

Sharing knowledge – to the benefit of all

Germany's Thünen Institute has increased its activities in Africa in recent years. Scientific training and education are a crucial part of many of these activities. Specific examples are presented in this article, as are opportunities and challenges in the sharing of knowledge.

By Veronika Jorch, Heino Fock, Aida Gonzalez-Mellado and Goran Schmidt

As a Federal Research Institution, the Thünen Institute and its predecessors have more than 100 years of experience in providing scientific advice to the German government and stakeholders. Long-term monitoring of greenhouse gases, fisheries surveys, soil and forest inventories, and extensive modelling capacities, such as fisheries and agro-economic modelling, are the main tools to generate advice for national and international policies. Combatting climate change and the management of fish stocks requires internationally coordinated efforts, and bound by the terms of international trade and exchange, ecological-economic policies can only be successful if conducted at regional to global scale. Present and historical ties between European and the African countries are strong, and the neighbourhood status makes science collaboration between Africa and Europe a natural process. With a strengthening of German policies towards African countries in recent years, the Thünen Institute has acknowledged its responsibility to contribute with an increasing number of partnerships and research activities with African institutions.

As for policy consulting, developing networks and scientific infrastructure can only be successful in the long term if a sufficient number of adequately trained researchers, laboratory staff, technicians and consultants are available and employed in the target regions. Also, the effectiveness of bilateral research collaboration will be higher if both sides dispose of an understanding and sound knowledge of the respective other region. Therefore, a core element in our cooperative activities is to develop capacities among both partners with shared training and education programmes. Moreover, research in rural areas will only be efficient if it benefits the local population. So our activities follow a holistic approach in which stakeholder involvement and the com-



Scientific Production Technician Mbulelo Makhetha with the CTD [Conductivity, Temperature, Depth] rosette aboard the research vessel 'Meteor', during a practical training & research cruise.

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munication of results for other segments of the population, meaning farmers, government and consumers, are included. In the following, we present a selection of activities run at the Thünen Institute.

Agricultural economic modelling for strengthening food security

Agricultural economists from the Thünen Institute use agricultural mathematical models as tools to estimate potential agricultural and economic developments for key agricultural markets in Germany and European Union countries. Policy-makers use these estimates to assess how the agricultural markets will behave

under the current policies. In the project 'AGMEMOD goes Africa' (the abbreviation stands for AGri-cultural MEMber State MODel), scientists from the Thünen Institute and six African countries work together to develop similar agricultural models in order to project the future situation regarding local and imported food supplies. Thünen scientists have been preparing training sessions on the building of agricultural economic models since 2013. Furthermore, scientists communicate continuously to maintain and extend the models, but also to evaluate results together via video conferences. Regular training is provided in Germany for new staff starting to work with the model in the partner countries. As the project has already been running for eight years, it has been possible to establish a cooperative network, particularly in Eastern Africa.

Enhancing local training capacities for fisheries research

In close cooperation with African and European partners, a series of fishery research projects build up on each other and interlink strongly. This has contributed significantly to the enhancement of academic fisheries science capacities in several African countries and Germany. The series began in 2013 with AWA (Ecosystem approach to West African fisheries) in Senegal. Cheikh Anta Diop University in Dakar and the Thünen Institute shared supervising several Senegalese PhDs. This comprised inter alia mini-symposia in Germany, summer schools in Senegal and training on-board a research vessel. International conferences have been organised to strengthen the regional network of marine science in terms of fisheries research and other ocean-related issues. During the PREFACE project (Enhancing the predictability of tropical climate), the Thünen Insti-

tute continued the activities in Cabo Verde at graduate and post-graduate level in cooperation with the University of Cabo Verde. The first Master's degree in fisheries science will be conferred in 2020. The concept of individual doctoral theses evolved into a full academic post-graduate programme within the WASCAL framework (West African Science Service Centre on Climate Change and Adapted Land Use), of which the maritime branch has been hosted by the University of Cabo Verde since 2019. Within WASCAL, research and educational capacities are shared between eleven West African countries and Germany. Thünen experts contribute in the fields of marine genetic resources, fisheries biology and assessment, and hydro-acoustics. The Coastal Ecosystem Monitoring in Cabo Verde project augments fieldwork for the WASCAL programme which also addresses non-academic capacity-building. Finally, these activities feed back into the EU maritime "All Atlantic" strategy as one of the pillars of Thünen Institute marine research.

