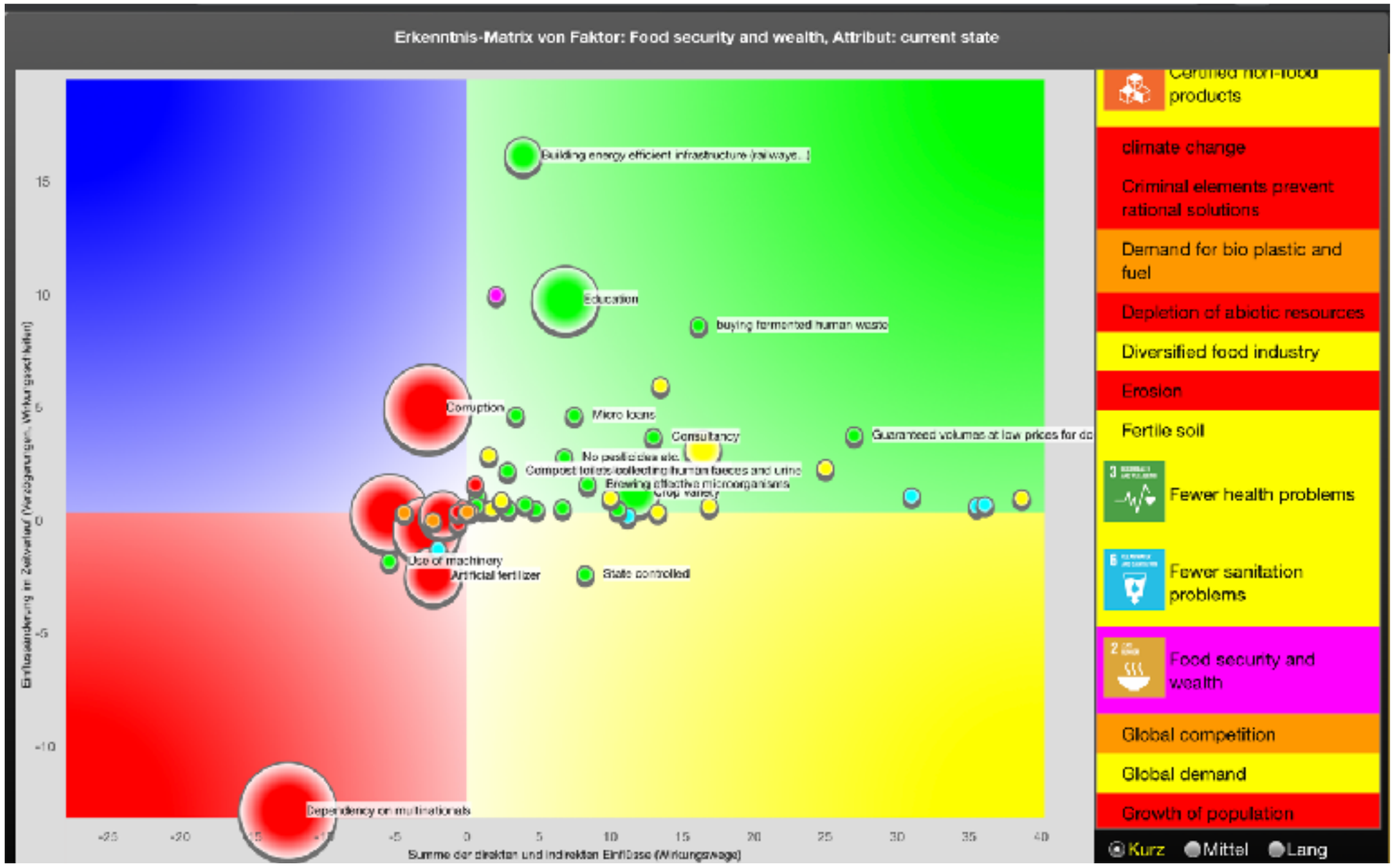
Bioeconomy - the intelligent way

Consideo - Kai Neumann, Franc Grimm



Inisght matrix from the model "The intelligent way from Africa" with a holistic view of how food security can be guaranteed in the future - not only - in African countries. The use of machines and automation have a negative impact just like artificial fertilizers. Circular diameters stand for the current status.

