

By Katarzyna Negacz, July 2018.

Hidden Potential: Salt-tolerant Crops on Salinized, Degraded Lands

The Netherlands, Bangladesh and Kenya – these countries share a challenge of progressing salinization caused by the climate change. However, properly managed saline areas can be beneficial for people and nature. In my research project, I explore the potential of saline degraded lands for food production on global, regional and local level in view of the growing knowledge on salt-tolerant crops.



As a student of Environment and Resource Management at the Vrije University Amsterdam, I was looking for a research project with an impact and practical application. A topic on salinized, degraded lands caught my attention, as it linked a global problem of food security and sustainability, leading-edge field experiments conducted at Salt Farm Texel and diversified research methods, which I could apply. I decided to learn more about the salinity around the world, after a meeting with Prof. Pier Vellinga, a renowned expert in climate change, who introduced me to the saline farming and became a supervisor of the project together with Dr. Arjen de Vos from Salt Farm Texel.

Saline agriculture includes innovative practices which involve crop cultivation on salty soils or irrigating with salty water. It was applied at Salt Farm Texel, which obtained much more salt-tolerant vegetable varieties than it was previously assumed by FAO. The European Union Interreg project SalFar, co-funded by the North Sea Region Programme 2014–2020, was established to better understand opportunities created by the saline agriculture. In March 2018 the SalFar project partners from more than 10 countries gathered on Texel. There, I learnt more about the current conditions for saline farming, tasted saline products and talked to researchers from the UK, Sweden and Denmark investigating this topic. Dr. Eric Ruto, researcher in the Salfar project of Lincoln University has been of great help in sharing information and helping with contacts in Kenya.

My project results come from mixed research methods, ranging from global and local mapping in ArcGIS, through interviews with 11 experts from all around the world (e.g. Dubai, Moscow, Nairobi, and the Hague) to economic estimations of costs and revenues. The spatial analysis has shown that there is 420 million ha of saline soils, out of which 58 million ha are moderately or highly saline. However, after applying additional conditions, such as water availability and fertility, which are crucial for the crops, the surface equals to 8,8 million ha, which is the top priority area, currently inaccessible for conventional agriculture. These lands are located in countries such as Mexico, China, Pakistan, Bangladesh, Iran,

Ethiopia, Kenya, Tanzania, Egypt and Argentina. I have further explored two of them, Bangladesh and Kenya, as my case studies.

The results of global economic analysis of the potential revenues from saline agriculture show a total of 3,978 trillion USD per year with 90% yield and 2,210 trillion USD per year with 50% yield (for 420 million ha). On the regional and local level, mapping exercise for both Kenya and Bangladesh has revealed large areas suitable for the salt-tolerant crop cultivation and favourable socio-economic conditions. Interviewed experts on Bangladesh and Kenya highlighted key enabling factors for saline agriculture: areas with suitable salinity levels, interested farmers and existing market for saline products.

Additionally, the research project tested various research methods for exploring the saline agriculture issue. The spatial and cost-benefit analyses appeared as promising and holistic methods to measure salt-tolerant crops' potential, which can accommodate testing various conditions and scenarios.

The findings of this project may be of interest to organisations and policy makers for planning and allocating funds to saline degraded lands restoration. They indicate priority areas for investment and economic potential of salt tolerant crop cultivation. As Dr. Dionysia Lyra from ICBA, who was interviewed as an expert, says: "With increasing population reaching 9 billion people before 2050, feeding the world will not be possible with current rate of environment degradation and severity of climate change impacts. We need to find solutions and see how to utilize these unconventional lands and plants. We should re-evaluate the conventional agriculture as implemented now".

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