With support from
Federal Ministry of Food and Agriculture
by decision of the German Bundestag

中德农业中心
Deutsch-Chinesisches AGRARZENTRUM

Harvest | 丰收

Sino-German Agricultural Magazine

Issue #3
Nov 2023

Cover Topic

Agrobiodiversity: perspectives from Germany and China

GFA CONSULTING GROUP
General Agent BMEL Berlin Office
IAK AGRAR CONSULTING
iamo Leibniz-Institut für Agrarentwicklung in Transformationsökonomien
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About the DCZ

The Sino-German Agricultural Centre (DCZ) is a joint initiative of the German Federal Ministry of Food and Agriculture (BMEL) and the Ministry of Agriculture and Rural Affairs (MARA) of the People's Republic of China.

The DCZ was established in March 2015 as a central contact and information platform in charge of coordinating the bilateral co-operation between Germany and China in the agriculture and food sector. In April 2022, the project entered its third phase.

China is one of the world's largest food producers and consumers. Therefore, its agricultural development and transformation process is of significant importance for its German partners. By bringing together stakeholders from politics, business, and academia, the DCZ promotes the exchange of experience and knowledge to tackle shared challenges and support the sustainable development of the agriculture and food sector in both countries.

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Editorial

Dear partners and friends of the Sino-German Agricultural Centre (DCZ),

Biodiversity is declining at an alarming rate. According to the United Nations (UN), one million plant and animal species are now under threat of extinction as a result of human activities.

Agricultural expansion continues to be the main driver of biodiversity loss. As we are pushing the fields on which we grow food, fiber, and biofuels to ever more areas around the globe, habitats for other species are shrinking, thereby undermining the diverse ecosystems and the natural benefits that these provide to life on our planet and the well-being of humanity. But agriculture is not just a driver of biodiversity loss, it is also uniquely affected by it. Soil degradation, susceptibility to pests and weather extremes, as well as reduced pollinator activity are some of its consequences.

Agriculture, it is clear, cannot be overlooked when it comes to tackling the current biodiversity crisis. This issue of Harvest · 丰收 takes a closer look at the relationship between agriculture and biodiversity conservation, sharing insights and practices from Germany and China. Our contributors discuss the benefits and shortcomings of China's current agro-biodiversity policies, show how new (digital) technologies are leveraged in Germany to shift from monocultures to heterogeneous landscapes, and share stories from rural China that give insights into how and why farmers adopt biodiversity-friendly practices. Our contributions suggest: by combining the right policies and incentives with new technologies, we can foster agricultural practices that increase biodiversity while at the same time supporting food production goals as well as the interests of farmers and consumers.

We hope this issue of Harvest · 丰收 inspires debate and exchange. Please share your feedback and suggestions with us at info-dcz@iakleipzig.de.

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Cover Topic

Status quo and trends of agrobiodiversity conservation in China

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Agrobiodiversity refers to the diversity of different living organisms present in farmlands and agroecosystems, including cultivated crops, livestock, wildlife, insects, microorganisms, and other organisms. Agrobiodiversity directly affects agricultural production and ultimately food security and ecological safety. According to the Food and Agriculture Organization of the United Nations (FAO) in 2011, more than 95% of the crop varieties in the global seed bank come from local traditional resources, which retain rich genetic diversity and are of great value for breeding new crop varieties[1]. Agrobiodiversity forms complex food chains and ecological webs that help to control pests and diseases and reduce crop losses by 23%. By enhancing agricultural productivity through rhizosphere effects between crops, agrobiodiversity also enhances ecosystem resilience and food diversity, ensuring a sustained supply of agricultural products and a wider range of nutrient sources.

1. Status quo and problems of agrobiodiversity in China

China is one of the richest countries in agrobiodiversity, with 9,631 grain and agricultural plant species, including 3,269 species of cultivated and wild relatives of plants, 4,204 herborize and grazing species, 2,218 weeds and poisonous plants, 590 livestock and poultry varieties and 966 edible fungi categories. Many species and their habitat types are unique[2]. Rice, wheat, maize, soybean, sweet potato, tea, cotton, etc. originated in China. As the world's largest producer of vegetables and fruits, many varieties are adaptable to different ecological conditions and help reduce the pressure of climate change, pests, and diseases.

Traditional Chinese agriculture attaches importance to the diversity of ecosystems and has established a compound agricultural ecosystem. It includes eco-agricultural models such as mulberry field silkworm rearing combined with fishponds, paddy-field fish farming, resource conservation and utilization facilities such as kariz wells, as well as intercropping and rotation. The compound agroecosystem of "fruit tree + ground lotus + crops + Chinese honeybee" in Yunnan and Sichuan Province, for example, can effectively prevent pests and diseases as well as pollinate the crops, and provide food, feed, and economic incomes for farmers. In addition, due to topographic and geomorphic factors, relatively rich biodiversity is still retained in South China and Southwest China (Figure 1).

Figure 1: Diversified agricultural landscapes in Southwest China

However, due to urbanization, farmland expansion, and land degradation, the loss of biotope is severe, and the diversity of many agroecosystems is declining, resulting in the accelerated loss of some endemic varieties and wild relatives of crops. As of 2014, there were only 3,271 endemic varieties of major crops remaining, with a loss ratio of 71.8%. Climate change has also brought uncertainty to agrobiodiversity, resulting in over 70% crop failure and about 17% of sown area affected by drought every year. Intensive agriculture tends to grow a few high-yielding crops, to increase the size of fields and reduce edge habitats, thereby intensifying land use.

2. Status quo and progress of agrobiodiversity conservation in China

In recent years, the Chinese government has taken several measures to actively promote the conservation and sustainable use of agrobiodiversity. The Ministry of Agriculture and Rural Affairs (MARA) has set up management agencies such as the Offices for Agricultural Wild Plants and Exotic Species. The Rural Energy and Environment Agency of MARA is responsible for specific work. Provincial agriculture and rural affairs departments (committees and bureaus) have set up agro- environmental management agencies, and most local and county level agricultural and rural bureaus also have environmental protection stations or personnel assigned for agrobiodiversity conservation.

Regarding agrobiodiversity conservation, the Ministry of Agriculture and Rural Affairs (MARA) conducted a comprehensive survey and inventory of the biodiversity in agricultural areas across the country for the first time from 2001 to 2004 and published the Catalogue of Biodiversity in Agricultural Areas in 2008. The catalogue listed the ecosystems, habitats, and species in agricultural areas in 26 provinces (and autonomous regions). Important wetlands in agricultural areas, distribution areas of wild relatives of crops, distribution areas of important agricultural specialties, agricultural areas under extreme environments, important typical ecological areas and transition zones, ecological impacts of imported varieties, important agricultural pests and diseases and natural enemy habitats, as well as nature reserves affiliated to the agricultural departments were cataloged. The third national census and collection of crop germplasm resources is being carried out from 2021 to 2024 [1] .

China has established an **agricultural genetic resource bank** to preserve and manage germplasm resources of various crop varieties, farm animals, and plants. By the end of 2019, a national ex-situ conservation system of 1 long-term bank, 1 duplicate bank, 13 medium-term banks, and 48 national germplasm nurseries (including 2 test tube seedling banks) was completed, preserving 500,000 copies of germplasm resources of 340 crop varieties. The Chinese Academy of Sciences has established a southwest wildlife germplasm resource bank in Yunnan Province. The number has recently reached 66,500 copies of 6,450 species, including repeatedly preserved species, duplicates, bacterial strains, and cell strains or cell lines. In addition, China has established a technical system for in-vitro and ex-situ conservation of medicinal plant germplasm resources. Nearly 30,000 in vitro germplasm of medicinal plants were collected, involving 3,599 species. Moreover, a national medicinal plant germplasm resource bank has been established and 5,282 medicinal plants are under ex-situ conservation, of which 243 are nationally protected rare and endangered species[3].

Agricultural wild plants are important strategic resources in China. Since 2001, the Ministry of Agriculture and Rural Affairs (MARA) has implemented **in-situ conservation projects for agricultural wild plants**, so that many endangered wild plants have been properly protected and restored. By the end of 2020, 217 protected areas (sites) had been constructed in 203 districts and counties in 28 provinces (municipalities and autonomous regions), covering an area of approx. 24,000 ha. Over 70 endangered wild plant species (categories) that have a significant impact on food security and sustainable agricultural development and are included on the List of Key Wild Plants under National Protection. Four species have more than ten project sites, namely wild soybean, wild rice, wild kiwi, and wild orchid, with wild soybean having the largest share with 50 sites. Meanwhile, in cooperation with the United Nations Development Program (UNDP), MARA implemented the project of conservation and sustainable use of crop wild relatives in China, which successfully protected eight important populations of wild rice, wild soybean, and wild wheat relatives, and extended it to 64 wild crop relatives in 15 provinces[4].