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Bioeconomy - the intelligent way

SYSTEMIC INSIGHTS FROM A PROJECT ON FOOD SECURITY IN SUBSAHARAN AFRICA

Summary

As part of an extensive project on food security in sub-Saharan countries (using Ethiopia, Nigeria and Ghana as examples), we have been able to gain numerous systemic insights through qualitative, participatory, explorative stakeholder modelling and a quantitative simulation model on biomass, money and information flows, taking into account so-called megatrends and the UN Sustainable Development Goals.

According to this, classical consulting approaches, which recommend increasing agricultural productivity in African (and other developing) countries through the use of machinery, pesticides (in combination with seeds from multinational corporations) and artificial fertilizers on large fields, are, viewed in a systemic context, an aberration.

Indeed, land productivity should be increased and more land should be used, but the labour intensity in agriculture should be maintained against the background of global automation and digitalisation of other sectors and fatal urbanisation. Cultivation practices should be resilient with legumes, agroforestry, a recirculation also of human biomass, etc. without dependence on multinational corporations and with a minimization of vulnerability to weather extremes (floods and droughts caused by climate change).

Following the primacy of self-sufficiency through state-guaranteed prices, export goods should not be marketed internationally according to price, but according to the criterion of sustainability with appropriate labels.

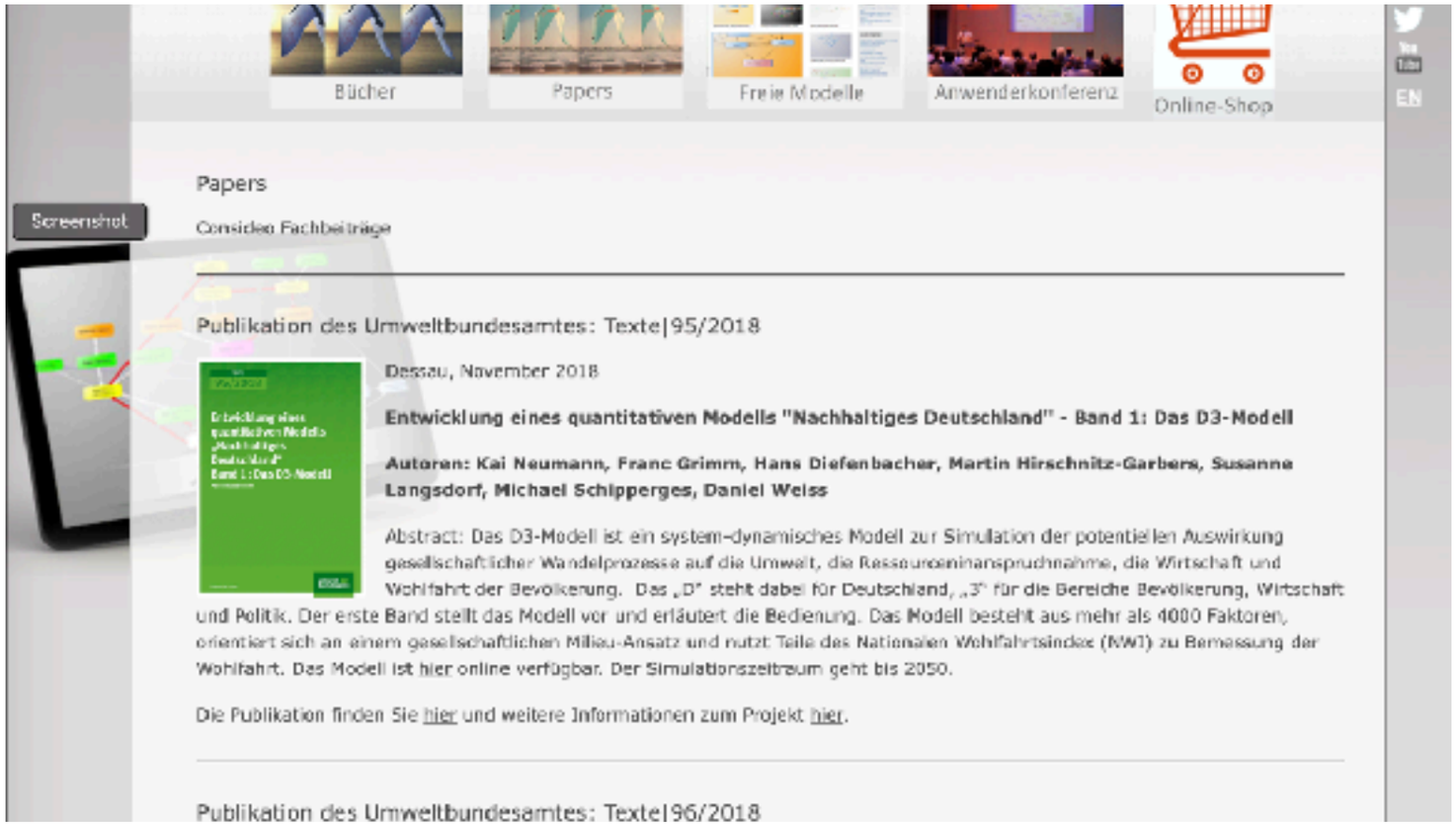
Adoption of the western consumer style with concrete buildings in Africa - at least the scaffolds are made of bamboo.

