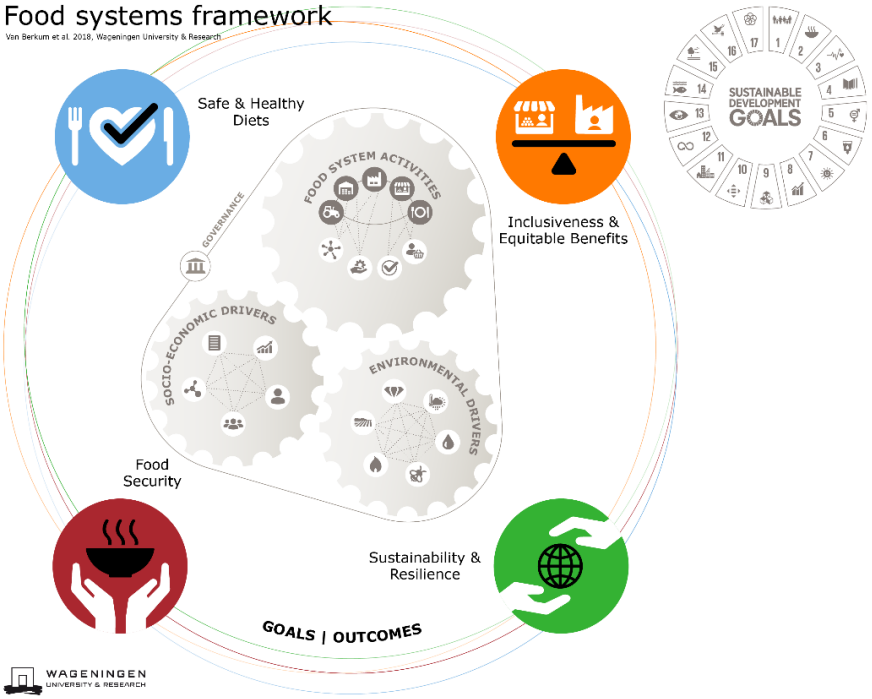
WAGENINGEN
UNIVERSITY & RESEARCH

Wageningen Research Theme Activity Plan 2023 and 2024

Food Security and Valuing Water Programme (KB35)



KB35 Core Team

October 2022

1 Management information

WR Thema	KB 35 Food Security and Valuing Water[1]
WR Programmelead	Ivo Demmers
Core Team WUR	Jakob Asjes, Karsten Beekmann, Arjan Budding, Joost Guijt, Jan van der Lee, Stijn Reinhard, Joost Snels, Jan Verhagen
Total annual budget	3,2 M EUR excluding VAT[2]

2 Overview

2.1 Objective - mission

Our mission is to **contribute to Zero Hunger by combining our interdisciplinary knowledge in the agri-food and water domains to shape the transitions towards sustainable food systems.** The analytical framework we use to address the challenges in achieving SDG2 is the Food System Approach (Van Berkum et al., 2018).

