco water transfer, Brazil	Brazil	Oel, van
32	Various Organizations in Nepal	Nepal	Bruins
33	Optimal water security for irrigation schemes	Tasmania	Hellegers; Nikkels
34	Value creation/m ³ in the Netherlands and Tasmania	Tasmania	Hellegers; Nikkels



Water Resources Management

Operationalizing community-driven multiple use water services (MUS) in South Africa



Fig 2 Community's "water wisdom"
Considerable own investments for self-supply



Operationalizing Community-Driven Multiple-Use Water Services in South Africa

Short project description.

The action-research project 'Operationalizing community-driven multiple use water services (MUS) in Limpopo Province, South Africa', which is supported by the African Development Bank, has just been launched. It has three goals, of which two are highlighted below.

Goal 1 (research) is led by the International Water Management Institute in collaboration with South African universities, and focuses on knowledge generation through robust analysis, documentation and evaluation (also by one or more students/interns) about the following two other goals.

Goal 2 (action): Local-level demonstration of participatory planning for multiple water uses

The second project goal is at local level, and is led by the NGO Tsogang. This is to demonstrate the 'best practice' of community-driven planning of holistic water services to meet people's domestic and productive water needs, overcoming the fragmentation of the public sector. This demonstration takes place in three pilot villages in Sekhukhune District and three in Vhembe District. See Figure 1 for participatory planning cycle in each of the villages. The participatory diagnosis of the existing situation is taking place up till September 2017. However, people's own, often informal investments in water development and management have hardly ever been studied (see figure 2).

M.Sc./intern research question for the period February/March-September: What are existing local-level individual and collective investments in water infrastructure by different local people? Who takes the initiative and why? Who invests? Who benefits? How is the water distribution for multiple uses within a scheme organized? How is water sharing between water schemes organized? How is this embedded in wider historical social, economic and political trends? How can we assess the pre-project situation in such a way that we can measure the future impact of the intervention?

M.Sc./intern research question short- and medium-term: how does the participatory planning process by Tsogang take place? How are typical challenges in participatory planning addressed? Can these solutions be widely upscaled? What can we learn about requirements for community-driven planning?

Host institute(s): Barbara van Koppen b.vankoppen@cgiar.org (principal researcher poverty, gender and water, based in IWMI office in Pretoria; co-supervision; provision of office space for periods in Pretoria; contacts/literature; assistance in installation of field office; €300/month to compensate research costs). The student/intern is expected to give a seminar for IWMI staff in the Pretoria office.

Country: South Africa

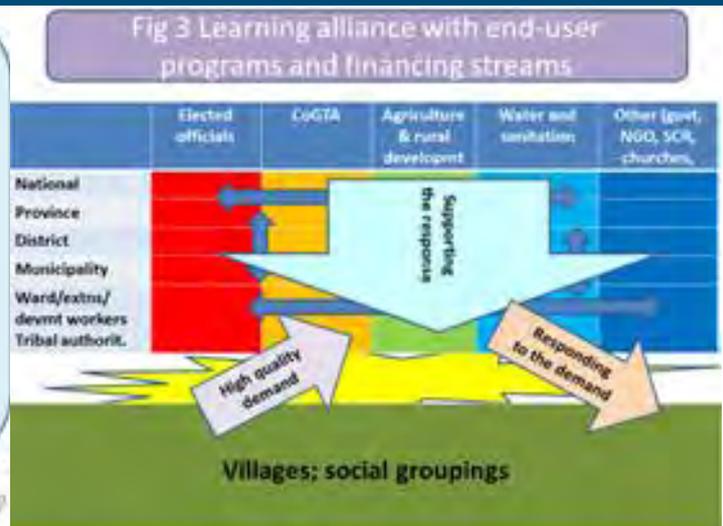
Starting date: asap, Feb 2017

WRM contact person: Alex Bolding, alex.bolding@wur.nl, Lumen, room C045



Water Resources Management

Operationalizing community-driven multiple use water services (MUS) in South Africa - 02



Short project description.

The action-research project 'Operationalizing community-driven multiple use water services (MUS) in Limpopo Province, South Africa', which is supported by the African Development Bank, has just been launched. It has three goals, of which the third is highlighted below.

Goal 3 (action) Upscaling of MUS at municipal, district, provincial and national levels

The third project goal is to lobby and widely upscale the concept of MUS at district, provincial and national level so that future investments in water service delivery become more holistic, most participatory, sustainable and more cost-effective in empowering communities and generating livelihood benefits. This advocacy is based on the evidence generated and a joint goal of all project partners, including the Water Research Commission, which is managing this project. Figure 3 illustrates how this question focuses on: existing local level planning processes, especially local government structures and line agencies; an appropriate response by 'frontline' staff; and support, including financial support, by higher levels of the various line agencies and political structures of elected councillors.

M.Sc./intern research question at short- or medium term: How are local planning processes of local government and line agencies working, in particular with regard to water services for domestic uses, for irrigation, and other uses? How are (whose) local demands identified/negotiated? How are they matched (or not) with public support structures at higher levels?

What's on offer?

Provision of office space for periods in Pretoria; contacts/literature; assistance in installation of field office; €300/month to compensate research costs). The student/intern is expected to give a seminar for IWMI staff in the Pretoria office.

Host institute(s): Barbara van Koppen b.vankoppen@cgiar.org (principal researcher poverty, gender and water, based in IWMI office in Pretoria; co-supervision);

Country: South Africa

Starting date: asap, Feb 2017

WRM contact person: Alex Bolding, alex.bolding@wur.nl, Lumen, room C045

Research Internship placement 2017

Campfire Academy strives to be a leading role player in promoting sustainability and innovative conservation solutions in the tourism industry and local rural communities. Since 1999 Tinus Cronje, the founder and owner of Tehillah Conservation Centre, implemented programmes and opportunities for students to make this a reality. His legacy is still alive in every project Campfire Academy takes part in.

With this in mind Campfire Academy embarked on a new goal of sustainable projects, with sound research to promote innovative research fields in need of solutions. The future is in this generation's hands to ensure a change in the tourism industry and upliftment for local rural communities.

Why Campfire Academy?

- Registered Non-Profit Organisation
- Established accredited training facility since 2007 through [FGASA](#) (Field Guiding Association of Southern Africa) & [CATHSSETA](#) (The Culture, Art, Tourism, Hospitality, and Sport Sector Education and Training Authority)
- Research testing center since 1999
- Situated within a Big 5 nature reserve as part of the Greater Kruger National Park
- Training and research takes place under supervision of qualified nature guides
- Internship research supervised by a supervisor with a BSc degree in Zoology & Botany
- Comfortable accommodation with all facilities available to students
- All students have access to the free-roaming wildlife on bush walks and game drives

Need for research

Balule Nature Reserve covers 40 000 hectares of privately owned land within the Greater Kruger National Park. The park consists of 9 regions with 18 commercial lodges and 43 landowners. Thorough research and data received from the Balule Nature Reserve trust comity, we have identified five fields in need of research:

Sustainable food production and alternative cooking methods

- Estimated food waste is 1987kg per lodge per year, a total of 35 766 kg (excluding landowners household food waste)

Renewable energy

- Estimated 2 619 680kWh electricity usage for 18 lodges in the area for 2015

Recycling

- Recyclable materials burned during 2015 measured 32 tons (excluding private incinerators)

Biofuel and Biodiesel

- Estimated 52 four-wheel drive game viewing vehicles and 184 vehicles in total (excluding contractors)
- Estimated carbon emissions of 940 metric tons per year (excluding personal and contractor vehicles)
- Estimated fuel consumption of 98 500 liters per year

Water recycling and management

- Estimated grey water waste of 243 000 liters per year for the area

Implementation of sustainable product

- Unsustainable tourism practices undermine the purpose of what we perceive nature to be. Research solutions will make a difference to a sustainable future for humans and wildlife alike
- Rural communities NEED solutions that are practical at low to zero cost! Research solutions inspire new solutions to eradicate this problem. What works for Europe does not always work in Africa!
- Campfire Academy and Tehillah Conservation Centre, intend to implement sustainable solutions to these two sectors.



What do Campfire Academy offer?