The 'grey series'

Studies do not seem to reach the political arena at all, are usually too specific for the general public, and are all too often perceived by other scientists as competition or are not taken up.

We can reach policymakers through the public and we will continue to write official project reports and peer-reviewed articles for the scientific community. But for the public, we want to offer an attractive format that is easy to read and that sums up the findings and the action that can be derived from them - our 'grey series' based on the term 'grey literature'.

Our findings from the project on food security in African countries raise some general criticism of the type of research (faculty silo thinking), the design of development aid (choice of services and practices by own corporations) and the behaviour of multinational corporations (safeguarding natural resources while shifting the creation of value and simultaneously returning inferior food products).



Screenshot of the Consideo website with the project reports and scientific publications linked there (www.consideo.de/papers.html)

No doubt, the future belongs to the bio-economy, and regions with appropriate growth conditions must go their own, in many countries labour-intensive yet productive way, with the primacy of their own, state-protected interests and emancipated from international influence. Challenging!

The biomass-web project

The Biomass - Web Project (https://biomassweb.org) started with the thesis that food security in Africa could be increased by regional availability of food and income - from agriculture, forestry and processing industries and the resulting trade (bioeconomy) for buying food - through a holistic view of the synergies between the different fruits (especially cassava, maize and bamboo). It is assumed that crop rotations, consulting services, marketing channels, industrial exploitation, etc. could provide synergies and productivity increases.

The overall project was carried out by renowned institutions from Germany and locally, and Consideo's task was actually only in a smaller work package to discover potential synergies in the flow of biomass, money or information through participatory stakeholder modelling.

It soon became clear that no synergies could be expected from the predominant small farmers and the regional, traditional marketing channels. Many soft and hard factors showed that there were thick boards to be drilled here, but also that the focus on only a few fruits might not be sufficient. Systematically, we at Consideo then wanted to reflect on other aspects as well, such as the reduced soil fertility if the plant residues were fully utilised, the possibilities of dispensing with mineral fertilisation, the possibility of using the widespread use of open fires through pyrolysis furnaces to produce vegetable coal, the lack of waste water treatment in cities through composting of excrement, and much more. However, we had to learn that in large research projects,

Virgin forest or agriculture? Or agroforestry?

each area does its own research, that cooperation is subordinated to concrete constraints, that in Africa, development aid projects are not very ambitious anyway, and that a systemic view of potential developments has no chance without empirical evidence, even though all those involved are extremely competent and likeable.