Diversified eco-farming practices provide a sustainable approach to agrobiodiversity conservation (Figure 2). In Yunnan Province, an innovation system for effective diseases control through crop diversity has been listed as a major technical measure to spread to increase grain yield. The rice-fishery symbiotic system, which has been vigorously promoted in Southern China in recent years, has maintained local rice varieties and fish diversity while ensuring farmers‘ food and income. In 2021, China‘s rice-fishery farming area exceeded 2.6 million ha, with an output of nearly 20 million tons of rice and 3,556,900 tons of aquatic products. Eco-farming emphasizes agricultural development under the premise of protecting the ecosystem, thus preserving the diversity of numerous agricultural species and crop varieties. China has built more than 100 national eco-farming demonstration counties and more than 2,000 eco-farming pilots. Starting in 2021, MARA has been using eco-farms as starting point to promote the development of eco-farming. Currently, 431 national-level eco-farms have been identified. Organic farming is a typical model of ecological agriculture. By the end of 2022, China‘s organic crop cultivation area reached 4,206 million ha, ranking third in the world.

1 https://www.gov.cn/zhengce/zhengceku/2021-03/25/content_5595469.htm

Figure 2: Diversified eco-farming practices

Biodiversity is an important component of agricultural heritage and, as a necessary condition for the sustainable development of the food system, it plays a crucial role in the food system transformation. China is the earliest responder, active participant, and outstanding contributor to the Global Important Agricultural Heritage Protection System (GIAHS). Currently, China has 22 GIAHS projects, ranking first in the world (accounting for 28.2%). From 2013 to 2023, MARA has successively published seven batches of 188 nationally important agricultural heritage sites (Figure 3), which play an important role in the conservation of agrobiodiversity and farming cultural diversity. In addition, many civil society organizations are engaged in participatory in-situ habitat conservation and multi-level interdisciplinary exchanges, dissemination, and policy advocacy in the fields of agrobiodiversity, conservation and utilization of traditional culture, development of smallholder farmers and communities, eco-circular agriculture, as well as tackling climate change. For example, the Farmers' Seed Network works in more than 40 rural communities in ten provinces across the country.

3. Policies related to agrobiodiversity conservation in China

China formulated its first national biodiversity strategy and action plan, the China Biodiversity Conservation Strategy and Action Plan, in 2010. This was followed by more relevant plans like the National Plan for Conservation and Utilization of Biological Species Resources, the Medium- and Long-Term Development Plan for the Conservation and Utilization of National Crop Germplasm Resources (2015-2030) and the Opinions of the General Office of the State Council on Strengthening the Conservation and Utilization of Agricultural Germplasm Resources, etc. All of them emphasize the importance of agrobiodiversity conservation. Relevant laws have also been enacted and improved, including the Seed Law of the People's Republic of China, Regulations of the People's Republic of China on the Protection of Wild Plants, and Measures for the Management of Crop Germplasm Resources. In 2014, MARA issued Measures for the Management of China's Important Agricultural Heritage (trial version) to protect traditional agricultural heritage[2].

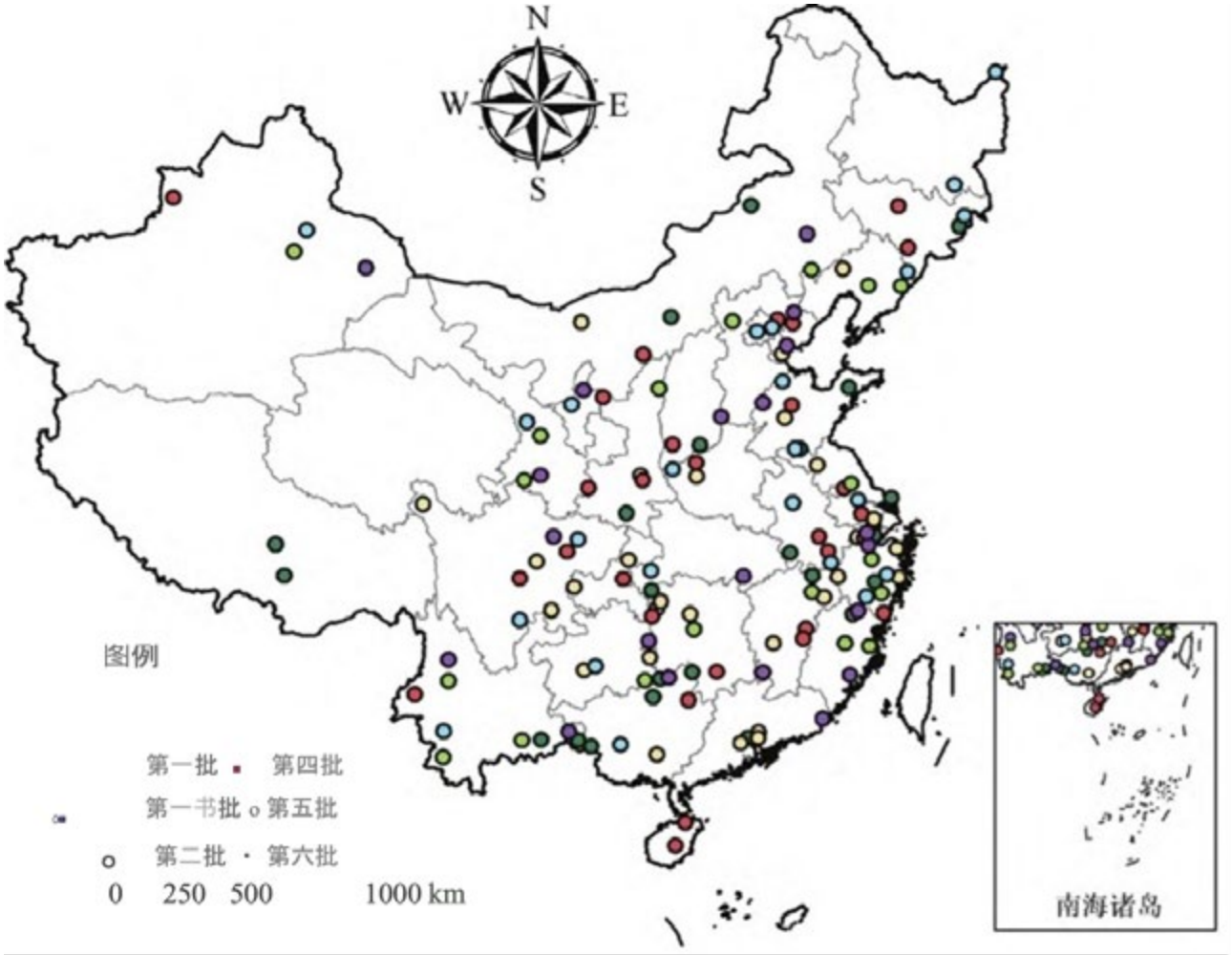

Figure 3: Spatial distribution of important agricultural heritages in China (Wu Rulian et al., 2023)

The 14th Five-Year Plan for National Economic and Social Development and the Outline of Long-term Goals for 2035 clearly identifies the implementation of biodiversity conservation projects and the construction of a biodiversity conservation network as an important part of ecological development. The 14th Five-Year Plan for Promoting Agricultural and Rural Modernization makes it clear that a rural ecosystem will be built, farmland eco-corridors will be improved, and a complex eco-agroforestry network will be created. The 14th Five-Year Plan for National Green Agricultural Development stipulates that by 2025, the agroecosystem will be significantly improved, the arable land ecology will be restored, biodiversity will be effectively protected, and the farmland ecosystem will be more stable. To promote the green transformation of China's agriculture and to better protect agrobiodiversity, the General Office of MARA issued a Guiding Opinions on Promoting the Development of Eco-Farms in early 2022, which stipulates that 1,000 national eco-farms will be built nationwide and 10,000 local eco-farms will be built in provinces by 2025.

2 http://www.moa.gov.cn/nybgb/2014/dliuq/201712/t20171219_6111689.htm

4. Problems and prospects of agrobiodiversity conservation in China

Although China has made some progress in agrobiodiversity conservation, there are still some problems and challenges. First, there is insufficient attention on the conservation of agricultural habitats. For a long time, the focus has only been on the protection of natural habitats, but there is a lack of effective biodiversity conservation measures for agricultural land, which accounts for more than 50% of the total land area. In the planning and formulation of various policies, there is no direct reference to agrobiodiversity conservation on farmland, nor is there a clear target for agrobiodiversity conservation in the Convention on Biological Diversity National Biodiversity Strategy and Action Plan[5]. Second, there is a lack of systems and methodology to assess and monitor agrobiodiversity. Although China attaches great importance to the conservation of germplasm resources, there is a lack of clarity and understanding of the biodiversity which provides important ecosystem services for agricultural production, a lack of network and technical systems for surveying and monitoring agrobiodiversity, as well as a lack of methodological systems for systematically assessing and responding to the impacts of agricultural production on biodiversity. Third, there is still a lack of supportive and incentive policies for promoting eco-farming. Most eco-farming measures require more inputs and management and may not be able to obtain the corresponding economic return immediately, making it difficult for these measures to be supported or adopted.