- Research that not only contributes to rural community upliftment and innovative solutions to a sustainable tourism industry BUT also in the student's personal life
- Participation of mentors, supervisors and lecturers at the testing sites
- Collaboration between international and local students and volunteers
- 35-hour work week from Monday to Friday
- Accommodation and facilities
- Laundry
- Social outings and excursions (optional)
- 24 hour uncapped Wi-Fi
- All facilities available to the volunteers i.e. swimming pool, barbeque area, lookout tower, bush hides for sleep-outs etc.
- Lectures
- Bushwalks and game drives on week days with weekends optional

What will your day look like?

Interns at Campfire Academy are the foundation of all the projects in progress. You will have a 35-hour work week from Monday to Friday and leisure time over weekends. Leisure time can be spend on social interactions with other projects in the area, optional excursions such as visiting the Kruger National Park or spending quality time in nature.

A typical day (Monday – Friday):

05:30 – 06:00	Wake-up, coffee/tea
06:00 – 07:30	Bush walk or game drive with a qualified nature guide
07:30 – 08:00	Breakfast
08:00 – 12:00	Research
12:00 – 14:00	Lunch and off time
14:00 – 17:00	Research
17:00 – 19:00	Bush walk or game drive
19:00 – 22:00	Dinner, leisure, games, movies etc.
22:00	Quite time

Current projects:

- *Sustainable food production*
Aquaponics ecosystem
 New project starting January 2017 breeding Tilapia fish and growing vegetables & herbs in grow beds with different grow medium, comparing natural growth to the growth in the Aquaponics ecosystem. Various factors will be monitored including, NO_2^- , NO_3^- and NH_4^+ , water temperature, O_2 %, fish growth and production and nutrient deficiencies.
- *Indigenous nursery*
Re-introduction of Marula (*Sclerocarya birrea*) and Knob thorn trees (*Acacia nigrescens*).
 These trees were heavily impacted by the current drought in South Africa. Trees will be grown in a nursery and compared to the natural growth in the field. Solutions to protect the introduced trees will be researched such as bees, rocks etc.
- *Recycling*
Compost production from food waste and various other recyclable materials.
 The compost will be used in any agricultural projects and camp garden.
- *Water recycling and management*
Grey water recycling.
 Different methods of recycling will be tested and introduced to the camp grounds, agricultural projects etc. Water quality testing after different methods of purification, testing possibilities of re-use at waterholes.



Proposed projects for 2017:

- *Sustainable food production and pest control*
Micro farming targeting rural development and research pest control methods
Bio-intensive agriculture targeting lodges and rural development and research pest control methods
- *Biofuel / Biodiesel solutions*
Specifically, biodiesel for use in game viewing vehicles. Use of food waste and used vegetable oil to produce biodiesel. Other used for biofuels will be researched such as energy production.
- *Alternative cooking methods*
Design and use of solar cookers and mirt stoves. Targeted for rural development.
- *Black water recycling*
Design systems to recycle black water back into the bush from french drain system and septic tanks.
- *Water management*
Design and research systems to reduce water usage in showers and toilet cisterns
- *Renewable energy*
Design solar and wind energy systems specific to run camp off the grid

Fees 2017

Weekly rate of €70-00

Included in the fees:

- Accommodation
- All facilities such as bush hides, barbeque area, lookout tower, kitchen, lecture room etc.
- Trips to town for supplies
- Coffee and tea
- Research supervision
- Research assistance
- Lectures
- Bushwalks and game drives
- Volunteers to assist you with areas such as construction, data capture, ideas, etc.
- Uncapped Wi-Fi
- Pickup and drop-off at Hoedspruit or East Gate Airport on arrival and departure

Excluded:

- Food
- Transport not related to the research project
- Personal items
- Social events
- Excursions
- Research equipment such as microscope, water testing equipment, etc.
- Laundry
- Travel and Medical insurance. You have to ensure you have adequate travel and medical insurance before you arrive at Campfire Academy
- Traveling to and from Hoedspruit is at your own cost

Contact person:
Email:
Cell number:

Laetitia Cronje
info@campfireacademy.co.za
+27823728751





Water Resources Management

Exploring irrigation & water knowledge and “mainstream” expert thinking



The problem of mainstream water expert thinking

Traditionally, irrigation and water knowledge is defined as a domain of technology and engineering. This tradition is still mainstream today. It is often engineers or professionals with technical skills that claim to know “how irrigation and water works”. No doubt, knowledge on science and technology has clear advantages. For instance, dry lands can be turned into productive fields through the installation of pumps or the construction of canal irrigation systems. However, relying on mainstream technical knowledge also has clear disadvantages. Water problems continue to be seen as mainly “technical” problems, while they also are problems with social and environmental dimensions. More specifically, the trend is to overlook and ignore innovations that take place in the field. Hence, it is not just engineers who have knowledge on irrigation; it also is farmers. But their knowledge and views are repeatedly marginalized and/or forgotten. This raises questions on whose knowledge really counts?

Research Objective/Question: To explore the (policy) characteristics of water and irrigation knowledge, focusing on Mozambique. To cooperate with professionals to learn about their views.

What is expected from the student (type of research): The student will conduct interviews (and a small survey) with engineers and professionals, accompanying them to project sites and learning from their work. The student will also study the history of the irrigation department.

Host institute(s): Resiliência Moçambique

Country: Mozambique (alternatively Southern Africa)

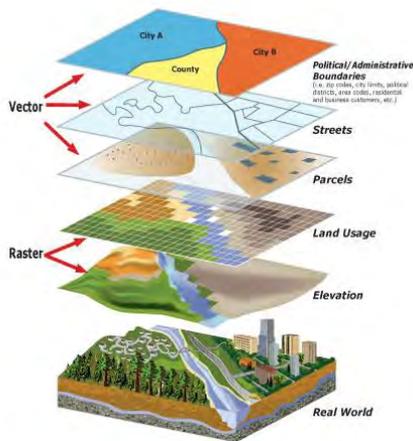
Starting date: Now, any time.

WRM contact person: Janwillem Liebrand and Wouter Beekman



Water Resources Management

Mapping of irrigation and water use with remote sensing in Central Mozambique



Introduction: Solving a lack of data

In Mozambique, as elsewhere, there is a general lack of data and information on the status of existing irrigation. This is particularly true for irrigated areas that are developed by farmers themselves, called smallholder or farmer-led irrigation. This type of irrigation often remains invisible and is difficult to detect. To illustrate, the photo on the right appears a savanna landscape, but is, in fact, an intensively irrigated area. Remote sensing is a tool that can be used in mapping actual irrigated area to better dynamics of use and support policy decisions. However, it remains doubtful whether this form of land use is measurable with RS due to variances in area, planting dates and crops as compared to the pixel sizes of images. This study aims to critically review the current possibilities with RS in identifying farmer-led irrigation to demonstrate the prolific nature of this form of irrigated development and its importance to agricultural development. This study will build on ground data collected from 2010 onwards, with additional fieldwork by the student for extra ground-truthing and hydrological measurements to help assess and compare the availability and use of water resources in an area.

Research Objective/Question: What are the current possibilities and limitation of available freeware RS imagery and how can they be used to identify the extent of farmer-led irrigation in central Mozambique?

What is expected from the student: The student will be willing to travel to Mozambique to undertake ground-truthing in the field and analyze the data, producing useful interpretations. The student is expected to be proficient with remote sensing and GIS.

Host institute(s): Resilience BV/Resiliência Moçambique Lda. (www.resiliencebv.com)

Country: Mozambique (alternatively Southern Africa) Starting date: Now, anytime

WRM contact person: Janwillem Liebrand & Wouter Beekman (janwillem.liebrand@wur.nl, wouter@resiliencebv.com)



Water Resources Management

Water system design for water use from multiple sources



Short project description.

Problem context

Irrigation needs are changing triggered by land use changes and an increasing demand for (irrigation) water. In the past, large-scale irrigation systems were built to supply water to farmers for a limited number of crops, mainly irrigated by surface water. Important recent developments include diversifying cropping patterns, changing field irrigation methods, urbanization and increasing non-agricultural water uses (including ecosystem services). As a result river basins are closing, water uses and conservation become increasingly contested, and stakeholders engage in different ways to influence water policies and intervention programs. Irrigation water demands are increasing and intensifying and surface water is often supplemented with water from other sources: groundwater, waste water and/or drainage water. Increasing awareness of these changes led to approaches that include multiple water services, which has repercussions for the hydraulic design of irrigation systems.