Overriding trends

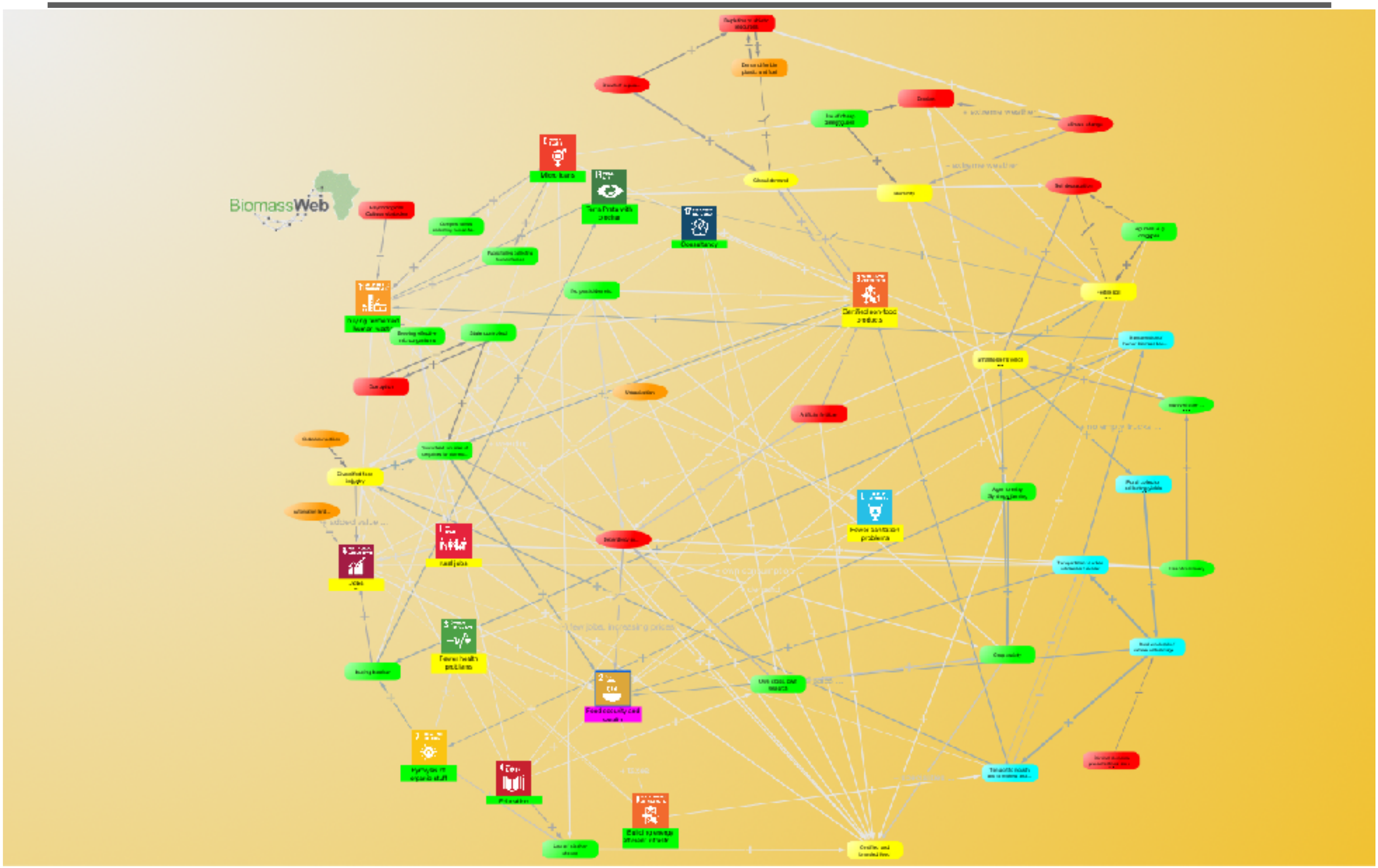
On the ground, we recognised that young people are migrating to the cities and have no prospects there if global competition favours imported goods, especially food. Wastewater is also a major problem in the slums of the cities. In the countryside, many areas are unused, and cooking over open fires is a health hazard, and not only dead wood is used for this. Moreover, small farmers are extremely vulnerable to extreme weather conditions caused by climate change.

In fact, the context is even bigger:

- Rural exodus and slum formation
- Global competitive pressure through automation and digitization - cheap labor no longer represents a competitive advantage.
- Climate change causes extreme weather conditions with soil degradation.
- Biotic raw materials are gaining in importance, not only because more and more people are consuming more and more meat, but also to replace building materials (such as concrete with high greenhouse gas emissions) or fossil raw materials for plastics, thus permanently binding CO2.
- Local food prices will rise with global crop failure due to extreme weather conditions from climate change.
- Globally growing awareness and demand for sustainable products.
- Multinational corporations control seeds, fertilizers, pesticides and marketing channels with low added value in producer countries. High-quality plant raw materials are exported, and junk food is reimported with good marketing.
- Classical mindsets of consultants recommend to cultivate large areas of land (susceptible) with machinery, pesticides and fertilizers and low-cost labour and thus to adapt yields to global competition, sometimes in vain.
- Western patterns of consumption are aimed at without objective increase of happiness and welfare.
- Dependencies and exploitation are mainstreamed.

Plastic instead of eco tourists

BIOECONOMY - THE INTELLIGENT WAY



Qualitative cause-and-effect model "The intelligent way from Africa", the evaluation of which is shown on the title page of this paper. The model shows the basic cause-effect paths of agricultural production plus the framework conditions, trends and also the SDGs.

