

<b>Vacancy</b>	<b>PhD in socio-hydrology: socio-hydrological dynamics of drought in north-east Brazil</b>
<b>Organization</b>	Wageningen University
<b>Department</b>	Environmental Sciences, Hydrology and Quantitative Water Management group
<b>Chair holder</b>	Prof.dr. Remko Uijlenhoet
<b>Starting date</b>	1 April 2019
<b>Duration</b>	4 years at 1 fte

In April 2019 an interdisciplinary research project will start, coordinated by Wageningen University: ***Diagnosing drought for dealing with drought in 3D: Toolbox for increasing drought preparedness of actors in water and climate governance, starting from north-eastern Brazil***

This project is a joint effort of Brazilian and Dutch organizations including: Wageningen University (WU; The Netherlands); the Research Institute of Meteorology and Water Resources (FUNCEME; Brazil); the Federal University of Ceará (UFC; Brazil) and the Brazilian Research Agricultural Corporation, National Research Tropical Agroindustry Center (EMBRAPA; Brazil).

*Project description:* To manage drought better, human influences on drought must be better understood. Current frameworks for drought monitoring and water accounting focus on the natural boundary conditions and therefore offer little help in distilling human influences on drought. This project combines insights from socio-hydrology and water management to produce an entirely new approach, incorporating the study of water-related human dimensions ( $D_1$ ), **socio-hydrological dynamics ( $D_2$ )**, and the structuring of dialogues ( $D_3$ ) among actors. The project will develop and test the integrated, participatory 3D Drought Diagnosis (3DDD) toolbox. We will investigate nested scale levels, related to local water resources and virtual-water transfers together with actor networks of users, managers, traders, and policymakers. Test case is the drought-affected north-east of Brazil. Finally, the 3D Drought Diagnosis toolbox can be used to enable existing drought monitors to provide contextualized information in drought-affected regions worldwide. We will demonstrate how proposed drought management solutions perform with regard to cross-scale synergies and trade-offs in relation to the UN Sustainable Development Goals 2, 6, 10, and 13. The project will kick-off with three PhD candidates, each focussing on one of the three D's: water-related human dimensions ( $D_1$ ), socio-hydrological dynamics ( $D_2$ ), and dialogues among actors ( $D_3$ ). As a PhD candidate in this project, you will work in an international and interdisciplinary team, studying the development and impact of droughts using approaches from different scientific disciplines.

In the context of the 3DDD project Wageningen University is looking for a **PhD student in the field of socio-hydrology: Socio-hydrological dynamics ( $D_2$ ) of drought in north-east Brazil**.

The PhD student will focus on the following **research question**:

What are the mechanisms that drive co-evolution of human activities and hydrological drought that can potentially push socio-hydrological-system dynamics ( $D_2$ ) beyond critical thresholds, evoking transitions to unfavourable states?

Together with two other PhD students and a post-doctoral researcher you will develop and test an integrated, participatory 3DDD toolbox for providing actionable knowledge to improve water and climate governance supported by drought monitoring frameworks. The toolbox will serve to increase drought preparedness of actors in multi-level water and climate governance. You will focus on human-drought interactions using a modelling approach, thereby combining the natural boundary conditions of drought (e.g. due to a lack of precipitation) with the social boundary conditions of drought (e.g. due to over-exploitation), while accounting for their interdependency.

**Your tasks:**

- Development of an agent-based model (ABM) to simulate the co-evolution of drought and human activities. The model design builds on existing studies regarding feedback mechanisms between water availability and use and accounting for social influences on the diffusion of innovations. A social survey and in-depth interviews will be conducted for data collection.
- ABM validation based on a series of three participatory modelling workshops. Model outcomes regarding spatiotemporal patterns of drought will be validated using the results from other sub-projects.
- Evaluation of proposed drought management interventions using the participatory ABM. This activity will be done in collaboration with other researchers.
- Writing academic publications in international journals and a PhD thesis.

**Who we are.**

Wageningen University & Research centre aims to deliver a substantial contribution to the quality of life. Within our domain, healthy food and living environment, we search for answers to issues affecting society - such as sustainable food production, climate change and alternative energy. Every day, 6,500 people work on 'the quality of life', turning ideas into reality, on a global scale.

This PhD-project will be carried out at the Hydrology and Quantitative Water Management (HWM) group of Wageningen University. HWM is part of the Department of Environmental Sciences of Wageningen University. HWM's research and teaching focus on understanding and prediction of hydrological processes in river basins and deltas for improved water management. The PhD-project will be conducted in close collaboration with Water Resources Management (WRM) group of Wageningen University. WRM is engaged in interdisciplinary research and education at the intersection of water, technology, and society.

**What we look for.**

We are looking for a candidate with the following qualifications:

- a master degree (MSc) in hydrology, water resources management or a related field
- experience in modelling (hydrological modelling, system dynamics, or agent-based modelling) and coding / scripting (e.g. in R, Matlab, Python, or Fortran)
- experience with collecting social data (household surveys, interviews) is an asset
- eager to work on yet unexplored topics, and able to independently propose research directions
- a creative, critical and collaborative person with an interest in interdisciplinary research
- ability, willingness and commitment to collaborate in a research team and write joint publications
- excellent communication in English (<https://www.wur.nl/en/Education-Programmes/PhD-Programme/English-language-requirements.htm>), and good communication skills
- some knowledge of the Portuguese language would be an asset.

**Conditions:**

This PhD project is in the form of a Sandwich PhD. This means that your PhD defence will at Wageningen University. You will stay in the Netherlands for 18 months and in Brazil for 30 months. Your supervisors will be experts from Wageningen University and project partners from Brazil (UFC, EMBRAPA, FUNCEME). Your monthly allowance will be: €1,400 (in the Netherlands) and €1,000 (in Brazil). There is additional budget for research activities, attending courses and workshops, international travel, etc.

You can only apply for a Sandwich PhD if you are a national of one of the countries in the following regions: Middle and South America, Africa, countries that belong to the former Soviet Union and that are not an EU-member state and all Asian countries except Israel, Japan, South Korea and Singapore.

**Contact information:**

Additional information about this project can be obtained from  
Dr Lieke Melsen (Wageningen University; [lieke.melsen@wur.nl](mailto:lieke.melsen@wur.nl))  
Dr Pieter van Oel (Wageningen University; [pieter.vanoel@wur.nl](mailto:pieter.vanoel@wur.nl))  
Prof.dr. Eduardo Martins (FUNCEME; [espr.martins@gmail.com](mailto:espr.martins@gmail.com))

You can apply up and until 28 February 2019.

For this position you can only apply by sending your CV and motivation letter to [pieter.vanoel@wur.nl](mailto:pieter.vanoel@wur.nl)

Job interviews will be held in the period 11-15 March 2019 in Fortaleza, Brazil.