Research Objective/Question

- 1) Analyse the conjunctive use in one of the research site of ANGRAU
- 2) Model the water and salt balance in the area to assess the options for conjunctive use
- 3) Propose innovative technical solutions at local and/or scheme level to enhance the conjunctive use of irrigation water

We offer: local support and supervision.

Host institute(s): Andhra Pradesh Agricultural University

Country: location (?), Andhra Pradesh, India

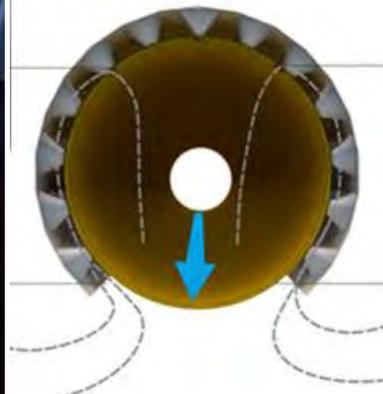
Starting date: open

WRM contact person: Dr. Henk Ritzema, henk.ritzema@wur.nl



Water Resources Management

Testing the Hydroluis Drainage Pipe System



Short project description.

Problem context.

In irrigated lands, drain pipes are equipped with envelopes to safeguard the subsurface drainage system against the three main hazards of poor drain-line performance: high flow resistance in the vicinity of the drain, siltation, and root growth inside the pipe. A wide variety of materials are used as envelopes, ranging from mineral and synthetic materials to mineral fibres. The challenge is to match the envelope specifications with the soil type. As soils are rather variable, the design of envelopes is not straightforward as illustrated with the numerous norms and criteria that have been developed worldwide. In Turkey, a new concept, Hydroluis®, consisting of a corrugated inner pipe with two rows of perforations at the top and an unperforated outer pipe that covers about 2/3 of the inner pipe, has been developed. The main advantage of the new concept is that it is less dependent on the soil type than the existing envelope materials.

Research Objective/Question

- 1) Assist with testing and analysing the performance of the new Hydroluis® concept at pilot scale.
- 2) Assess the options and opportunities to introduce and test the Hydroluis® concept under various soil & hydrological conditions in the Middle East region.
- 3) Propose innovative technical and institutional solutions to introduce the Hydroluis® concept in these countries.

Host institute(s): Hidroluis Drainage Pipe System, Istanbul, in cooperation with the Faculty of Agriculture, Harran University, Şanlıurfa, Turkey

Country: Turkey

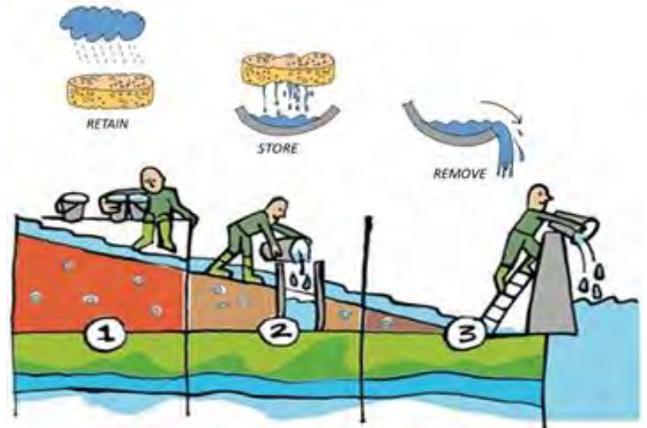
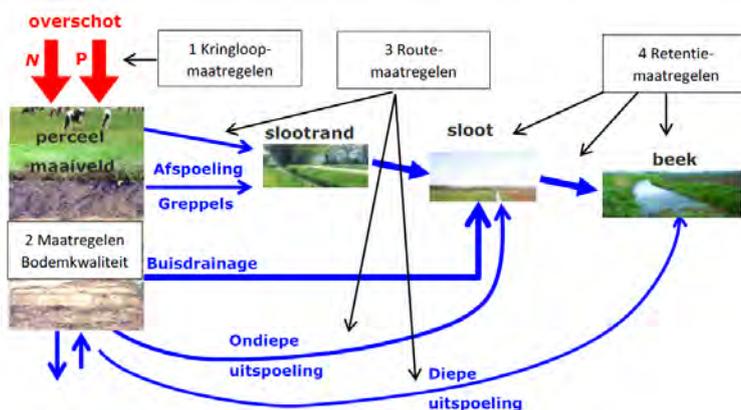
Starting date: Spring 2017

WRM contact person: Henk Ritzema, email: henk.ritzema@wur.nl



Water Resources Management

Opstellen onderzoekagenda “Water en zout schade in de landbouw”



Short project description.

Problem context

Door de klimaatverandering lopen in Nederland installateurs en agrariërs tegen een scala van bodem en water gerelateerde problemen aan. Het voorkomen van natschade, droogteschade en zoutschade wordt steeds complexer. Kennisinstellingen als de WUR, Deltares en Alterra zijn opgericht om probleem oplossend onderzoek te doen; wat speelt er in het veld en wat voor onderzoek moet er gedaan worden om “de landbouw” verder te helpen?

Kennis en ervaring van uitvoerende partijen met kennis en ervaring uit de praktijk zouden voedend moeten zijn voor de onderzoekagenda van de WUR. Het doel van deze stage opdracht is om een onderzoekagenda opstellen voor kennis instellingen, gebaseerd op de problemen waar in de praktijk tegenaan gelopen wordt.

Research Objective/Question

- 1) Inventarisatie van de bodem en water gerelateerde problemen waar agrariërs en installateurs tegen aanlopen als zij maatregelen willen nemen om natschade, droogteschade en zoutschade te voorkomen.
- 2) Opstellen van een onderzoekagenda voor kennis instellingen, met name Wageningen University & Research, om deze problematiek aan te pakken.

Host institute(s): Aequator Groen&Ruimte

Country: Nederland

Starting date: in overleg

WRM contact person: Henk Ritzema (henk.ritzema@wur.nl) en Melle Nikkels (melle.nikkels@wur.nl)



Water Resources Management

Water Management in Nickerie, Surinam



Overliggend Waterschap
Multi-purpose Corantijn Project

[Welkom](#)[Over OW-MCP](#)[Actueel](#)[Samenwerking](#)[Doelstellingen](#)[Voorlichting](#)[English](#)

Background: In the Nickerie (5353 km²) in West Suriname, with approximately 35,000 inhabitants, rice is grown in 22 polders (about 15,000 ha). These polders are mainly cultivated by "small" farmers with an average plot size of 3.1 ha. The rice sector, however, has become less competitive as the knowledge on recent developments in cultivation practices and land & water management is poor, the infrastructure has been neglected, the knowledge level is low, the methods used are often outdated, the infrastructure is partly in disrepair. The Water Board "Overliggend Waterschap OW-MCP" is responsible for the water management in the area (<http://www.owmcp.org>).

Internship and thesis opportunities: Water Management Studies in Nickerie

OW-MCP is conducting several water management studies in Nickerie rice polders. These studies are focussing on the total system: from field level, the individual polders, but also the entire water system in the district and address both the technical and institutional aspects of water management. There are also opportunities to work with GIS software. These studies are performed in the context of a long-term collaboration between OW-MCP, Waternet and Wageningen University. The subject of the internship/thesis can be selected in consultation with OW-MCP.

Work: fieldwork, measurements, Excel, reporting

You will participate in fieldwork conducted by OW-MCP. During the internship, there is plenty of opportunity to collect data and information to complete a BSc or MSc thesis. The most preferable period to do research is the long dry season and the following short rainy season which last from November and February.



Host institute(s): Overliggend Waterschap OW-MCP, Nickerie i.s.m. de Anton de Kom University, Paramaribo and Waternet, Amsterdam

Country: Surinam

Starting date: open, but keep in mind that it normally takes about two month to prepare the internship

Contact persons: Henk Ritzema (WUR)



Water Resources Management

Knowledge management in Rio Santa river basin, Peru (MSc research)



The National Glacier and Mountain Ecosystem Institute in Peru (INAIGEM) actively promotes the production and sharing of knowledge about the state and management of the water resources in the mountain area of Peru. It commits studies to academic partners and shares information and reports with other water organizations and with the general public on the INAIGEM website. INAIGEM is interested in the experiences and knowledge generated and studies needed by stakeholders and the coordination of information and studies between INAIGEM and other stakeholders.