Qualitatively: the intelligent way

The qualitative model shows how the use of machinery in agriculture to increase labour productivity frees up labour that cannot be absorbed by any other sector - too much has to be imported in these countries and too little is exported. In the past, economic growth could still be achieved by locating industries in countries with low labour costs, but with increasing digitalisation and automation, labour costs are already rising in China and falling short of expectations in India. It is unlikely that African countries will leapfrog into the digitalised service society without industrialisation, for example, as long as technologies are exclusively imported and it will take a whole generation before competitive technologies can come from African countries themselves through improved education and other measures.

Through increased work productivity, even tractor drivers can afford more. The more these people can afford, the more money flows into imported goods, from mopeds to televisions to cars. This money is then missing on the regional markets. If, on the other hand, smaller incomes are spent mainly on healthy food and other natural products (building materials, clothing, biochemical products) from regional markets, plus of course local services, less money will migrate for imports and potentially more people will have access to healthy food.

However, this requires market intervention, so that there are minimum wages and also minimum and maximum prices and that exports are subordinated. Exports are internationally competitive if the overall added value, also in terms of the Sustainable Development Goals, is expressed in a label that allows sufficiently high prices.

Such a label, for example "The intelligent way from Africa", would pursue the Sustainable Development Goals and would ensure a demand for fair products worldwide.

.... with local circular economy

The global demand for biotic raw materials will increase dramatically. In Africa, too, more land must be cultivated with higher yields, but with improved soil quality, labour-intensive and resistant to extreme weather conditions. Instead of fertilizers and pesticides, legumes such as chickpeas and cultivation practices such as agroforestry should enhance the value of the soil and ensure high yields. This long-term view is then made possible by certification and, as a result, higher prices and guaranteed markets.

Another way to increase soil productivity is to add biochar, which can be left over when using pyrolysis cookers without the charcoal continuing to burn. In this vegetable coal on the field not only CO2 is then permanently bound, but also nutrients and moisture.

There could therefore be trade in dead wood followed by trade in charcoal back to the farmers.

A large proportion of the nutrients in the soil are lost through the plants and their consumption, followed by excretion and untreated discharge into the groundwater and the rivers and seas. If human sewage could be returned to the fields as uncontaminated as possible in the cycle, and if compost toilets with so-called effective microorganisms could prevail, the productivity of the land would be increased even further and a trade in microorganisms such as fermented faeces would mean a true bioeconomy.