In terms of agrobiodiversity conservation in the future, China could encourage farmers to adopt diversified eco-agricultural practices to help reduce dependence on chemicals and increase the diversity of farmland. Coordination and cooperation among different government departments and relevant stakeholders should be strengthened to ensure policy coherence and effective implementation. Farmer training and education should be strengthened to increase their ecological awareness and knowledge of sustainable agricultural practices. This will help farmers to better participate in agrobiodiversity conservation. International cooperation should be strengthened to share best practices and experiences, actively participate in international agreements and cooperation projects, as well as address global agrobiodiversity challenges jointly.

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3

Window on German agriculture

Digitalization to optimize agriculture and enhance ecosystem services and biodiversity: Digital Agricultural Knowledge and Information System (DAKIS)

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Digitalization is profoundly reshaping various aspects of agriculture, as reflected in terms such as Smart Farming, Precise Agriculture, or Agriculture 4.0. They all stand for a future form of agricultural land management in which the most modern information and communication technologies are applied. Through technologies like IoT (Internet of Things) sensors, data analytics, and remote monitoring, farmers can theoretically gather data on weather conditions, soil health, crop growth, and economic performance. The combination of data and agricultural knowledge enables farmers to apply resources more efficiently, reduce waste, and minimize the environmental impact of their operations. Many farmers recognize the importance of preserving their land, yet frequently lack the time, expertise, and incentive to determine and implement the optimal approach. Farmland may therefore hold potential for environmental protection, but ultimately this must also be financially sustainable for the farmers. Furthermore, climate change and the rise in extreme weather occurrences heighten the likelihood of crop yield failures and uncertainties in production across various regions. This is the exact point at which digitalization becomes relevant for sustainable agriculture, as it enables us to address and resolve highly complex multi-disciplinary problems. While digital agriculture has received considerable attention to improve efficiency, productivity, and food security, less attention has been given to the potential of digitalization towards sustainable development, e.g., through biodiversity conservation and climate change mitigation. This, in large part, can be attributed to the conflicts between goals in land management. The harmonization of these conflicting goals through an optimally balanced provision of ecosystem services represents a major opportunity for sustainable land management.

In response to this challenge, a consortium of researchers from ten scientific institutions, led by the Leibniz Centre for Agricultural Landscape Research (ZALF), is spearheading a groundbreaking initiative aimed at revolutionizing agriculture. This project, known as the „Digital Agricultural Knowledge and Information System“ (DAKIS), is funded by the German Federal Ministry of Education and Research. DAKIS aims to integrate ecosystem service and biodiversity assessment information with resource efficiency methodologies into the decision-making processes of farmers. Central to DAKIS is the integration of digitalization tools, such as sensors, computer models, and robotics to enhance economic efficiency and simulta-

Figure 1: Sustainable agriculture in the new „patchCROP" landscape laboratory: large monocultures are split into smaller patches to improve biodiversity and pollination performance, source: Hendrik Schneider

neously promote environmental sustainability in agricultural practices. By introducing innovative, site-specific farming techniques, DAKIS aims to harmonize food production with the preservation and enhancement of biodiversity and essential ecosystem services, such as clean water and fertile soils. This endeavor opens up exciting possibilities for innovative products, novel business models, and the creation of new communication channels for cooperation between farmers, consumers, and society. Since 2019, over 30 researchers from diverse fields, including agricultural research, economics, sociology, computer science, and legal studies, are collaborating closely to bring this future vision to fruition.

Find out more about DAKIS on our website:
https://adz-dakis.com/en/

What are the goals?

Prof. Sonoko Bellingrath-Kimura, who serves as the project coordinator and is an agricultural scientist at ZALF, explains, „Our goal is to establish a decision support system for farmers, agricultural advisors, and policymakers, which can best harmonize the different goals that land use can provide". The farmers we have involved in our participatory process naturally see themselves as „stewards of land" – as land managers who want to preserve natural resources in the long term. They view occurrences like soil erosion, severe weather, and species extinction as indications of a problem that will require a proactive approach to solve. By harnessing its extensive datasets, DAKIS can gain insights into the ecological state of the land and its surroundings and generate information for the decision. Then applying agronomic calculations, DAKIS can quantify the economic effects of on-farm measures. DAKIS also processes complex financial data, such as rapidly changing market prices, subsidies, and, in the longer term, even carbon credits, all of which have become fundamental to modern agriculture. DAKIS makes it much easier to decide, e.g., how to divide a large monoculture field into small-structured field units for different crops adapting to the soil properties ("patchCROP"), how to integrate a flowering strip or a hedge as a long-term element, and how to implement appropriate crop rotation to respond more flexibly to climate change.

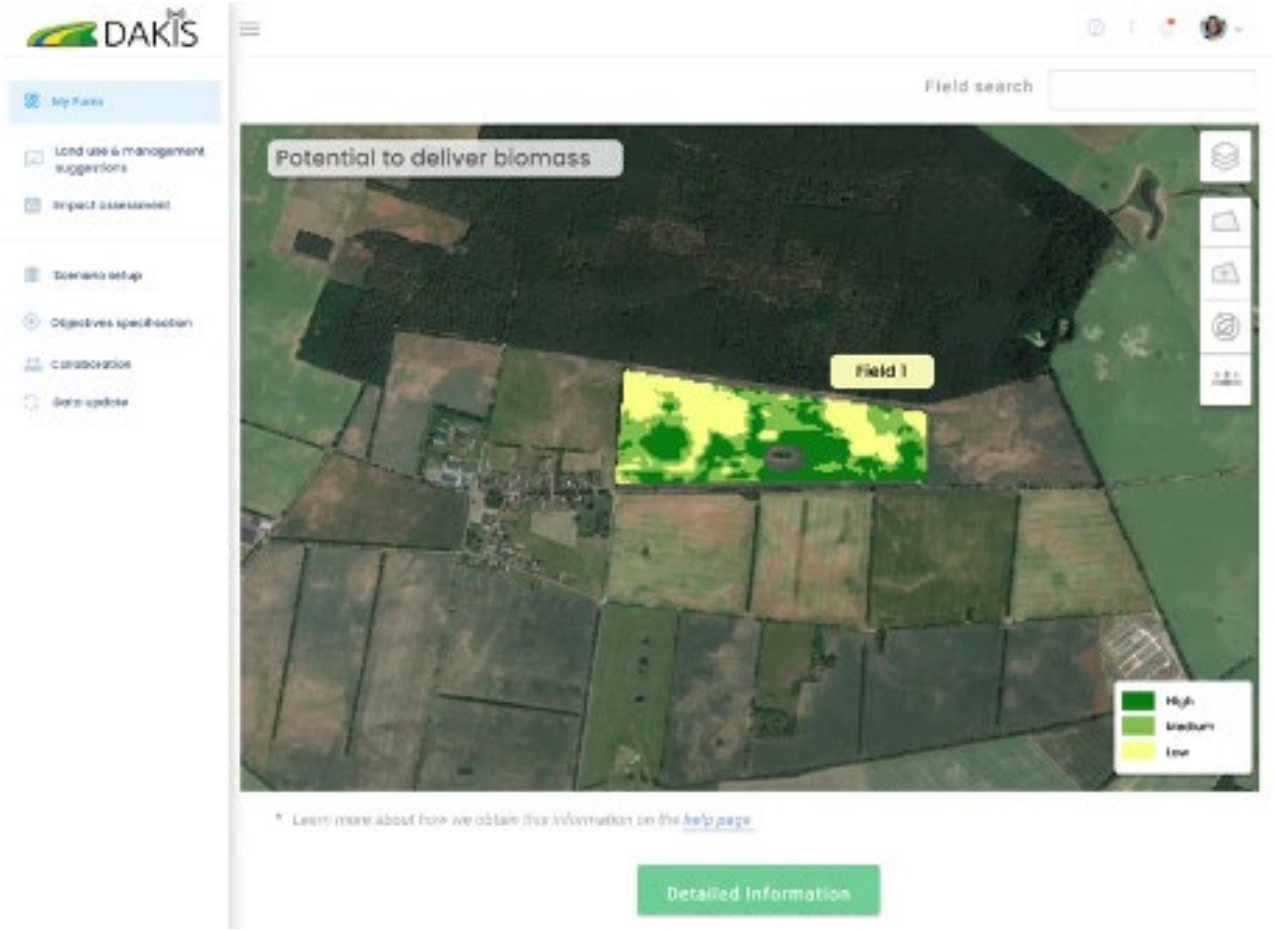

Figure 2: DAKIS user graphic interface

How does it work?

DAKIS involves gathering an extensive volume of data. Utilizing satellites and drones, the research teams ascertain various factors such as the surrounding landscape structures of fields and pastures, as well as the topographical features in the area. Tractors equipped with sensors will assess soil characteristics and nutrient content, while other devices will monitor soil moisture levels. In the future, DAKIS has the capability to utilize autonomous robots for tasks such as planting seeds, automatically eliminating weeds, and evaluating the nutrient levels of individual plants. All of this data is stored and processed in the DAKIS database, with the goal of providing its access to every farm to support crucial decision-making.