The Rio Santa river is much affected by increased water demand for irrigation and drinking water and melting glaciers of the Cordillera Blanca mountain range. The farmers in the highlands increasingly use irrigation for (securing) crop production. This demand is predicted to continue increasing. The research will be conducted from Huaraz in the Ancash department (headwaters of the Rio Santa).

The student will analyze the organization of the knowledge generation and sharing on mountain water resources and uses. Questions arise about who commissions what type of investigations, who conducts the studies and who has access to the investigation reports. Also the (potential) role of water users' associations, citizen science, expert knowledge and water observatories will be studied.

Host institute(s): National Glacier and Mountain Ecosystem Institute in Peru (INAIGEM)

Country: Peru

Starting date: to be coordinated

WRM contact persons: Jeroen Vos, jeroen.vos@wur.nl





Water Resources Management

Regional effect of windbreaks on evapotranspiration New Zealand



Problem context

Dairy farmers are replacing traditional irrigation methods such as border-dyke with centre pivot irrigation systems. As a result windbreaks that were once placed as a protection method against strong south westerly winds, are removed or shortened. Windbreaks decrease both the wind speed and to a lesser extent solar radiation, and thus the removal of windbreaks causes a higher rate of evapotranspiration. The effect of a single windbreak on evaporation is reasonably well understood, however fields in Canterbury are generally quite small and windbreaks are close enough to influence each other. Field work was done in 2016 to verify the accuracy of the existing single row models when used to model multiple rows. Further research is necessary to determine if this reduction is valid for higher/low wind speeds, different temperatures, different row spacings, different plant species, etc. The results of this analysis will be used to develop a regional model that can be used to determine the effect of wind break removal on Canterbury as a whole.

Research Question

The proposed study consists of two parts. The first part will study the reduction in wind speed behind multiple windbreaks. The second part of this study is to develop a regional model which can model a number of scenarios such as a decrease/increase in the number of windbreaks, a decrease/increase in height or a change in species.

Requirements:

The student must have experience with ArcGIS (or equivalent). Knowledge of Python and/or MatLab is desirable. For field work a current, unrestricted driving license is necessary.

Outputs of the proposed study

The student is expected to deliver a full report before leaving New Zealand. If the work is of sufficient quality, it will be used to form the basis of a journal publication.

Host institute(s): Department of Civil and Natural Resources Engineering, University of Canterbury

Country: New Zealand

Starting date: Sept-Oct 2017 (min. of 6 months)

WRM contact person: Harm Boesveld

Local supervisor: Dr. Ir. Tonny Tessa de Vries



Water Resources Management

Assessing drip irrigation performance in a context of an incipient and non-centralized process of “modernization” in Santiago del Estero, Argentina



Problem context

- Santiago del Estero is a province located in the north of Argentina, the climate is semi-arid, with a negative water balance the round year. Temperatures during spring and summer are high to very high.
- The main irrigated area is the “Río Dulce Irrigation System”, where about 70.000 hectares are being irrigated. Most of the farmers use surface irrigation; namely, basin and furrow.
- In the last years, some farmers shifted from surface to drip irrigation; the process is incipient, no led by the irrigation managers and mainly limited to horticultural crops. It is estimated that about 1.500 hectares are being irrigated by drip irrigation.
- Farmers are adopting a more “sophisticated” irrigation method, but the extension services do not give enough support to adequately accompany this process.

Research Questions

1. What are the main reasons for farmers to change the irrigation method to drip and which was/is the main source of technical advice for the design and management of it?
What is the performance of drip irrigation in the Río Dulce Irrigation System, Santiago del Estero, Argentina considering both technical aspects and the users' point of view?

Outputs of the proposed study

1. Evaluate why farmers adopted drip irrigation and how they cope with a different technology having insufficient or null support of the extension services.
2. Preliminary characterization of the drip irrigation performance in the Río Dulce Irrigation System in Santiago del Estero, Argentina.

Host institute(s): Wageningen University & Research and Instituto Nacional de Tecnología Agropecuaria (INTA)

Country: Argentina

Starting date: March/April 2017

WRM contact person: Harm Boesveld

INTA: Gabriel Angella, Daniel Prieto,



Water Resources Management

Thesis opportunities with banana producing company NEH Philippines



Problem context

- Philippine banana production is affected by changing weather patterns. Traditionally farms are rain fed.
- New threat of panama disease in surface water limit ability to use existing water sources..
- Limited expertise and experience in the sustainable sourcing and management of water resources (river, irrigation canals and deep wells), irrigation system design, and sustainable (economic, social, environmental) water and nutrition management lead to inefficient and ineffective banana production management

Research Question

- 1) Baseline assessment: how is the economic, social and environmental impact of current water and nutrition management practices on banana production?
- 2) How to optimize water and nutrition management for commercial banana production to ensure its sustainability?
- 3) What are the best alternative technologies in sustainable water and nutrition management with short term, mid-term and long term prioritization?

Outputs of the proposed study

- Factual assessment of current performance of water and nutrition management systems
- Summary of alternative and optimized water and nutrition management system
- Recommendations for improvement and further research

Host institute(s): NEH Philippines

Starting date: To be determined

Country: Philippines

Local supervisor(s):

For research on R&D: Joel Mora & Metushella.

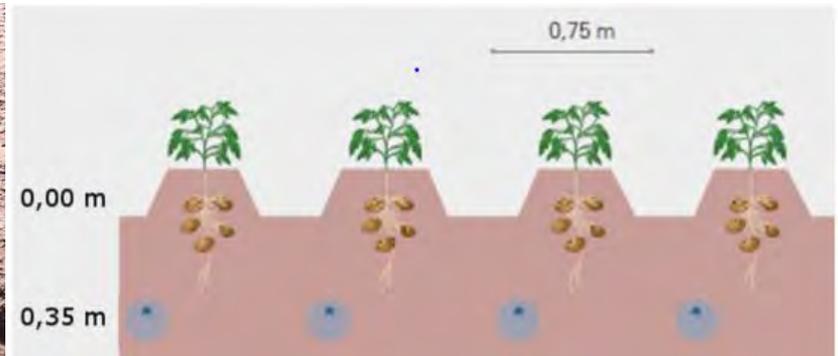
WRM contact person: Harm Boesveld

For research on social impact: Nelben Raymunda



Water Resources Management

Effectief watergebruik - Druppelirrigatie Spaarwater II, Nederland



Aanleiding

In Noord Nederland is het ondiepe grondwater door het recente geologische verleden en de kwel vanuit de Waddenzee brak en treedt er verzouting van het oppervlaktewatersysteem op. In droge perioden is er derhalve onvoldoende zoet water beschikbaar om gewassen optimaal te laten groeien. Spaarwater doet onderzoek naar een efficiënter water- en mestgebruik in de agrarische sector. Een van de maatregelen die in deze context wordt onderzocht is druppelirrigatie.

Onderzoeksvraag

Hoe kan druppelbevloeiing in Nederland worden geoptimaliseerd zodat deze leidt tot hogere gewasopbrengsten, een efficiënter gebruik van water en mest middels een zo goedkoop mogelijk systeem?

Methodologie (student)

Literatuurstudie, bezoek aan druppelprojecten, geohydrologische monsternamen, analyse watermonsters

Producten:

Overzicht Druppelen in Nederland, systeemanalyse opname en uitspoeling van meststoffen

Host institute(s): Acacia Water (www.acaciawater.com, www.spaarwater.com)

Country: Nederland

Starting date: ASAP (Feb – Mar 2017)

WRM contact person: Harm Boesveld, Harm.boesveld@wur.nl

Local supervisor: M. Hulshof



Water Resources Management

Groundwater storage in sand rivers

A case study in Tigray, Ethiopia



Problem context

Water is scarce in semi-arid regions, especially in the dry season. The riverbed of ephemeral sand rivers form unconfined aquifers in which water is stored. Water can be abstracted from these river beds and used to increase crop production and further socio-economic development. Currently, there is limited understanding of how much water is stored in the sand river beds, how storage develops over time and how much water can be sustainably abstracted.

