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From Mining to Agriculture: Citizen Science for Soil Re-cultivation on Bangka Island, Indonesia

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Bangka Island lies in the South Eastern Asian tin belt extending from Myanmar to Malaysia, harbouring one of the largest tin mines world-wide. Around 70% of Bangka is mining area; it satisfies more than a third of the world tin demand, mostly for use in the electronics industry. At the same time, Bangka is renowned for its production of supreme pepper and agriculture is vital for the island. As tin deposits dwindle, the importance of other economic sectors like agriculture and emerging tourism become increasingly evident.

Tin is extracted through physical separation, namely density fractionation, yielding cassiterite (fine-sand fraction) and two by-products (quartz sand and kaolinite). While the cassiterite is melted to recover tin, quartz and suspended kaolinite are discarded in large quantities, and deposited mostly in an uncontrolled way in the landscape. This destructs the top soil. Kaolinite deposits lead to water logging of soils and hence to the development of ponds; quartz sand deposits, on the other hand, have almost no water retention capacity, show extremely high infiltration rates, and are devoid of nutrients. Both phenomena render the environment difficult for plants and make agriculture challenging, especially with respect to obtaining sufficient crop yields.

In one village, a small group of farmers had already started re-cultivation measures. The local extension service linked these farmers to a university community service program, out of which a trans-disciplinary collaboration has developed. Re-cultivation measures have to be designed to be economically viable and environmentally friendly. Several locally available soil amendments hold great potential for improving soil fertility. In 2018, a demonstration field with 24 plots was set-up jointly by researchers and farmers to test how several soil amendments affect physico-chemical soil properties and crop yields.

The trans-disciplinary approach has reunited farmers, local extension, government and regional, as well as, international scientists. We documented the establishment of the field experiment using video and complemented these impressions with interviews of the involved farmers.

Citizen science and participation are two of the buzzwords of today's scientific landscape; but including non-scientist actors in research processes is far from straightforward. Including outreach or participatory research measures is often little more than lip service. In the present case, what turned into a fully-fledged research project began as a true grassroots initiative that attracted several other actors beyond the immediate local farming community. Farmers were the driving force of this transition process from abandoned to agricultural land from the very beginning. After a brief observant period upon inclusion of scientific actors, farmers quickly recovered their active role in the innovation process as experimenters and creative forces. Already in the first vegetation period, yield gains upon amending were so important and obvious to local farmers, that they started to develop strategies for producing some of the additives on their own for application in their fields in the former mining area.

This contribution aims at illustrating the approach that developed organically and that can be a promising formula, not only for future research but also for development interventions.