DAKIS can identify the optimal production operation for each location, including the remuneration of ecosystem services. All farming operations on the site are therefore modeled for this purpose, and optimal solutions and scenarios are found between the contrasting priorities of economics, ecosystem services, and the technical feasibility. Rather than solely focusing on producing food as cost-effectively as possible on all agricultural land, the prioritization of climate protection or biodiversity may be more appropriate for certain portions of the land. For example, if there is a nearby water body with rare plant and animal species, reducing the application of fertilizers may be a prudent choice to safeguard it.

By using smart farming technologies, innovative cultivation methods are being developed that make it possible to realize different production goals on a diversified and site-specific basis. Outputs are designed to be presented via a web-based application to facilitate accessibility and usability.

More details can be found in our scientific publication in Environmental Science and Ecotechnology: https://doi.org/10.1016/j.ese.2023.100274.

Who can benefit?

While DAKIS focuses on the operations of agricultural practitioners, its user base is not only aimed at farmers, but also at various social actors who want to help shape diversified and sustainable agricultural landscapes. Policy makers can use DAKIS to design new payment schemes that consider the site-specific nature of agroecosystems and prevent a mismatch between objectives and results by, e.g., using results-based payments. We know that consumers are already willing to pay more for agricultural products that preserve ecosystem services and biodiversity. However, consumers often lack transparency about production conditions and digitalization shows potential to change that. By making production conditions traceable, a digital tool like DAKIS can bring agriculture and consumers closer together and strengthen trust in agriculture. In this context, new communication channels will be established for cooperation between farmers, consumers, and society to achieve increased ecosystem services provision and biodiversity protection throughout the region.

Testing in two focus regions

Not least of interest to the scientists is the question of whether DAKIS can be applied in practice. Therefore, DAKIS is being developed and tested in two pilot regions of Brandenburg and Bavaria, which differ greatly from one another in terms of their agricultural structure. Regional project advisory boards are established in the two pilot regions. In the Brandenburg pilot region, DAKIS research focuses primarily on selected landscape windows that are located within the districts of Märkisch-Oderland and Oder-Spree. Within these landscape windows, DAKIS experimental fields contain small-scale cultivation ("patchCROP") with the aim of measuring the differentiated provision of ecosystem services. The landscape is characterized by low annual precipitation and a large-scale agricultural landscape on soils with medium yield potential. The sites are mostly sandy with a low water storage capacity and are considered particularly vulnerable to climate change, which is already reflected in yield losses. Furthermore, the arable land in Brandenburg is generally managed by large farms, which, as in the Uckermark, manage an average of 346 ha, with the field size in some cases being 50 ha. Due to the landscape's glacial history (young moraine area), however, the arable land is very heterogeneous (strongly variable soil types in a very small area). In addition to the large-scale agricultural structure, the pilot region of Brandenburg is characterized by a high proportion of large protected areas (biosphere reserves, nature parks) and surface waters. Within the large protected areas, the proportion of ecologically managed farmland is particularly high (regionally up to more than 25%, nationwide on average 11%).

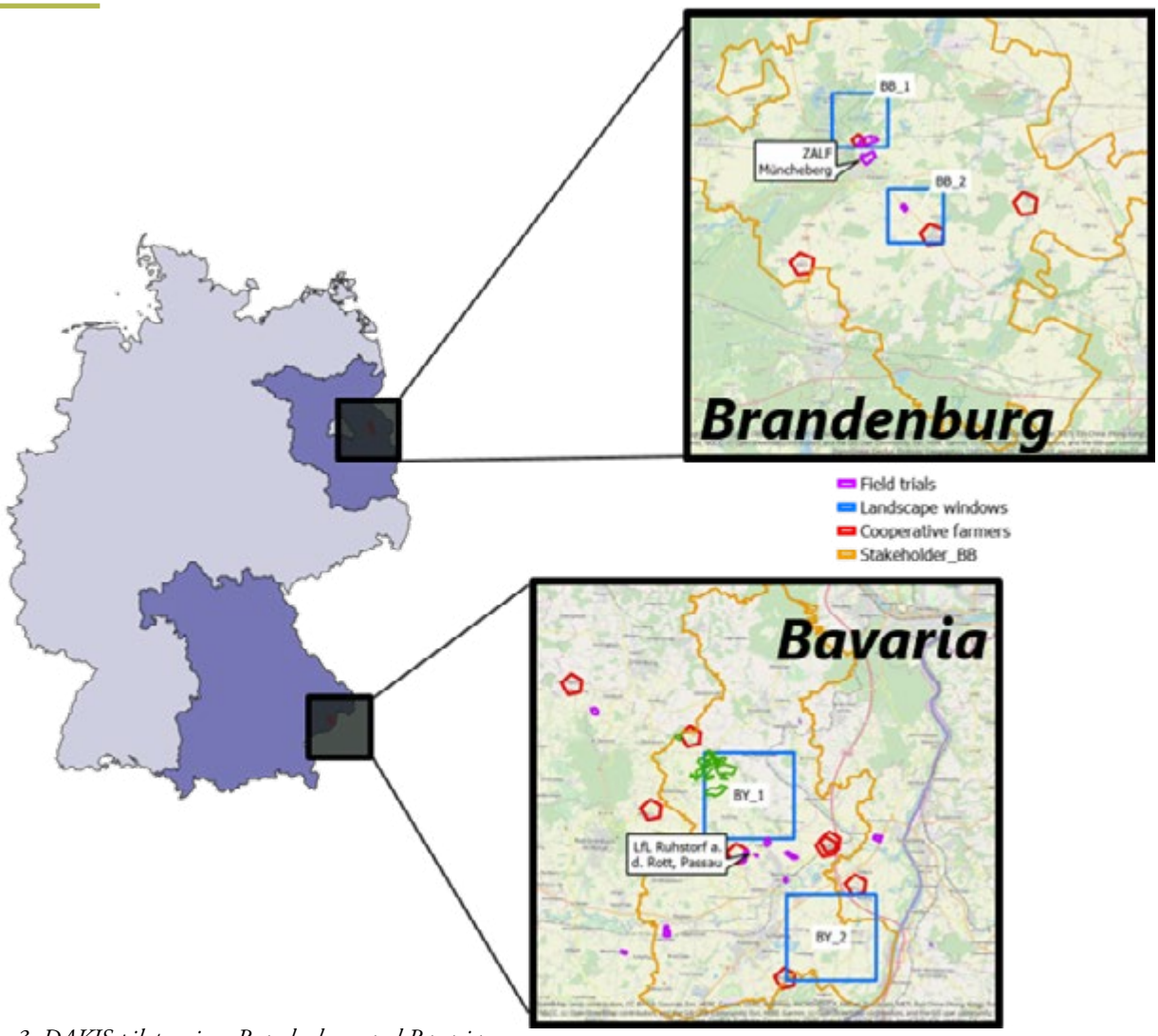

Figure 3: DAKIS pilot regions Brandenburg and Bavaria

Due to the abundance of water bodies and forests, the Brandenburg region has a high potential for nature conservation and tourism.

The second DAKIS pilot region is located in the Lower Bavarian Isar-Inn-Hügelland and the adjacent flat Inntal, in the district of Passau. In the hill country, erosion control on agricultural land poses a particular challenge. The annual soil loss due to water erosion can be up to 10 tonnes per ha and requires adapted management (e.g., year-round ground cover), especially on arable land. Due to the relief, yield-determining factors such as water and nutrient availability as well as solar radiation and soil conditions, can vary greatly even within small land parcels. The agricultural areas of the Inntal, on the other hand, are far more homogeneous and therefore make for simpler land management with the cultivation of crops such as maize, rapeseed, and wheat. The pilot region is characterized by small-scale agriculture with an average field size of less than 2 ha and farms around 26 ha. This is also reflected in a significantly higher labor force of up to 5 workers per 100 ha, in contrast to Brandenburg with an average of 2.5 workers employed per ha. As such, agriculture in the area is also an integral part of society. Due to small-scale structure and relief, landscape elements such as hedges, copses, individual trees, ditches, and riparian zones have established themselves at the borders of neighboring fields, woodlands, and streams, making a valuable contribution to the preservation of biodiversity and their protection has gained in importance in recent decades.

Potential in China

Both Germany and China are actively adopting digital technologies in agriculture. While the specific approaches and priorities may differ between the two countries due to varying agricultural landscapes and farm size, the overarching goal to improve agricultural efficiency and sustainability is a common thread. A significant portion of China's agricultural production comes from smallholder farmers who cultivate small plots of land, often less than 1 ha. Small farms often struggle to gather the necessary funds for investments, and substantial upfront costs for digital technology may not yield significant returns for these farmers. Therefore, low-cost decision support systems, particularly smartphone applications for farmers, have a greater market potential in China. As DAKIS is not only an application, but also a novel framework, its approach in addressing complex drivers of land-use and farm management might provide valuable insights to develop decision support systems in the Chinese context. China also has large commercial farms that employ advanced digital technologies, including automation, drones, and data analytics, to optimize production and reduce labor costs. It is however essential to note that large-scale agriculture is not a one-size-fits-all solution, as evidenced in Germany. Despite decades of land consolidation, Germany has recognized several adverse effects of large-scale agriculture, including monocultures, biodiversity depletion, and soil erosion. China has made significant progress in collecting and analyzing agricultural data at scale and Germany may be able to learn from these data management techniques, which are vital for informed decision-making in agriculture. By leveraging each other's strengths and experiences, China and Germany can accelerate the adoption of digital agriculture technologies, improve decision support systems for farmers, and work towards more sustainable and efficient agricultural practices in their respective regions and beyond.