Research Question

How do the quantity and quality of groundwater in sandy river beds change over time?

- What is the spatial and temporal variation in groundwater level?
- What is the quality of the groundwater and the water flowing in from the river banks?
- How much water is available for abstraction?

Methods

Hydrogeological fieldwork in Ethiopia, establishment of monitoring network, basic groundwater modelling

Outputs of the proposed study

Distribution and volume of water in the sand river throughout the year, Volume of sustainable abstraction

Host institute(s): Acacia Water (NL), Unesco IHE (NL), Mekelle University (Ethiopia)

Country: Ethiopia

Starting date: ASAP (Feb – Mar 2017)

WRM contact person: Harm Boesveld, harm.boesveld@wur.nl

Local supervisor: M. Hulshof

www.acaciawater.com | a4labs.unesco-ihe.org (still under construction)



Water Resources Management

Assessing water productivity of maize in a semi-arid environment in Argentina



Problem context

- About 1,2 million hectares of field crops are sown in rainfed conditions in Santiago del Estero, Argentina, being soybean, maize and cotton the most important crops.
- Santiago del Estero is located in the north of Argentina, the climate is semi-arid, with a negative water balance the round year. Temperatures during spring and summer are high to very high.
- The rainfall is concentrated from October to April, i.e. during springtime and summer, and shows an unreliable pattern. Droughts and dry spells during the crop cycle are not unusual.
- In such conditions, yields and water productivity of field crops are limited.
- Nitrogen availability would also influence the crop's performance.

Research Questions

1. What are the average and the variability of yields and water productivity of maize under rainfed conditions in Santiago del Estero, Argentina?
2. What are the yields and water productivity gaps (i.e. potential–average farm performance) of maize and which are the main productivity factors explaining them?

Outputs of the proposed study

1. Characterization of the average and inter-annual variability of yield and water productivity of maize under rainfed conditions in Santiago del Estero, Argentina.
2. Preliminary quantification of the yield and water productivity gaps and identification of the main agricultural factors causing these gaps.

Host institute(s): Wageningen University & Research and Instituto Nacional de Tecnología Agropecuaria (INTA)

Country: Argentina

Starting date: March/April 2017

WRM contact: Gerardo van Halsema, Gerardo.vanhalsema@wur.nl

Local supervisor: Salvador Prieto Angueira, Daniel Prieto, Gabriel Angella



Water Resources Management

Studying grassroots irrigation initiatives by farmers in Mozambique (Southern Africa)



Introduction: farmer-led irrigation in Mozambique.

Explorative research in Mozambique suggests that over 100.000 ha of irrigated agriculture have been developed through dispersed small-scale grassroots initiatives and innovations (ARF, 2015). In literature, these grassroots initiatives and innovations are known as farmer-led irrigation development (Nkoka *et al.*, 2014). In contrast, the World Bank identified just 20.000 ha under irrigation by smallholders in 2010-11 and the National Irrigation Strategy of Mozambique mentions only about 9000 ha (under 50 ha). Overall, farmer-led irrigation is thus grossly overlooked and underestimated. Grassroots initiatives in irrigation typically are qualified as 'small', 'traditional', 'unplanned', 'informal', 'illegal' and 'unsustainable'. Such a traditional view on irrigation ignores the investments of smallholders and the creation of productive agriculture and far-reaching trading networks.

Research Objective/Question: To explore the dynamics of grassroots irrigation initiatives by farmers in Mozambique. How much area is covered under irrigation by smallholder farmers? How much water do they use and how are they organized?

What is expected from the student: The student is expected to undertake case study and/or literature review research. Ideally, student(s) will be placed in an area with farmer activities in irrigation, to map and explore how smallholder irrigation works, technically, environmentally and social-economically.

Host institute(s): Resiliência Moçambique

Country: Mozambique (alternatively Southern Africa)

Starting date: Now, anytime

WRM contact person: Janwillem Liebrand en Wouter Beekman



MSc Internship at Akvo: smartphone-based soil and water monitoring

The Sustainable Development Goals (SDGs) are set of international and intergovernmental agreed upon goals in which governments, NGO's, private and societal actors are working towards the 2030 Agenda for Sustainable Development. The second SDG aims to: '*End hunger, achieve food security and improved nutrition and promote sustainable agriculture*'.

In light of working towards the second SDG while keeping track of its progress, [Akvo](#) is looking for an intern to support us with developing and improving our smartphone-based soil and water quality testing, [Akvo Caddisfly](#).

About Akvo Caddisfly

Akvo Caddisfly is a simple, low cost, open source, smartphone-based soil and water quality testing system connected to an online data platform. Existing features of the phone combine with software apps and pocket-sized hardware attachments, to conduct reliable soil and water quality tests. Testing can scale up very affordably, with data immediately accessible and shareable via an online dashboard. Measurements can be combined with GPS-data, metadata and qualitative data, allowing for interactive maps, quantitative data can be linked with qualitative data and more. This can enable faster and better interventions to take place and therefore using smartphones can transform soil and water quality management.

About the Internship

We recently developed [soil moisture \(SOM\)](#) and [soil electrical conductivity \(SEC\)](#) sensors that can play an essential role in working towards and tracking development of the second SDG. Moreover, we are working towards a soil quality measurement package that also includes soil pH and NPK. For this internship, the SEC and SOM sensors will be central.

Specific activities are:

- Perform validation tests on the SEC and SOM sensors at the WUR Soil Laboratory in terms of trueness, precision and accuracy in different types of soils and soil conditions
- Write a validation report that describes the used methods, presentation of the data and conclusions/recommendations that can be drawn from the data

Duration: 4 months (24 ECTs), starting date: as soon as possible

Internship allowance: €250, - / month, travel expenses will be compensated by us as well if these are not covered by DUO or other forms of subsidy.

Interested? Want to join in on this global effort for sustainable development? Contact Arthur Heijstek at arthur@akvo.org

Host institute: Akvo, Netherlands

Starting date: February, 2017

SLM/WRM contact person: Piet Peters, (piet.peters@wur.nl) Harm Boesveld (harm.boesveld@wur.nl)



Water Resources Management

MSc Thesis Farmer-led Irrigation Development

Policy analysis and cases in Mozambique, Tanzania & Kenya



Interest in development of irrigation in sub-Saharan Africa is on the rise as a response to increased food prices and continuing low productivity of agricultural production. The SAFI project seeks to understand if current investment by farmers in small-scale irrigation can offer a model for broad-based economic growth in rural areas of Africa.

A clear systematic analysis of existing farmers' initiatives will inform policies to generate growth in agricultural productivity, give a greater understanding of social and economic consequences, of changing land and water rights, and the choices of technical and financial support required.

SAFI is looking for MSc students to conduct:

1. case study research on instances of farmer-led irrigation development to engage with research question such as: What characterises small-scale farmers' own initiatives in developing improvements in water management for agriculture, and what social and economic changes are associated with them? And how are these socially differentiated (gender, age, ethnicity, etc.)?
2. policy process analyses of irrigation investment policies to engage with research questions such as: What views do agricultural development agencies (government, donors, NGOs, commercial investors) have about irrigation developed by small-scale farmers?

<u>Host institutes:</u>	SAFI project, see www.safi-research.org/
<u>Countries:</u>	Mozambique, Tanzania, Kenya
<u>Starting date:</u>	Flexible
<u>WRM contact person:</u>	Gert Jan Veldwisch (gertjan.veldwisch@wur.nl)



Water Resources Management

Minor MSc Theses on Irrigation in Africa

Desk studies / literature research on various topics



After a twenty year hiatus of public investments in irrigation in sub-Saharan Africa (SSA), the wheel started to turn again in the late 2000s. Recent studies have focussed on the scope and constraints for irrigation development in sub-Saharan Africa feeding the policy debate around the type of investment that would be the most desirable and appropriate to the sub-Saharan African context. Various pan-African studies and policy processes ran parallel to each other, while contributing momentum to the development of the Comprehensive African Agriculture Development Programme (CAADP), a continent-wide program developed under the African Union's New Partnership for Africa's Development (NEPAD) initiative.

