Wim van Veen and Lia van Wesenbeeck visit Renmin University in Beijing and Nanjing Agricultural University, Nanjing

ACWFS researchers Wim van Veen and Lia van Wesenbeeck have been invited by Prof Dr H. Qiu, full professor of Agricultural Economics at Renmin University, Beijing, for a week-long visit, 19-25 june 2017. The general purpose of the visit was to maintain contacts and strengthen the partnership between Renmin University and ACWFS. Specifically,

- foundations for two research papers on the need for more sustainable Chinese agriculture have been laid
- a workshop on the characteristics and applications of a dedicated spatially explicit applied general equilibrium model for the Chinese agriculture (Chinagro) has been given (at Renmin University)
- a seminar was given on the economic-hydrological model for the Jordan River Basin (at Nanjing University)
- the continued interest of Renmin University and the Centre for Chinese Agricultural Policy (CCAP, Beijing University) for a research program that foresees in the appointment of one PhD student and one or two post doc researchers at the VU, financed through the China-VU partnership was secured, while Nanjing Agricultural University also has shown a keen interest

Need for more sustainable agriculture

The impressive performance of China's agricultural economy in the past decades, driven by institutional changes, market reforms and public investments, has led to significant improvements in terms of food supply and farm incomes and to an enormous boost in foreign agricultural trade. However, not all developments were equally positive. We mention three problems. First, many young farm household members have left the countryside leaving behind an ageing farm population, while at the same time farm sizes remain limited since the institutional reforms are based on the right of each farm household to cultivate its own plot of land. Secondly, water scarcity has become a serious threat to agricultural production, particularly in the North where groundwater levels decline permanently. Thirdly, the intensity of chemical fertilizer use has reached alarmingly high levels, with 430 kg of nutrients per hectare arable land in 2015. The two papers focus on the latter problem, i.e. the overuse of chemical fertilizer, which has turned into a major cause of China's environmental problems.

Nitrogen surpluses leach into the groundwater, which, if used for drinking water, pose threats to the health of particularly pregnant women and infants. In addition, they cause eutrophication of surface waters and are partly emitted as greenhouse gas. Phosphate surpluses contribute to eutrophication as well, and induce micronutrient deficiencies in the soil. In addition, phosphate fertilizer is often contaminated with traces of heavy metals originating from its parent rock, which ends up not only in soil and water, but also in human food and animal feed. One paper uses the Chinagro model to show the spatially explicit impact of government policies aimed at reducing fertilizer use on environment, production and rural incomes, while the second paper considers the potential for China to learn from the EU experience in implementing policies aimed at greening agriculture. These two papers will be submitted to leading international journals in the fall of this year.

Workshop on Chinagro model

On the second day of the visit, Tuesday, June 20, a workshop was given upon request of Prof Qiu on the characteristics and applications of the Chinagro model. Attendants were PhD students of Renmin university, interested in quantitative modelling of agriculture.

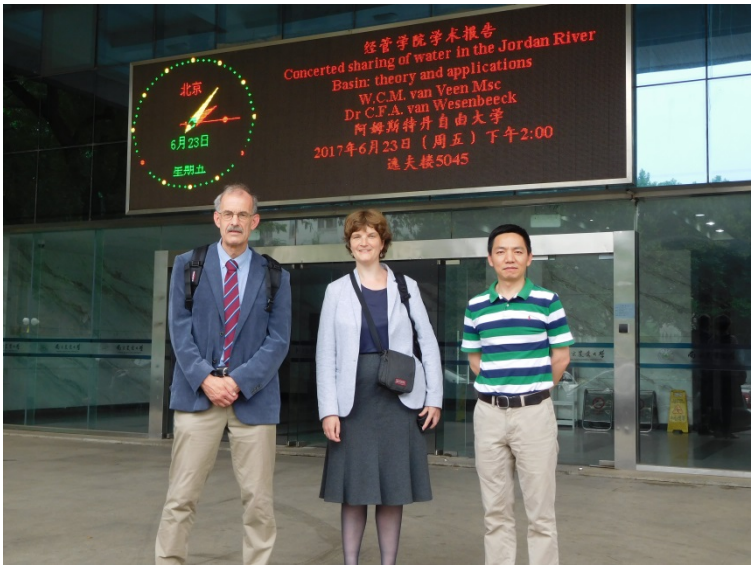
Chinagro is a spatially detailed general equilibrium model focusing on China's agricultural sector. The model distinguishes 16 tradable agricultural commodities (food and feed), plus one non-agricultural aggregate. Farm supply is represented at county level (say, 2500 rural counties) and accommodates for each of these counties the whole spectrum of farm activities, distinguished by land use type or livestock system. These activities compete for available labor and machinery within the county. They also exchange local commodities such as organic manure and crop residuals. Furthermore, nutrient balances are maintained at county level. Human consumption is depicted at a more aggregated geographical level, viz. for eight regions, and separately for the urban and the rural population, each divided into three income groups. Domestic trade is interregional. The model describes the price-based interaction between the supply behavior of farmers, the demand behavior of consumers and the trade flows connecting them. Government tax and trade policies are imposed exogenously. Foreign trade prices are not exogenous but cover the impact of China's imports and exports on world prices. The Chinagro model is especially suitable for studying the trade-off

between agricultural, economic and environmental developments due to its exhaustive coverage of China's agricultural economy, its spatial detail, its distinction of tradable and local production inputs, and its linkage of domestic markets to the world markets. The model is recursively dynamic and applies a dedicated algorithm for farm supply at county level to a selected number of years over the simulation period, which currently ends in 2030. The Chinagro model has been developed at ACWFS' predecessor SOW-VU in cooperation with the Center for Chinese Agricultural Policy (CCAP) in Beijing and the International Institute of Applied Systems Analysis (IIASA) in Laxenburg, Austria. It has been used for scenario simulations of the future of China's agricultural economy in successive EU-funded projects in the period 2000-2010. Since then it has been updated twice.