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Experts in dialogue

How Chinese farmers protect agricultural biodiversity

An interview with
Ze'en WANG
from Foodthink
by Michaela Boehme

The United Nations Decade on Ecosystem Restoration was launched in 2021. It aims to prevent, halt, and reverse the loss of nature as ecosystems worldwide are under pressure and biodiversity is rapidly declining. How is Foodthink involved in this global challenge? Can you describe the work you've been doing in this context?

Ze'en WANG: We are working closely with the Chinese environmental group Shan Shui Conservation Center, which has long been committed to biodiversity conservation. They have also been in the lead for drafting an Agrobiodiversity Conservation Action Plan for China under the framework of the UN Decade on Ecosystem Restoration. What we as Foodthink bring to the table is expert knowledge on agriculture and farming as an area of human activity closely connected to the issue of biodiversity. Through our links with Chinese alternative food networks and bottom-up organizations such as the Beijing Farmers' Market and the Farmers' Seed Network, we have close contacts with Chinese farmers that practice eco-friendly, sustainable farming. So, we prepared a report in which we present several case studies from farms around Beijing, Hebei, Jiangsu, Yunnan, Xinjiang, and Shaanxi, giving insights into what farmers do to protect agricultural biodiversity. We hope that the report highlights the important role farmers play in biodiversity conservation and serves as a source of inspiration of what's possible for decision-makers, experts, and other farmers.

You have focused mainly on rural initiatives that seek to make agricultural practices more sustainable. Why is agriculture and farmland key for tackling the biodiversity crisis?

Ze'en WANG: In many regions around the world, protected areas have been established as a cornerstone of biodiversity conservation. By limiting the access of human beings, they provide habitat and protection to endangered species. While protected areas have been an important tool in biodiversity conservation, we believe it is necessary to also include spaces into our conservation efforts where humans and nature interact. Farmland is such a space. Numerous studies have pointed out that agricultural intensification is one of the main drivers of global biodiversity loss. Yet, not a lot of attention is paid to farmland when it comes to biodiversity conservation. Through our research, we seek to put the spotlight on farmland and agriculture, highlighting that sustainable agricultural practices not only form an integral part of the solution to the current biodiversity crisis, but also work in synergy with long-term food security.

In your research you've been visiting many rural projects around China. How are the farmers you visited dealing with the loss of biodiversity? How do they integrate biodiversity-friendly practices into their farm work?

Ze'en WANG: I am truly astounded at how pioneering the farmers are. During our visit to a jujube farm in Xinjiang, we learned that the farmer had deliberately planted his jujube trees more densely because he had observed that this offered small birds protection from their predators. Only later did I find out this biodiversity-friendly measure is related to what conservation biologists call "mobbing behavior," in which small birds band together to protect themselves from predators. The denser the forest, the more likely this mobbing behavior works. The fact that this jujube farmer developed this biodiversity measure without any formal knowledge of bird behavior and only through close observation and his own farming experience is truly remarkable.

Each farm is different, but what they all have in common is a farming approach that avoids the use of chemical fertilizers and pesticides and focuses on the health and richness of the soil. It is also interesting to note that many of our farmers accept a certain level of damage to their crops. Their goal is not to achieve maximum yields, but to maintain the balance between the different species of their farm ecosystem.

What is the most important outcome of your research for you?

Ze'en WANG: Farmers are committed to biodiversity conservation not so much because they feel obligated to contribute to international biodiversity pledges, but because they want to find tangible solutions to the problems they face in their daily farming practices. Most of our farmers had realized that it was poor soil health that was preventing them from growing the healthy, safe, high-quality food they wanted. So, they began experimenting with different cultivation methods to make their soils, plants, and agricultural ecosystems healthier. In this way, many of them have significantly improved agro-biodiversity on their farms, but almost incidentally. So, I think it's important to recognize that, for farmers, adopting biodiversity-friendly practices is seldomly an end in itself, but something they do to tackle other is-

sues like soil degradation or climate change. This is important to keep in mind when communicating with farmers or designing policy.

What are the next steps for China's farm sector to restore farmland biodiversity? What are the biggest obstacles that need to be overcome?

Ze'en WANG: The biggest problem is the lack of policy support, particularly for smaller farmers. On the one hand, implementing eco-friendly practices in agriculture is much more expensive than a business-as-usual approach. On the other hand, many of the smaller farmers have no access to subsidies or support of any kind. That means that the costs of producing in a biodiversity-friendly way will ultimately have to be borne by the individual consumer. The government is always prone to subsidizing large-scale monoculture farms, which usually means more use of harmful agro-chemicals. What we need is a repositioning of support policies to better align food production goals, farmers' interests, and the protection of the natural ecosystems upon which agriculture depends.

Ze'en WANG
Foodthink

Ze'en WANG is the editor and researcher of Foodthink, a grassroot NGO and China's leading voice on sustainable food and agriculture.
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5

Photo story

Yaozhong TANG, a technician at Yuefengdao Organic Farm, is harvesting early-maturing rice for seed preservation

Connecting through seeds, protecting our water source

Pictures and text by
Ye SHEN

It is a breezy autumn afternoon. After lunch, Yaozhong TANG, a technician at Yuefengdao Organic Farm in Kunshan, is heading to the water crop seed experimental field together with several young interns. This year, nearly a hundred varieties of self-preserved seeds were planted, and some of the early-maturing rice is ready for harvest.

Their work today is to select, cut, bag, label, and store the early-maturing rice, so that it can be preserved and replanted next year. Furthermore, some of the rice varieties with excellent characteristics will be expanded to be planted in the community field next year.

The cooperative's 42 area managers oversee 1,700 ha belonging to 5,700 farmers, which in turn are managed by over 400 operators. They are all chosen from the ranks of the best farmers in each region. Every year, they evaluate the actual conditions of each piece of land before deciding on issues like crop rotation, seeding density, and what fertilizer to use.

After rice seeds are harvested, they are labeled, classified, dried, and stored

In 2009, to protect the water source of Yangcheng Lake, Kunshan Urban Investment Group established a „garden-style farm“ – Yuefengdao Organic Farm in Chuodunshan Village. The farm covers an area of 230 mu (approx. 15 ha) and is evaluated as a national-level ecological farm in 2022.

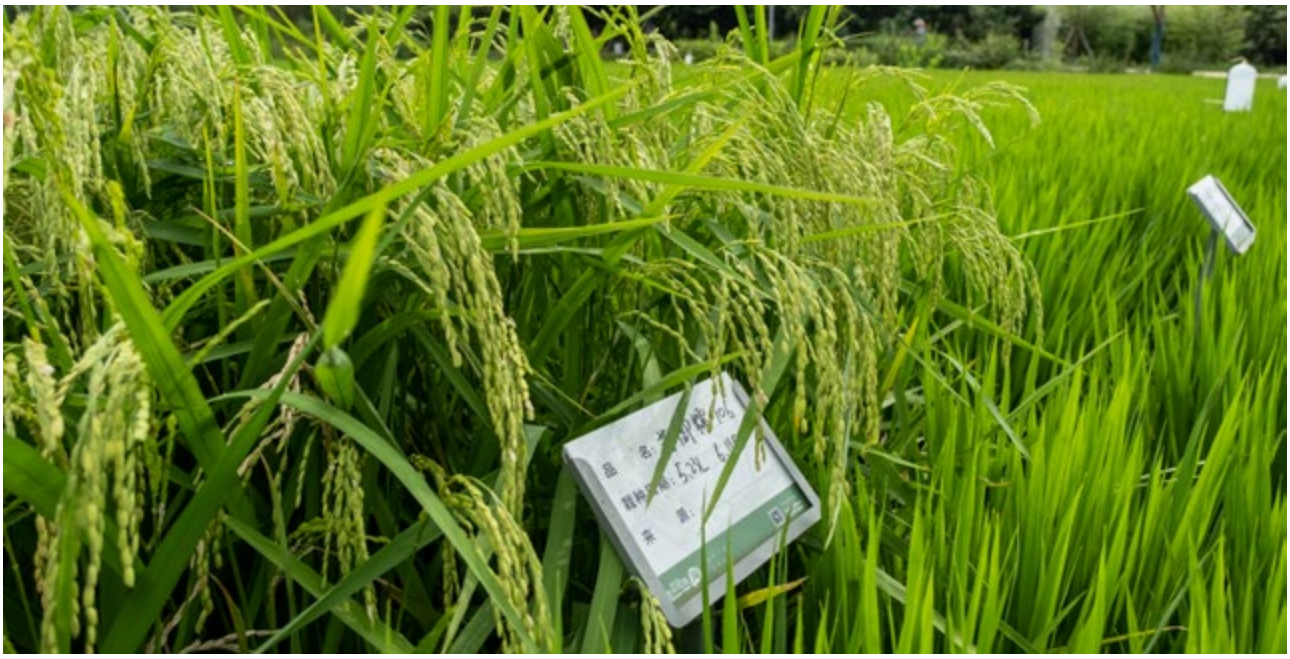
The farm is located in a special geographical area – Chuodunshan Village, the Yangcheng Lake Water Resources Reserve between Yangcheng Lake and Kuilei Lake. Archaeological discoveries show that human beings had settled on this land and cultivated rice since as early as 6,500 years ago in the Neolithic Age. These attributes – the water source protection area and the agricultural cultural heritage site – give this land a more special significance. Therefore, since its establishment, the farm has been adhering to an environmentally friendly cultivating model and continued to explore the arable wetland landscape by focusing on soil health, farmers‘ preservation of seeds, and the conservation of biodiversity.