Irrigation therefore is back on the agenda. However, there is a tendency in such advocacy to suggest that large-scale investment is required to achieve a significant increase in the irrigated area. Besides public investment, expectations of large-scale private (foreign) investments are especially high.

There are various topics in this field that lend itself for a desk study as part of a Minor Thesis, such as:

1. The construction and use of irrigation statistics in sub-Saharan Africa
2. Development and renewal of (national level) irrigation policies in relation to CAADP
3. Changing investment priorities of private and bilateral development donors

<u>Host institutes:</u>	WRM-group, Wageningen
<u>Countries:</u>	focus on sub-Saharan Africa, based in Wageningen
<u>Starting date:</u>	Flexible
<u>WRM contact person:</u>	Gert Jan Veldwisch (gertjan.veldwisch@wur.nl)



Water Resources Management

MSc Thesis “Smart Water for Agriculture”

Quick-scans and mapping of irrigation initiatives in Kenya



Smart Water for Agriculture (SWA) is a 5 year programme of the Netherlands embassy in Kenya. The programme promotes farmer-led and market-based smart water solutions. Smart water for agriculture is understood as part of the entire value chain. The smart water solutions that are promoted concern market-based options, both products and services, that will save water and energy and serve sustainable resource use, but also in many cases reduce labour and inputs, mitigate weather related risks, promotes off-season production opportunities, which makes them extra attractive.

In 2016 integrated assessment of farmer-led irrigation potential were conducted in 9 counties across Kenya. The project is now embarking on implementation activities, including:

- Field visits for ground-verification and cross-checking area estimates.
- In-depth assessments of drivers and bottlenecks on known aspects of key influence (including access to finance, technologies and markets) and associated social and environmental risks.
- Promotion and further development of pre-selected technologies and services on offer country-wide.
- Setting-up Irrigation Acceleration Platforms in the counties and at national level to facilitate innovation and learning processes.

There are various opportunities for MSc students to conduct their thesis research as part of this project.

Host institutes: SNV Kenya, Smart Water for Agriculture project
Countries: Kenya
Starting date: Flexible
WRM contact persons: Gert Jan Veldwisch (gertjan.veldwisch@wur.nl) & Harm Boesveld (harm.boesveld@wur.nl)



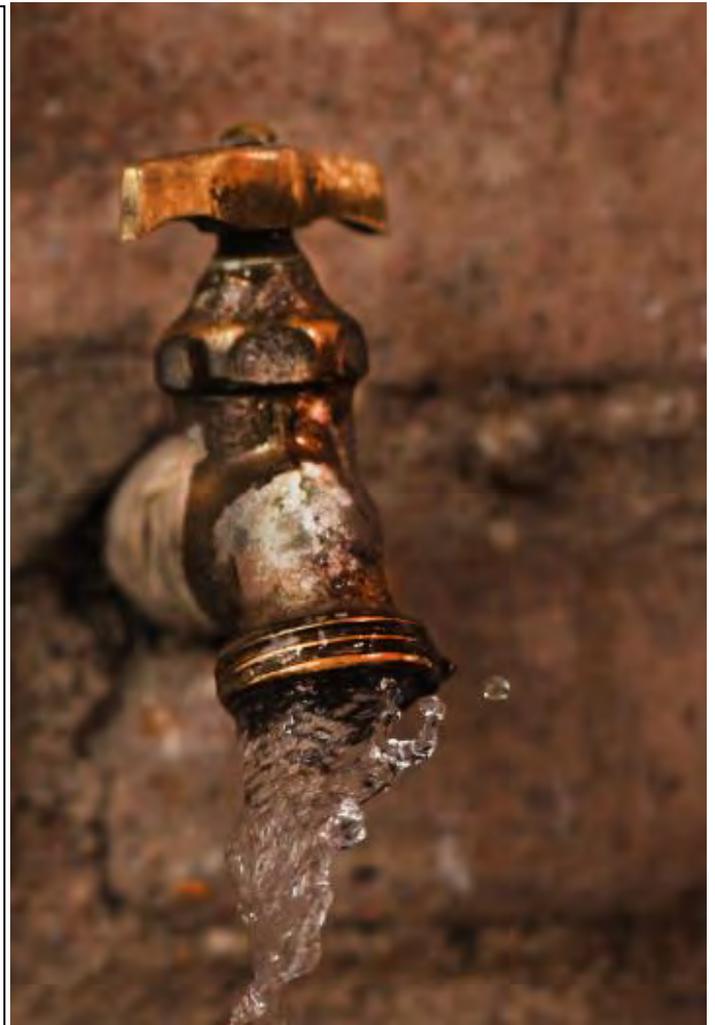
Water Resources Management

Mapping groundwater contamination with Arsenic and Fluoride in San Miguel de Allende, Mexico

Short project description. Due to high levels of groundwater overdraft many domestic water supply wells in the north of Guanajuato are now extracting groundwater with high levels of Arsenic and Fluoride. The consumption of this water leads to high levels of dental fluorosis and other associated health problems. Caminos de Agua, a local non-governmental organization has a water quality monitoring program which they use to generate knowledge, inform the population and develop mitigation strategies that are accessible and user friendly.

Research Objective/Question: With the aim of expanding this program Caminos de Agua is looking for an internship student that is eager to support their activities both in the field as well as in the lab and the office.

What is expected from the student (type of research): The research would combine technical lab work and the creation of visualization methods combined with a broader research into the coping strategies that are used at household and community level as well as by the authorities.



Host institute(s): Caminos de Agua, San Miguel de Allende, Mexico.

Country: Mexico

Starting date: March or September 2017

WRM contact person: Dr. Ir. Jaime Hoogesteger (jaimе.hoogesteger@wur.nl)



Water Resources Management

Integrated management of the Laja Watershed from the grassroots, Guanajuato, Mexico



Short project description: Integrated watershed management (IWRM) has been broadly embraced by governments, non-governmental organizations and civil society around the world. Yet how IWRM is interpreted and what actions are linked to this concept varies greatly. In the Laja River Watershed several initiatives have been started and implemented under the broad umbrella of IWRM but with relative little coordination. Therefore there is a need to map and critically analyze the different projects and programs that are being implemented on the ground with the aim of finding strategies to establish fruitful collaboration between the different stakeholders involved in promoting IWRM in this watershed.

Research Objective/Question: This internship and or MSc research aims to map and critically assess the different IWRM initiatives in the Laja Watershed with the aim of devising strategies that lead to synergies and collaboration.

What is expected from the student (type of research): The research would combine interviews with different stakeholders and field visits to the different projects that are being implemented in the region.

Host institute(s): Fundación de Apoyo Infantil, San Miguel de Allende, Mexico.

Country: Mexico

Starting date: March or September 2017

WRM contact person: Dr. Ir. Jaime Hoogesteger (jaimе.hoogesteger@wur.nl)



Water Resources Management

Labeling and the water question in imported vegetables: insights from the Dutch organic sector



Short project description: In a globalized world we have gotten accustomed to have an enormous array of fresh vegetables at our disposition throughout the year. These vegetables come from all corners of the earth and represent an enormous amount of virtual water that is often taken with high socio-environmental costs from fragile local environments. Labeling has emerged as a private sector initiative that aims to a) guarantee consumers that the product they buy complies to specific production regulations; and b) through these regulations influence the practices of production. Organic labeling is very often related to better socio-environmental production practices in the field; yet it remains unclear how the water issue and social responsibility are dealt with in the Dutch organic import sector. This research is part of the broader VENI project of Jaime Hoogesteger entitled Re-patterning Water Control.

Research Objective/Question: This research MSc research aims to analyze how the Dutch organic import sector deals with the issue of water and social responsibility in the production process of fresh fruits and vegetables.

What is expected from the student (type of research): The research will be carried out in the Netherlands and will consist of interviews with different Dutch import companies of organic fresh produce as well as with the important labeling companies.

Host institute(s): VENI research project: Re-patterning water control.