It is crucial that such an economy is marketed with a distinctive label and

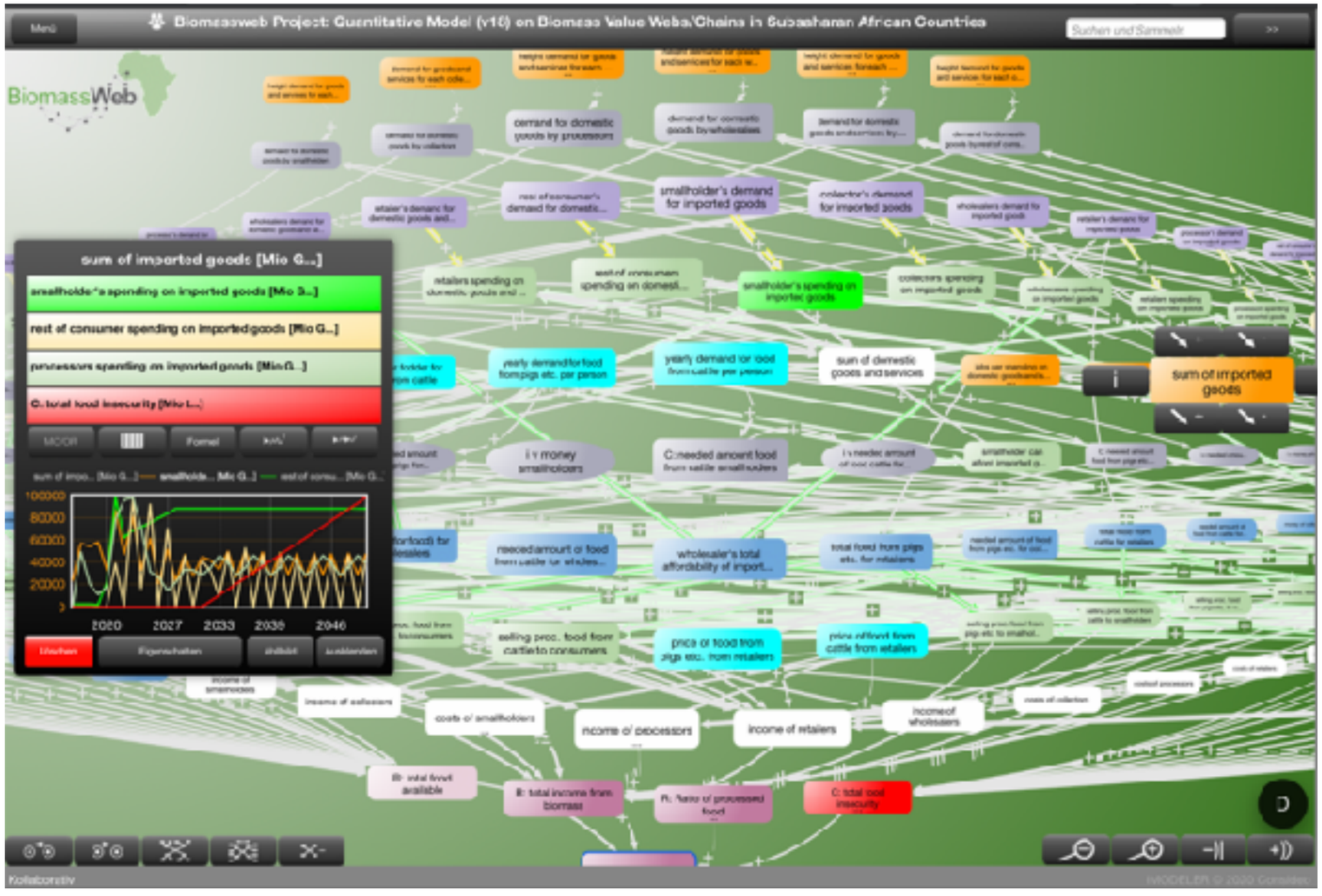
Micro economy

that prices and acceptance are guaranteed by the state. This would then enable microcredits and advice on cultivation methods and emancipation from both - multinational corporations and obstructive cultural traditions.

Not labor productivity

The qualitative model just presented and the perspective of a labour-intensive micro-economy with state influence was immediately criticised from all sides as unrealistic with too many assumptions - and this out of a sovereignty of interpretation and with the reference that there were no data on it. Adequate criticism would question individual connections in the model and remind us of missing factors. Without this, however, the model is an abductive - logical conclusion that remains valid until falsified.

To be more convincing, we have created a simulation model with Ghana's data - if available. The model shows how much biomass can be harvested from the available land, how much is needed for food and what is left for industrial production. Adjustable parameters allow to vary the use of machines and labour and to see in consequence more income for the few, or little income for the many. As one might expect, more income for the few would mean more money for imports, and the released labour force would not be absorbed by the bio-industry, nor by trade and services for those with more income.



The process model shows where the bottlenecks (Theory of Constraints) are in the flow of biomass and money and how the food shortage can develop in million tons.

References and link

Some of the models are shared on KNOW-WHY.NET

A published paper from the biomass-web project (https://biomassweb.org) can be found here:: http://www.economics-ejournal.org/economics/journalarticles/2018-25/version_1/at_download/file

Economics
The Open-Access, Open-Assessment E-Journal
Vol. 12, 2018-25 | April 26, 2018 | http://dx.doi.org/10.5018/economics-ejournal.ja.2018-25

Participatory, explorative, qualitative modeling: application of the iMODELER software to assess trade-offs among the SDGs

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Abstract
The UN's Sustainable Development Goals (SDGs) in their generalized form need to be further reflected in order to identify synergies and trade-offs between their targets, and to apply them to concrete nations and regions. Explorative qualitative cause and effect modeling could serve as an approach for considering crucial factors to better understand the interrelations among the SDGs, eventually leading to more informed concrete measures that are able to cope with the SDG's inherent obstacles. This work describes a model that could serve as a template for concrete application. The generalized model already points to some potential trade-offs. Its first analysis cautiously raises doubts that some possible assumptions behind the SDGs might overlook systemic boundaries. For example, an undifferentiated increase of productivity contradicts a lessened environmental impact and need for resources in light of potential planetary boundaries. However, the model was developed as a starting point and requires modification for its application to a concrete region.

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About Consideo

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With the platform KNOW-WHY.NET we offer collective connections.

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