Aerial view of Yuefengdao Organic Farm by Yangcheng Lake, Kunshan

In 2014, by cooperating with Renmin University of China, Yuefengdao Organic Farm launched the „Qingcheng Project“, encouraging young people to return to the land for rural revitalization. These young people learn and practice organic farming at the lakeside of Yangcheng Lake and actively share their knowledge with the Chuodunshan villagers at the same time. They conveyed the ecological concept to the villagers and worked with the community to expand organic planting areas and reduce water and soil pollution.

Rice seedling: farmers soak and germinate their preserved rice seeds, put them into seedling trays, drop the grains to germinate and raise seedlings

After transplanting rice seedlings: students take a picture with local villagers



Yuefengdao water farming experimental area: a total of 103 rice varieties are preserved

In 2017, with help of the Farmers‘ Seed Network, the farm began to consciously preserve its own seeds, sorting out and making plans for the old seeds it had collected. In 2020, with the expansion collection scale and the increase in the number of varieties, Yuefengdao, with the support of the Kunshan Bureau of Agriculture and Rural Affairs and the Farmers‘ Seed Network, established the „Specialized Preservation Team for Farmers‘ Seeds“, and developed two seed-preservation experimental areas for water and dry farming, and systematically preserved and reused the farm‘s own seeds and the crops that it had collected.

Yuefengdao dry farming experimental area: various local wheat, soybean, and vegetables varieties are planted here

Bean harvest at Yuefengdao

From „organic farming“ to „preserving farmers' seeds“ to „biodiversity“ along the waterways surrounding the farm, Yuefengdao has worked hard over the past eight years, connecting the farm with the community. Through everyone's joint efforts, the farm has established a local seed bank and seed showroom, successfully collected and preserved 206 farm seeds, and successfully developed many rice varieties, such as Suyu Glutinous Rice and Duck Blood Glutinous Rice into products favored by local consumers, thus making important contributions to the strengthening of the local seed and food system.

"Seed Bank Display" at Yuefengdao Organic Farm

As of 2022, Yuefengdao Organic Farm has successfully converted 320 mu of farmland to organic farming practices in Chuodunshan Village. This initiative has not only brought more than 2.5 million Yuan of increased income to the local villages but has also successfully reduced the use of 71,757 kg of chemical fertilizers and 386 kg of pesticides. This initiative also helped restore the ecology of Yangcheng Lake and Kuilei Lake. A total of 77 species of birds have been observed in the farm and the surrounding ecological wetlands. Only with blue sky, clear water, and good soil can more creatures flourish on this land.

Ye SHEN

Ye SHEN is a specialist in seed conservation, food security, and sustainable agricultural practices.

6

Who’s who in Sino-German agricultural cooperation

Sino-German cooperation project on optimizing mulch film management for sustainable agriculture

Jingyue HOU
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

The global discussion about the consequences of the use of plastic for both people and planet has found its way into the social mainstream. Over the years, its image has shifted from a symbol of progress to a source of pollution. Today, plastic is predominantly seen as a villain overshadowing its past role in promoting hygiene and safety or innovation in lightweight materials to reduce energy consumption and emissions that still benefit today's societies.

The challenge is thus not to eliminate plastic completely, but to curb the use of non-essential plastics and to optimize the holistic management of the entire plastic value chain. Although plastic consumption in the agricultural sector comprises less than 5% of global consumption[1], its importance tends to be underestimated. Agricultural plastics directly affect vital natural resources like soil, water, and living organisms. Its improper management puts these vital and increasingly scarcer resources at risk.

Sino-German project for upgrading plastic management in agriculture: comprehensive solutions provider

The Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, on behalf of the Federal Ministry of Economic Cooperation and Development (BMZ) through the development funding, has joined forces with European and Chinese experts including Reifenhäuser GmbH & Co. KG Maschinenfabrik, Zhuhai Kingfa Biomaterial Co., Ltd. and TÜV Rheinland (Shanghai) Co., Ltd. since 2020 in a bid to tackle the eco-challenges associated with the use of mulch films in agriculture in China. This article provides an overview of what has been achieved since the project started in 2020.

Mulch film in agriculture: harnessing its advantages

Mulch film is widely used in China and has been employed for over four decades to raise soil temperature, preserve moisture, and deter weeds. China consumes nearly 1.4 million tons of mulch film annually, representing 74% of global usage. This practice has increased crop yields by 30% and expanded cultivation northward by 2 to 5 degrees of latitudes. The thin plastic film's significance lies in ensuring food security, as China has to feed almost 20% of the world's population with less than 10% of the world's arable land. Consequently, imagining a day without mulch film is tantamount to jeopardizing livelihoods and social stability in China.

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Mulch film residue: detrimental impacts on nature and environment

Nevertheless, mulching also has detrimental impacts on nature and the environment. At present, the recycling rate of mulch film in China is less than 66%. A survey reveals that over 30% of the tested farmland sites in China show plastic residue contamination exceeding 90 kg/ha[2]. This residue not only reduces soil fertility and hinders microbial activity, but also carries the risk of microplastics accumulating in the soil, directly jeopardizing food production. Predictive modelling in the European Union indicates that if 25% of used plastic remains in the soil, crop yields will be reduced by 11% after 11 years[3].

Mulch film management: current challenges in practices

Managing mulch film is complex. Thin films, with a thickness down to 10 µm, become fragile and susceptible to damage after exposure to the elements for six months or longer. Some farmers even opt for non-compliant ultra-thin films worsening the issue even more. High levels of dust and straw contamination in film residues complicate recycling and reduce its profitability. A lack of clear responsibilities for waste film collection and recycling deters industrial investment in end-of-life mulch management. Moreover, the absence of a value chain tracking system hinders transparency and oversight, often leading to the prevalent practice of open burning to dispose mulch film. Therefore, the cooperation project has provided holistic approaches to solve the problems.

Innovative design as a start

Most mulch films are single-layered polyethylene (PE) and susceptible to tearing during collection. To tackle this issue, the project partners Reifenhäuser, ExxonMobil, and Clarient developed a robust 0.0125 mm mulch film. This innovative five-layer film includes metallocene linear low-density PE (MLLDPE) and aging-resistant, UV-protective additives. In the 18-month pilot project, the film showed a transverse tensile strain at break of over 300%, surpassing Chinese market counterparts, leading to a collection rate exceeding 90%.

© *GIZ*

Tracking system as a transparent management tool

The project also introduced a digital tracing system to monitor the entire lifecycle of mulch film, piloted in Gansu Province using the Web and WeChat. It visualizes the film's journey and streamlines information sharing among stakeholders, including mulch recipes and recycling tips, for improved lifecycle management.

Extended Producer Responsibility (EPR) scheme in the long term

EPR schemes, while promising, face challenges in China, particularly in the agricultural sector, where all stakeholders earn little. In contrast to other EPR models in China where the government foots the bill, this project has introduced an adapted approach. Mulch film producers, who have pledged to collect 85% of mulch residue, are eligible to participate in government tenders.

In addition to the topics mentioned above, the project has also focused on exploring value-added recycling approaches for PE film, including chemical recycling, as well as assessing the safety and eco-toxicity of biodegradable mulches. For further details, please refer to the project summary report available here.

1 Source: Assessment of agricultural plastics and their sustainability: A call for action, FAO, 2021

2 Source: https://caas.cn/xwzx/zjgd/300299.html

3 Source: Conventional and Biodegradable Plastics in Agriculture, Eunomia, 2021

Jingyue Hou

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Ms. Jingyue Hou is project manager of the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, where she is responsible for the Sino-German Project for Upgrading Plastics Management in Agriculture. Her work focuses on facilitating international cooperation in the field of environment and circular economy.