Country: The Netherlands

Starting date: As soon as possible

WRM contact person: Dr. Ir. Jaime Hoogesteger (jaimе.hoogesteger@wur.nl)



Water Resources Management

Irrigation modernization and agricultural change in the Módulo la Purísima, Guanajuato, Mexico



Short project description: Irrigation modernization is often portrayed as the silver bullet to save water in irrigation systems while at the same time facilitating more flexible and efficient water use. The modernization of irrigation often goes paired with the promotion of new crops, different cropping calendars and a switch to more intensive agriculture. The Módulo de Riego La Purísima in the State of Guanajuato, Mexico has been recently (2015) modernized to enable the use of drip irrigation in the whole system with the aim of facilitating a switch from basic grains to high yielding fresh vegetables. This has brought about a change in how water is managed and by whom as well as in the production practices of farmers.

Research Objective/Question: This MSc research which is part of the boarder VENI project 'Re-patterning water control' aims to unravel how the modernization of the irrigation system has changed the agricultural production practices of small farmers in the irrigation system.

What is expected from the student (type of research): The field research will take place in the irrigation system and will combine interviews with small farmers (ejidatarios), managers and water guards with participant observation in the irrigation system.

Host institute(s): Universidad de Guanajuato, Campus el Copal, Irapuato, Mexico.

Country: Mexico

Starting date: March or September 2017

WRM contact person: Dr. Ir. Jaime Hoogesteger (jaime.hoogesteger@wur.nl)



Water Resources Management

Expanding and strengthening sustainable agricultural services and market development for women through commercial partnerships, technology-empowered Farm Business Advisors (FBAs) and facilitation of agricultural finance for women farmers (or agribusinesses ran by women), while identifying and introducing gender equity techniques on family farms through the concept of Farming as a Family Business (FaFB):- a study of iDE PEMA farmers in Manica and Sofala Provinces of Moçambique



Problem context:

Poverty is persistent, complex, and affects one-third of the world's population. Although women play a critical role in strengthening and sustaining their households, they are most acutely affected by poverty. Despite the fact that women produce 60-80% of all food consumed in developing countries, women represent an estimated 70% of those living on less than \$2 a day, suffer most from poor nutrition, insufficient access to healthcare and limited education, and comprise the majority of victims of forced labor, gender-based violence, and legal and social inequities. Despite the fact that they provide the majority of agricultural labor, most Mozambican women are excluded from lucrative commercial agriculture because of poverty, traditional gender norms, and modern gender-biased policies and business practices. For example, when farmer groups are formed, outreach is generally focused on men, as household leaders and landowners. Additionally, women have lower literacy levels and smaller plot sizes, so targeting women requires a different service package. Further, most women are members of a family farm, while most agricultural development initiatives target male heads of household, ignoring women's role on the farm. Purposeful strategy is needed to include women in agricultural development work so that they realize their full potential.

Research Question:

1. How are FBAs assisting to introduce gender equity on the farms and how can the FBAs better implement and encourage the concept of FaFB?
2. Which technologies (including for production, information delivery etc) can be used by both FBAs and farmers to introduce the gender equity on the farmers?
3. How can the Agro-finance education component be best modeled to also encourage gender equity on the farms?

Outputs of the proposed study:

An analytical study of the iDE PEMA model being used to empower women farmers in Sofala and Manica Provinces of Moçambique and output clear research study suggestions on how to improve the FaFB and FBA model in the PEMA project.

Host institute(s): iDE Moçambique (PEMA Project)

Country: Mozambique

Starting date: Open but preferably btw Mar-Nov 2017

WRM contact person: Esha Shah, esha.shah@wur.nl

Local supervisor: L.S. Zisengwe



Water Resources Management

Conjunctive water use in irrigation to alleviate drought impacts in the Jaguaribe basin, Brazil



Short project description.

Problem context

In the Northeast of Brazil droughts are part of everyday life. Large investments in infrastructure (dams and irrigation schemes) have enabled economic development. However, especially during periods of inter-annual droughts, water demand outstrips water availability. As a result hydrological drought is extended well beyond meteorological drought.

Research Question

To what extent can hydrological drought be alleviated by deliberated strategies for conjunctive use of water for irrigation?

What is expected from the student (type of research)

- Define drought Indicators (meteorological and hydrological) for different catchments
- Identify areas where conjunctive use (groundwater and surface water) is possible
- Estimate the potential gain of conjunctive use in terms of hydrological drought indicators

A combination of GIS and hydrological modelling approaches is used.

Host institute(s): FUNCEME – Fortaleza, Ceará, Brazil (<http://www.funceme.br/>)

Country: Brazil

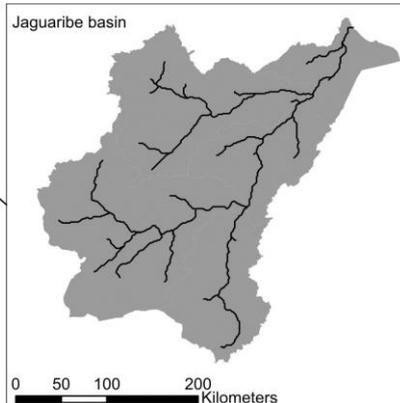
Starting date: 2017

WRM contact person: Pieter van Oel (pieter.vanoel@wur.nl)



Water Resources Management

Improving of groundwater resources management in NE Brazil



Short project description.

Problem context:

In the South Ceará (Jaguaribe basin, Northeast Brazil) the use of groundwater resources is regulated according to the following principle: total groundwater abstraction should not exceed average recharge. However, groundwater recharge is highly variable over time and estimating groundwater resources availability involves large uncertainties due to limitations in data availability, model schematizations (e.g. boundary conditions) and model parameter estimations. To overcome this, ideally the epistemic uncertainty of groundwater recharge should be considered in water management. In addition, long-term impacts of different water uses (human supply, irrigation, industry) on groundwater resources availability should be considered. Thus, an improved approach for the management of groundwater resources and their use is needed.

Research questions:

- What is the uncertainty of recharge estimations?
- What are the long-term effects of water abstraction practices by different sectors?
- How can uncertainties be included in water resources management for Southern Ceará, Brazil?

What is expected from the student (type of research)

A recently developed groundwater model will be used to estimate groundwater recharge and its uncertainty. Validation is done using monthly monitoring records of groundwater levels in the region available from the Ceará Water Agency (COGERH).

Host institute(s):

UNILAB - Redenção, Ceará, Brazil (<http://www.unilab.edu.br>)

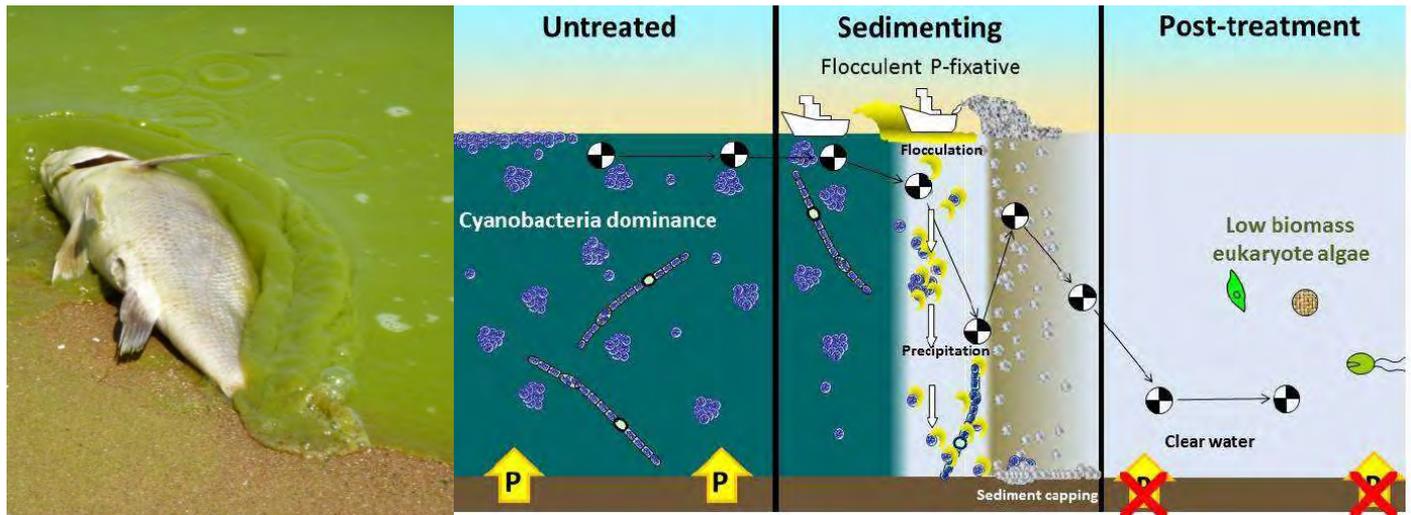
FUNCEME – Fortaleza, Ceará, Brazil (<http://www.funceme.br/>)

Country: Brazil; Starting date: 2017; WRM contact person: Pieter van Oel (pieter.vanoel@wur.nl)



Water Resources Management

Testing a technology to manage Eutrophication in Brazilian lakes



Short project description.