Seminar on economic-hydrological model for the Jordan River Basin

Upon invitation of the Prof Guanghua Lin, Vice-dean of the College of Economics and Management of Nanjing Agricultural University, a seminar was given on the economic-hydrological model for the Jordan River basin (JRB).

As is well-known, the current situation in the JRB is characterized by water scarcity and a history of water-related conflicts. Severe water-related inequalities are important drivers behind the regional conflicts and created long term political instability in the Middle East. All actors involved agree that peaceful settlement of water related conflicts require interregional agreements on managing water supply and demand. However, it is also clear that negotiations need a strong empirical base to start from, and a thorough understanding of the ways in which combined actions by riparian states affect water availability throughout the basin. This motivated the Concerted Sharing project, a joint collaboration of an international multidisciplinary team of water resource specialists and economists from ACWFS' predecessor SOW-VU , Jordan, Lebanon, the Palestine Territories and a regional research center located in Damascus. Throughout the project period the international team worked together to improve their understanding of the hydrological aspects in the JRB, the water economy and the local and cross-border related water problems. Partners jointly developed a spatially explicit regional water economy model and underlying database that accommodates spatial and temporal detail of water dynamics, balances in- and outflows of natural and controlled water flows over four layers; and characterizes water quality by using standard concentrations on water pollutants.

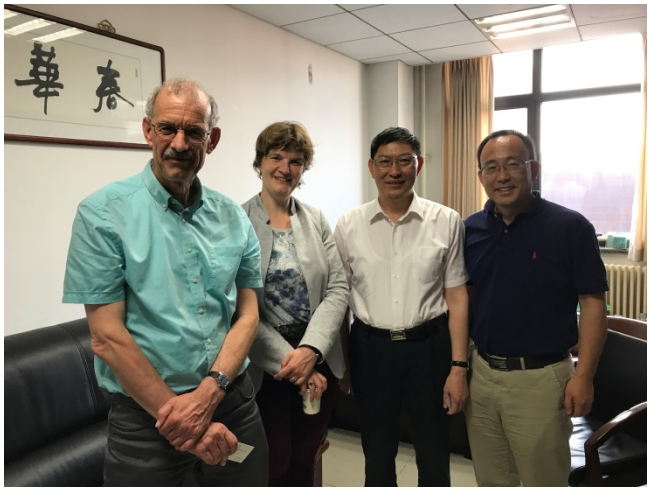


The JRB water economy model is a simulation model that specifies the hydrological response under natural shocks (climate change) and anthropogenic interventions (increased pumping, new infrastructure). The model accommodates a set of structural water response functions that reflect farmer's responses to changing water availability and cover natural water flows, man-made water flows and water use. In its representation of the JRB water economy, the model distinguishes 48 districts, and 26 (two-weekly) time steps. Water can flow within and between 5 different layers. These comprise a surface layer on land for natural flows, a surface layer on land representing anthropogenic influences on water, a river layer, a root zone and a layer representing aquifers. Pollutants are represented as volumes with standard concentrations. Mixing volumes of pollutants with pure water reproduces observed pollutant concentrations. Water quality changes are related to production (e.g. water treatment) or natural processes (e.g. salinity). The model is calibrated on the base year 2010 and is used in various simulations for future events, including climate change, increased irrigation efficiency and the impact of refugee inflows from war-torn Syria.

Although China and the JRB region differ in many aspects, there are also shared concerns. For China as for the JRB, water-economy linkages are clearly of importance given the falling water tables in parts of the country with associated challenges for agriculture and water quality, and the need to increase access to good quality water in rural areas. As in the JRB, large scale infrastructure is implemented to regulate water supply. Specifically, to address water shortages, the South–North Water Transfer Project (a 80 billion USD project) aims to channel 44.8 billion cubic meters of fresh water annually from the Yangtze River in southern China to the more arid and industrialized north through three canal systems: (1) the Eastern Route through the course of the Grand Canal, (2) the Central Route flowing from the upper reaches of the Han River (a tributary of Yangtze River) to Beijing and Tianjin, (3) the Western Route which goes from three tributaries of Yangtze River near the Bayankala Mountain to provinces like Qinghai, Gansu, Shaanxi, Shanxi, Inner Mongolia and Ningxia.

Joint research program

ACWFS has initiated the research program 'Balancing food security and sustainable agricultural development in China', building on its existing ties with the Centre for Chinese Agricultural Policy (CCAP) of the China Academy of Sciences, and the School of Agricultural Economics and Rural Development (SARD) at Renmin University, both located in Beijing. The framework offers the context for cooperation between Dutch and Chinese researchers and is meant in particular for the design of work programs for



Chinese PhD students and post-docs from CCAP and SARD. However, as participation in the program need not be confined to representatives from CCAP and SARD, Nanjing Agricultural University has also expressed a keen interest to be part of this program. The prominent role of China in international agricultural trade makes the research outcomes of this framework immediately relevant also for other parts of the world, whether low-income, middle-income or high-income. Therefore, apart from the specific interest in studying the developments of China's agricultural economy, the research framework is important for ACWFS also as element of its overall program of work that focuses on providing support, at both national and international level, to the formulation of food and agricultural policies and policies aiming at poverty reduction, in particular by designing and applying targeted research methods. Within the overall context of striking a balance between food security and environmental protection in the next decades, the research will focus on three specific themes, viz. sustainable agricultural practices, water shortages and changes in the external trade environment.