7

News from the DCZ

Flagship event

9th Sino-German Agricultural Week on the "Future of Agri-Food Systems"

NOV 2023

Field Day: At LongKang Farm

From 31 October to 3 November, the DCZ successfully hosted the 9th Sino-German Agricultural Week in Bengbu City, Anhui Province. The event marked the first time since the end of the Covid-19 pandemic that stakeholders from Germany could travel to China to meet their counterparts and engage in person-to-person exchanges. The German delegation was led by Parliamentary State Secretary Ophelia Nick from the Federal Ministry of Food and Agriculture and was comprised of policymakers as well as high-level representatives from German agribusinesses and industry peak bodies. From the Chinese side, Vice Minister of Agriculture MA Youxiang, high-ranking officials from the provincial and local levels, as well as representatives from international organizations such as the Food and Agriculture Organization (FAO) of the United Nations joined the discussions on site. Guided by the conference theme "The Future of Agri-Food Systems", the event provided a platform for policymakers,

Sustainable Diets Slam

experts, and business representatives to discuss Sino-German collaboration on how to transform our current agri-food system to make it more ecologically sustainable and climate resilient. Next to keynote speeches, panel discussions, and bilateral talks, business roundtables helped German agri-businesses and food-tech start-ups to discover opportunities for cooperation with local partners. Furthermore, a field day offered participants the opportunity to visit several agricultural projects in the region – from a large-scale dairy farm operating an integrated crop-livestock model to one of Anhui Province's most modern rice farms. Last but not least, the 9th Sino-German Agricultural Week featured a Sustainable Diets Slam, showcasing innovative approaches by four food start-ups and initiatives from Germany and China.

Read more

Study tours

CAAS delegation on study tour in Germany and France,

JUL 2023

Breeding of climate-resilient crops at Dottenfelder Hof

After a four-year break due to the Covid-19 pandemic, the DCZ was again able to organize a study tour in cooperation with the Chinese Academy of Agricultural Sciences (CAAS) to Germany and France. From 11-17 July 2023, a high-ranking delegation consisting of directors of eight CAAS institutes and representatives from the CAAS head office visited agricultural science institutes and agricultural projects. Following the theme of "transformation of food systems", the study tour agenda included exchanges, e.g., on alternative food systems of the future, adaptation to climate change, as well as bio-economy and circular economy.

The study visit started with a workshop on the transformation of food systems co-organized with the **Leibniz Institute for Agricultural Engineering and Bio-Economy (ATB)** in Potsdam. After a welcome by representatives of the **German Federal Ministry of Food and Agriculture (BMEL)**, speakers from ATB, CAAS, and other research institutes outlined possible transformation pathways towards a more sustainable food system – from circular economy approaches to agro-forestry and vertical farming. This was followed by a visit to the **Leibniz Institute of Agricultural Development in Transition Economies (IAMO)** in Halle, where a memorandum of understanding was signed between IAMO and the **Institute of Agriculture Economics and Development (IAED)** at CAAS. A central topic of the study trip was how to develop alternative food production options in urban areas in an era of increasing urbanization and diminishing agricultural land. Visits to urban agriculture projects brought the delegation not only to the Cubes Circles project at the **Institute for Agriculture and Horticulture Sciences of Humboldt University Berlin**, but also to various rooftop and vertical agriculture farms in Paris. Here, the CAAS delegation members learned about the **Parisculteur** program. Introduced by the Paris city government in 2016, the program intends to integrate food production into the cityscape and green the built environment to help the city adapt to rising temperatures from climate change.

Adaption to climate change was also the theme of a visit to the **Global Change Experimental Facility (GCEF) of the Environmental Research Center of the Helmholtz Society** in Bad Lauchstädt and to organic farm **Dottenfelder Hof** in Bad Vilbel. While the former presented long-term field experiments on how climate change affects various forms of land use – from conventional agriculture to grazing, the latter gave insights into the farm's breeding program for organic, climate-resilient crops and the impacts of agro-biodiversity on farm resilience. A visit to the **German Biomass Research Center (DBFZ)** in Leipzig presented an opportunity for the delegation members to exchange experiences on circular economy approaches with their German counterparts.

The trip ended with a visit to the **French Ministry of Agriculture** in Paris, where Lauric Cecillon, Director of the Research and Innovation Department, provided insights into the agricultural research landscape in France and possibilities for cooperation within the larger EU framework.

Read more

Study tour in Jiangsu province: Environmentally friendly agriculture and rural development

JUN 2023

Layout of pond aquaculture farm near Suzhou, Jiangsu Province

From 7-8 June 2023, the DCZ participated in a study tour in the area around Suzhou City, Jiangsu Province. The study tour was organized by the Suzhou **Municipal Bureau of Agriculture and Rural Development and the Foreign Economic Cooperation Center (FECC)** of the Chinese Ministry of Agriculture and Rural Affairs (MARA). The trip aimed to offer insights into advanced agricultural production and rural development in one of China's economically most developed provinces. In addition to its high level of economic development, the province also stands out for its efforts in restoring water ecosystems. Home to Lake Tai, the third largest freshwater lake in China and the drinking water source for about 10 million people, the province has been working to promote ecological management principles that seek to tackle agricultural nitrate run-off and industrial pollutants in the waterways.

To understand how these priorities are reshaping agriculture and rural development, the DCZ visited several **plant factories** and vertical farming projects such as Greenhouse A+ – a facility constructed by Chinese Academy of Agricultural Sciences (CAAS) subsidiary AgriGarden. We also visited two **pond aquaculture** farms in the area that produce widely consumed aquatic foods such as crabs, lobsters, and shrimps. The farms source their freshwater from the surrounding natural waterways and lakes and use ecological water treatment methods to clean the wastewater and feed it back into the ponds. To date, 300,000 ha of land are dedicated to pond aquaculture throughout the whole province, thereby reducing water pollution in natural waterways and protecting local fish stocks. An **aquaponics farm** demonstrated how to combine aquaculture and hydroponics by raising fish in tanks and using the water from the tanks to recirculate into plant beds. The trip ended with visits to a **rural digital service center** and several **rural tourism** projects. These projects highlighted how local authorities are leveraging a mix of digital technologies as well as investments in rural infrastructure and the built environment to shift rural development from intensive agriculture and polluting industries towards a more ecologically friendly development model.

Read more

APR 2023

Study tour:
Development of digital agriculture in Shandong Province

Drones at high-efficiency grain demonstration zone in Shanghe County, Shandong Province

From 24-30 April 2023, the DCZ team went on a study tour through Shandong province to explore how digitalization is transforming agriculture and rural areas in China. The trip began with a visit to the **World Expo on Digital Agriculture (WEDA)** in Weifang City, where Jürgen Ritter, Managing Director of the DCZ, and Michaela Boehme contributed as speakers to the Sino-German Entrepreneurs' Forum on Smart Agriculture. Following a day with business representatives and provincial government officials at the workshops and training centers of German agricultural machinery manufacturer **CLAAS** in Gaomi City, we visited a **high-efficiency grain demonstration zone** in Shanghe County. On 13,000 ha of farmland, this lighthouse project for digital agriculture uses a smart irrigation system, allowing farm managers to control irrigation and fertilization levels from their mobile devices. While a smart weather station collects meteorological data, sensors in the ground provide information on soil moisture and nutrient content. In addition, modern harvesters are used on the demonstration zone to reduce harvest losses, while the use of drones is hoped to lead to a more efficient use of pesticides.

The study trip also provided insights into the socio-economic transformations that go alongside the expansion of digital agriculture in China. Three transformative aspects stood out: (1) the scaling up of smaller plots into larger areas that can be farmed more efficiently by smart agricultural machinery and digital tools, (2) the shift from smallholder agrarian structures towards corporate farming as farm equipment is becoming more advanced and expensive, as well as (3) the increasing role of data as a source of value creation. In all three areas of transformation, there is room for meaningful cooperation between Germany and China.

Read more

Workshops

Workshop on sustainable meat and milk development in China

AUG 2023

At the workshop

Sustainable development of China's meat and dairy sector was the focus of a workshop co-organized by the DCZ, the Norwegian University of Science and Technology (NTNU), and the Chinese Academy of Agricultural Sciences (CAAS). Held on 26 August 2023 at Sun-Yatsen University (SYSU) in Guangzhou, the workshop shed light on the social, technical, and cultural factors that have fueled China's meat and dairy boom over the past decades. Different stakeholders from academia, business, and industry peak bodies discussed how much animal protein China can produce and consume sustainably. Following opening speeches by the event organizers, two special sessions explored the development of China's dairy and pork sector, respectively. Additional roundtables and group work sessions fostered the exchange between production and consumption perspectives, allowing participants to discuss what a sustainable meat and dairy sector might look like in China. The discussion results suggested that China should neither continue to focus on output increases and efficiency as main goals of animal farming development nor simply copy Western discourses around animal protein alternatives. Rather, China must find its own approach towards sustainable animal farming based on its historical experiences and agricultural traditions.

Read more

JUN 2023

Joint workshop with Nanjing Agricultural University on food systems transformation

With scholars from Germany and China at Nanjing Agricultural University

On 6 June 2023, the Sino-German Agricultural Centre (DCZ) and Nanjing Agricultural University (NAU) brought together a group of international experts to discuss pathways towards sustainable food systems. Jens Fehrmann from Technische Universität Dresden and Cheng CHEN from the Leibniz Centre for Agricultural Landscape Research (ZALF) discussed with their colleagues Jing ZHU, Tao CHENG, and Chaoping XIE from NAU how to transform our food systems to ensure access to healthy and nutritious food for everyone while protecting scarce natural resources and the environment for future generations. Using the food systems approach as a conceptual framework, the workshop zoomed in on digital technologies and the repositioning of agricultural support policies to explore potential pathways towards transformation.