In Namibia and South Africa, African partners and Thünen colleagues co-supervise individual students and support them in their academic careers to reach Masters and PhD degrees. Participation in international research cruises is provided to enable sea-going training, and training sessions will be organised to strengthen the networking component.

BioHome – research-driven education on recycling resources

Sub-Saharan economies consume enormous amounts of non-African imported building materials, while waste management and eco-industrial products are in their fledgling stages. A shortage of skilled staff further exacerbates this scenario. Low-threshold teaching formats for specialists may overcome such constraints. One example is the BioHome project, in which the Thünen Institute is cooperating with University of Hamburg/Germany and the universities in Ethiopia, South Africa and Ghana. The BioHome team develop building materials from by-products of combustion, post-consumer plastics and waste lignocelluloses. They work on frugal processes, e.g. compounding waste agricultural foils into high value building products. Consumer acceptance of their utilisation in the urban social housing sector is analysed and the substitution potential identified.

The project's backbone is postgraduates from eleven countries doing research-driven edu-

The Thünen Africa Concept

The Thünen Institute is a diverse and geographically dispersed departmental research institution. It consists of 14 specialised institutes that carry out research and provide policy advice in the fields of economy, ecology and technology. Alone in 2019, Thünen Institute cooperated with 57 partners in 23 different African countries. Cooperation centres on the topics of food security, climate change and sustainable use of natural resources.

The exchange and coherence underlying the different activities in Africa is more demanding than for other central organisations. To address this challenge, the institute is working out a special Africa Concept, following the idea that capacity development in distant countries is a process of change, involving all partners and individuals. The core of the Thünen Africa concept is to:

- establish an Africa contact point at the Thünen Institute both for scientific cooperation as well as for the political level and the Ministries;
- create an internal network of scientists taking an interest in Africa;
- provide guidelines for project planning for cooperation with African institutions, based on the knowledge of partners and colleagues;
- contribute to the national network of capacity building institutions.

cation and training. Together with the University of Hamburg, they are designing a masters' curriculum in "Wood Science" for Addis Ababa University, Ethiopia and Kumasi Technical University, Ghana, and are building open educational resources. The postgraduates are grouped thematically (Geopolymer-Wood-Composites, Wood Plastic Composites and Mass Flow Analysis) and perform as learners and as teachers. During summer schools in Germany and hands-on workshops in Ethiopia and South Africa, the African students learn about cost-saving processing and characterisation methods whilst the Europeans study the infrastructural circumstances of recycling and construction in urban Africa. The teams develop their teaching content based on their genuine research work and qualify themselves with e-learning tools (markdown, wiki, github). Excerpts from the lectures are translated into local languages and are illustrated to further mutual understanding between academics and locals.

Scientific education needs long-term, trustful relationships

Long-lasting trustful und respectful relationships are important to enhance an environment for exchange and mutual learning. Moreover, learning, and thus education, are never-ending processes of progress and adapting to new conditions. The world-wide Corona pandemic has hampered international education efforts. BioHome and WASCAL courses as well as the yearly-organised AGMEMOD Summer School had to be transferred completely to online formats. This highlights the importance of digitalisation in the development of capacities in international collaboration, reduces the car-

bon footprint of teaching programmes and can be seen as a model to sustain capacity building programmes cost-effectively. Thus, the "screen-sharing button" in most conferencing tools evolves into a "knowledge-sharing button".

The promotion of a suitable environment for effective scientific education is challenging, given the short 3–4-year lifetime of most projects. Therefore, within the African activities, the Thünen Institute attempts to build a complementary series of projects by pursuing one topic with a number of successive ventures, as described for fisheries research. In addition, approaches to obtain independent project funding for education and training are underway. Two examples are curriculum development by BioHomes and the capacity-building activities in the area of agro-economic modelling. Scientific education is a crucial part of the Thünen activities in Africa, while other important components involve the manner of communicating scientific results to different segments of society. Moreover, scientific education can only be effective if the educated persons find jobs or can be encouraged to create their own enterprises at home. This asynchrony needs to be solved by governments and international organisations.

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