Problem context

In the Northeast of Brazil droughts are part of everyday life. Especially during periods of drought reservoir levels drop considerably. Even when enough water is in them, water quality does not always allow its safe use for drinking and watering livestock. Especially during periods of drought eutrophication is a problem in many small lakes. A low-cost approach to overcome this nuisance/problem could be the use of flocculants as part of a “Flock and Lock” treatment, combining a low-dose flocculent with a solid-phase P sorbent. This technique has been applied successfully in two lakes in The Netherlands. To explore the potential of this approach in Brazil on-site testing is needed.

Research Question

What is the potential of the “Flock and Lock” treatment in lakes in Northeast Brazil, using different materials?

What is expected from the student (type of research)

- Set-up and execute an experiment to test the “Flock and Lock” treatment for a selected lake in Ceará, Brazil. This is done in collaboration with researchers from the Aquatic Ecology and Water Quality Management group

Host institute(s): FUNCEME – Fortaleza, Ceará, Brazil (<http://www.funceme.br/>)

Country: Brazil

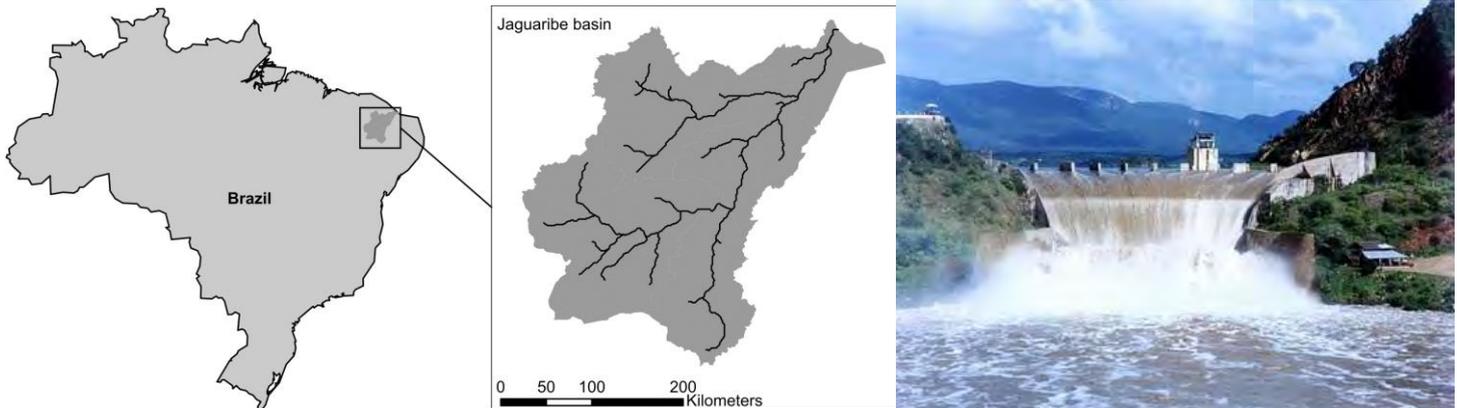
Starting date: 2017

WRM contact person: Pieter van Oel (pieter.vanoel@wur.nl)



Water Resources Management

Re-establishing yield-reliability relationships for strategic reservoirs in the Jaguaribe basin, Brazil



Short project description.

Problem context:

In the Northeast of Brazil droughts are part of everyday life. Large investments in infrastructure (dams and irrigation schemes) have enabled economic development. However, especially during periods of inter-annual droughts, water demand outstrips water availability. Public 'strategic' reservoirs (dams) in the Northeast of Brazil are designed and operated based on a reservoir yield reliability approach. Water supply is typically limited to a discharge that can be provided ninety percent of the time (Q90). However, as more and more new reservoirs are constructed, and water use in reservoir catchments reduces, the yield-reliability relationship decreases.

Research questions:

What is effect of upstream reservoirs and water use on the reliability of yield from strategic reservoirs?

What is expected from the student (type of research)

- Data analysis (GIS) for estimating water use and reservoir storage.
- Establishing improved yield-reliability curves using stochastic methods

Host institute(s):

UNILAB - Redenção, Ceará, Brazil (<http://www.unilab.edu.br>)

FUNCEME – Fortaleza, Ceará, Brazil (<http://www.funceme.br/>)

Country: Brazil; Starting date: 2017; WRM contact person: Pieter van Oel (pieter.vanoel@wur.nl)



Water Resources Management

Water-energy nexus effect of São Francisco water transfer, Brazil



Short project description.

Problem context

A long history of drought in the Northeast of Brazil has led to the development of a large water transfer project. The 'Transposição' is designed to bring water from the São Francisco river to smaller river basins in the semi-arid North-east of Brazil. One of these basins is the Jaguaribe basin in the state of Ceará

Research Question

What are the effects of the water transfer from the São Francisco basin to the Jaguaribe basin for beneficial use of water in agriculture and hydropower generation.

What is expected from the student (type of research)

You will use quantitative methods to evaluate reservoir yield-reliabilities and translate this into indicators for hydropower generation and agricultural production.

You will evaluate the effects of water transfer under different climate scenarios.

Host institute(s): FUNCEME – Fortaleza, Ceará, Brazil (<http://www.funceme.br/>)

Country: Brazil

Starting date: 2017

WRM contact person: Pieter van Oel (pieter.vanoel@wur.nl)

Water Resources Management

Various Organizations in Nepal



Host institute(s): Various

Country: Nepal

Starting date: to be determined

WRM contact person: Bert Bruins, bert.bruins@wur.nl



Water Resources Management

Optimal water security for irrigation schemes in Tasmania



Short project description.

Problem context

The Tasmanian government has committed to increase the value generated by the agricultural sector in Tasmania with tenfold to \$10 billion by 2050. Therefore, the government seeks to secure water availability by means of implementing irrigations schemes. The idea is that farmers can intensify and grow high value crops if water is secured. Perennial crops, like fruit trees and grapes, create more value/m³ compared to annual crops but need high water security to make the investment worthwhile.

High water security might reduce water availability if more water is needed to stay in storage for the following season. Is there an optimal water security? When do farmers dare to switch from annual to perennial crops? These are important questions when designing irrigation schemes to increase value generation.

Research Objective/Question

Is there an “optimal” water security in Tasmania?

- Does high security reduce availability of irrigation water in Tasmania?
- What is the minimal water security before a farmers dare to plant fruit trees?
- What is the optimal water security for Tasmania based on value generation/m³?

Type of research:

literature review, interviews

Host institute(s): Wageningen University, University of Tasmania

Country: Australia

Starting date:

WRM contact person: Petra Hellegers
Melle Nikkels



Water Resources Management

Value creation/m³ in the Netherlands and Tasmania



Short project description.

Problem context

The Tasmanian government has committed to increase the value generated by the agricultural sector in Tasmania with tenfold to \$10 billion by 2050. Therefore, the government seeks to secure water availability by means of implementing irrigations schemes. The idea is that farmers can intensify and grow high value and perineal crops if water is secured.

On the island there is limited water and suitable farm land. How much value do farmers have to create/m³ to reach the long term goal? Are there lessons to be learned from the Netherlands? The aim of this study is to compare between the value creation at farm gate and “agricultural complex” (this includes processing raw products) of Tasmania and the Netherlands.

Research Objective/Question

What is the current value generated/m³ in Tasmania and in the Netherlands?

- Where do the differences come from?
- What needs to be done to reach the long term goal of Tasmania?
- Are the current investments in irrigation schemes sufficient to reach the long term goal?

Host institute(s): Wageningen University, University of Tasmania

Country: Australia

Starting date:

WRM contact person: Petra Hellegers
Melle Nikkels