Following welcome speeches by the organizers and host, Jing ZHU from NAU gave a detailed overview of China's food security and agricultural green transformation. Her talk focused on the new balance China must strike between making agriculture more environmentally friendly and achieving a high degree of food self-sufficiency. Moving from policy to technology, Jens Fehrmann from Dresden Technical University and his counterpart Tao CHENG from NAU provided an overview of the state-of-the-art of smart agricultural machinery in Germany and China. Finally, Cheng CHEN from the Leibniz Centre for Agricultural Landscape Research (ZALF) introduced the Digital Agricultural Knowledge and Information System (DAKIS), which combines technologies such as remote sensing, crop modelling, and artificial intelligence to achieve environmental and climate goals while ensuring high yields and stable incomes for farmers. The workshop concluded with a panel discussion involving all five experts. The discussion made clear: While the transformation of our food system will require trade-offs between environmental, social, and food security objectives, the right technologies and policies can help optimize such trade-offs and make the transition more equitable.

Read more

Workshop on agriculture and climate change

MAY 2023

Workshop participants at the DCZ office

On 25 May 2023, the DCZ invited a group of EU agriculture and science counselors to a workshop on agriculture and climate change, including a field visit to an experimental field site run by the Chinese Academy of Agricultural Sciences (CAAS) in Shunyi district, Beijing. The event was hosted by German Agricultural Counselor Ms. Friederike Dörfler, the Science & Technology Platform of the DCZ, and the Department of International Cooperation of CAAS. Besides agriculture and science counsellors from nine EU countries and the EU Delegation to China, the event was attended by high-level representatives from the Institute for Environment and Sustainable Development in Agriculture (IEDA) of CAAS.

Following a session on China's research efforts at mitigating the impact of climate change on agriculture, the workshop continued with a site visit and discussion at the experimental field site of IEDA in Shunyi district, Beijing. On 1,000 mu of land (approx. 67 ha), the experimental site explores the impact of soil, water, and atmospheric conditions on grain yields and quality, with a focus on winter wheat and corn production. During their visit, the DCZ experts and EU counselors had the opportunity to gain insights into climate experiments with different tillage and crop rotation systems, a Free Air CO2 Enrichment (FACE) facility, and the energy design of different greenhouse types and plant factories.

Read more

Webinar series DCZ TALKS

With moderator Harald Schneider (second from the left) and food activist Ze'en WANG (third from the left) at a DCZ TALKS webinar on biodiversity and agriculture

Throughout 2023, the DCZ has continued its webinar series DCZ TALKS. By offering a digital platform for exchange, the series aims to open the debate on key issues of interest to Sino-German agricultural cooperation to the wider public. Following our first DCZ TALKS webinar on **urban agriculture** in March 2023, the second event put the spotlight on **digital villages**. On 28 June 2023, Pei GUO from China Agricultural University (CAU), Rui GU from the Chinese Academy of Agricultural Sciences (CAAS), Lena Kuhn from the Leibniz Institute of Agricultural Development in Transformation Economies (IAMO), and Michaela Boehme from the DCZ discussed how digital village initiatives can help address rural challenges such as population decline, lack of infrastructure, and a widening rural-urban gap. The discussion highlighted some of the shared challenges facing digitalization of rural areas in both countries and revealed some notable differences, such as different governance approaches, levels of digital literacy, and public acceptance.

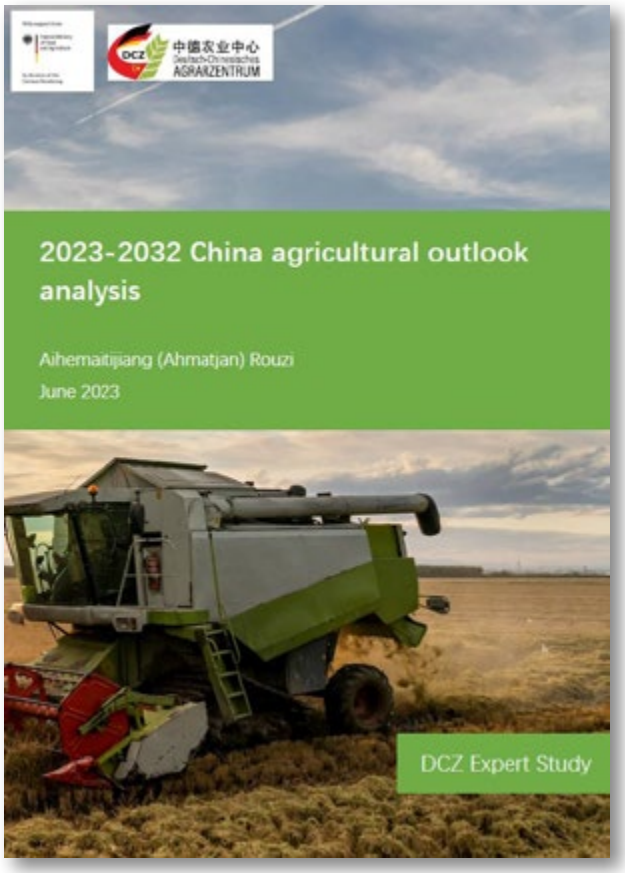
In the third edition of the DCZ TALKS webinar series, on 4 September 2023, German and Chinese experts from academia and civil society organizations discussed the relationship between biodiversity **conservation and agricultural production**. The webinar was jointly organized by the Sino-German Agricultural Centre and the Journal Integrative Conservation, published by Xishuangbanna Tropical Botanical Garden (XTBG) in collaboration with academic publishing house Wiley. Our speakers Martin Welp from the Eberswalde University for Sustainable Development, Tianbao QIN from Wuhan University, Teja Tscharntke from Göttingen University, and Ze'en WANG from grassroots NGO Foodthink discussed with Harald Schneider from XTBG how to transform agriculture towards more biodiversity-friendly practices without compromising agricultural yields. Our DCZ TALKS have reached over 1,000 viewers online and are available as recordings on our YouTube channel.

Watch DCZ TALKS on YouTube

Read more on our website

Publications

Study: China's agricultural outlook 2023-2032



In April 2023, the Chinese Ministry of Agriculture and Rural Affairs (MARA) published its annual outlook on the development of agricultural production, consumption, and trade in China.

The report uses a complex statistical model to make projections on future yields, output, and prices for a variety of agricultural commodities – from grains to meat and dairy. How do these figures compare to the projections of other international institutions and what are their implications for China's domestic food security, the natural environment, and global agricultural trade? This study by DCZ expert Ahmatjan Rouzi provides a critical assessment of the projections published in the outlook report and discusses them in light of China's agricultural modernization strategy and shifting consumption patterns. An annual blueprint for agricultural policy, this year's No. 1 Document focused on building an "agriculture superpower", food security, rural revitalization, preventing a large-scale return to poverty, building affordable housing, and creating more employment opportunities in rural areas. In this policy brief, DCZ expert Ahmatjan Rouzi goes through the key issues of agriculture, food, and rural development in the document and discusses the implications for the various sub-sectors and stakeholders.

Download PDF

Terminology paper: 农业强国 agricultural power

In October 2022, the 20th National Congress of the Communist Party of China (CPC) spelled out the target of building China into an agricultural power by the middle of the century. While the Chinese government has been long committed to modernizing its agriculture sector, this marks the first time the term "agricultural power" (农业强国 nongye qiangguo) has been used. This contribution by sustainable agriculture specialist Yuelai LU to our "Making sense of …" series explores what Chinese policymakers mean when they talk about building China into an agricultural power and how this new policy buzzword relates to China's long-term strategy of agricultural modernization. An annual blueprint for agricultural policy, this year's No. 1 Document focused on building an "agriculture superpower", food security, rural revitalization, preventing a large-scale return to poverty, building affordable housing, and creating more employment opportunities in rural areas. In this policy brief, DCZ expert Ahmatjan Rouzi goes through the key issues of agriculture, food, and rural development in the document and discusses the implications for the various sub-sectors and stakeholders.

Download PDF

Report: Shandong study tour on digital agriculture

From 24-30 April 2023, the DCZ team went on a study tour through Shandong province to explore how digitalization is transforming agriculture and rural areas in China. Based on our observations from the trip, this report by DCZ expert Michaela Boehme explores China's drive towards digital agriculture from the national, county, and village level. It compares national policy goals and practical implementation on the ground and assesses the ways in which digitalization is transforming China's agricultural sector and rural areas. The report highlights the transformative impact of digitalization on farmland, rural labor, and data and sketches out policy recommendations for cooperation in these three areas.

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Published and edited by:
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Layout and design:
Advertising agency okkool berlin
www.okkool.de

This publication is available free of charge from the DCZ website at **www.dcz-china.org**