2.2 Rationale and Theory of Change

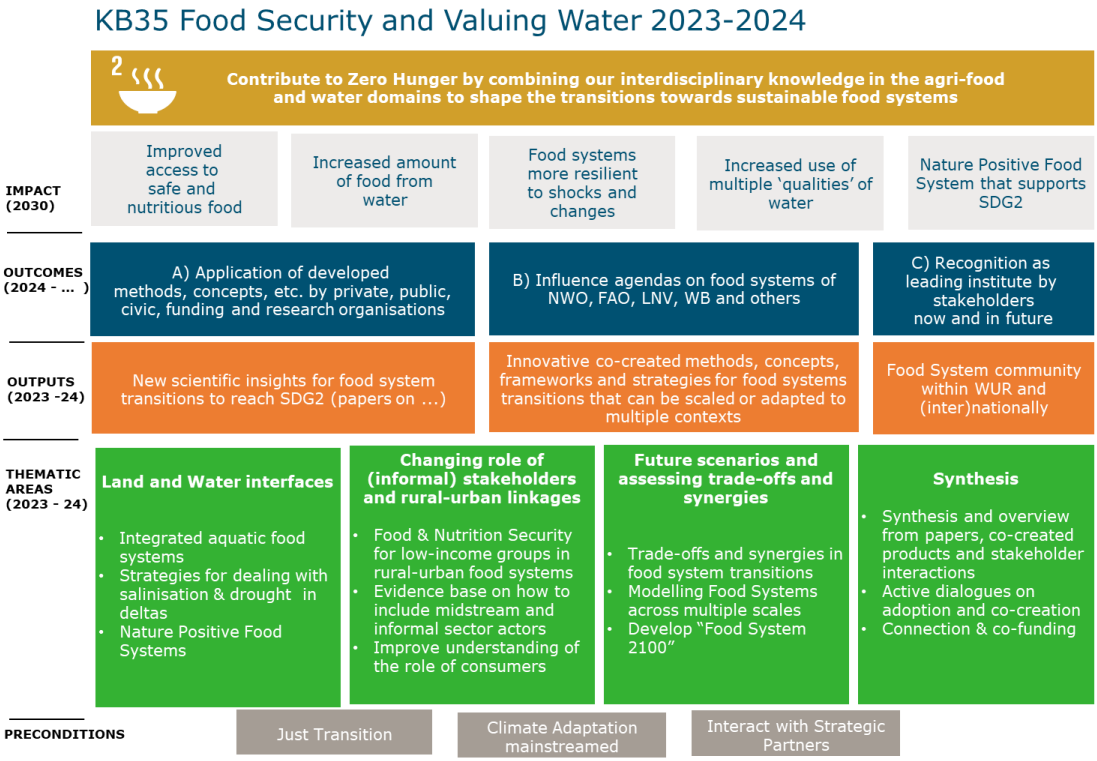
An estimated 828 million people faced hunger in 2021, 46 million more than in 2020. More than half of the world's undernourished live in Asia, 1/3 live in Africa (FAO, 2021). Challenges impacting both access to and availability of food are related to gradual climate change, depleting freshwater resources, loss of biodiversity, land degradation, shocks and extreme events. These include conflicts, price shocks, floods, droughts, pests and plagues.

All of the above, combined with changing demands from a fast growing and urbanising society are putting additional pressures on our already stressed and complex food systems (food system: production, harvesting, packing, processing, transforming, marketing, consuming and disposing of food). To find pathways to reach SDG2 (Zero Hunger), we must increase our understanding of the trade-offs and synergies between the different elements of a food system in their local as well as their global contexts.

[1] The 'Wageningen Research (WR) – Strategic Research Themes' are identified in the Strategic Plan for Wageningen University & Research. This Knowledge Base 35 (KB) research plan covers the activities withing the WR theme 'Food Security & Valuing Water' for 2023 and 2024. Funding for the programme is provided by the Ministry of Agriculture, Nature and Food Quality.

[2] The activities and corresponding budget for KB35 can be labelled as 'Homogene Groep Internationale Samenwerking (HGIS) - middelen'.

The impacts, outcomes and activities of the KB 35 programme are linked into a **Theory of Change** (ToC) that provides an overview and guidance for research, communication, partnering and value creation.



From WR themes to research projects

For the KB35 programme on Food Security and Valuing Water, we build forward on results from ongoing KB35 projects, other research at WUR, developments in Food and Nutrition Security globally and voids in current research. In reconsidering the research priorities, we focussed on research that delivers valuable input for: policy; global, European and Dutch research agendas and new project/ programme interventions within three to five years from now. The input was collected in a series of sessions starting early 2022. The series started with 'Creative Brainstorm' sessions in January, February and March 2022 in which experts (both from Wageningen University as well as Wageningen Research) from multiple disciplines discussed the future needs of KB research for all KB programmes.

Specifically for KB35 this lead to a recognition of the need for a deeper understanding of how consumers and informal sector can be included in transition pathways towards improving SDG2. Also we saw the need to put more emphasis on mainstreaming climate mitigation and adaptation in Food System research. This includes the attention for water (quantity and quality) in our research. Thirdly we choose to increase attention for Nature Positive Food Systems, in line with increased awareness of the trade-offs and synergies between Food Systems and biodiversity. The use of the Food System Approach, attention for (just) transition and the resilience

of food systems remained on the research agenda. This lead to a Theory of Change as presented above.

Following the Theory of Change, each Thematic Area developed specific 'Research Questions' and projects in May and June 2022. The research questions are based on: what is missing in research and what impact are we aiming for with the research? Together with a set of proposed stakeholders and a list of WUR-experts to be consulted, this was collated into specific Terms of Reference (TOR) for each project. Based on this TOR, project teams were invited to develop research plans for 2023 and 2024.

3 Three Thematic Areas – headlines for 2023

The research activities in the KB35 programme are organised along three inter-or transdisciplinary research areas (previously called 'motifs' in KB35) and each consist of several projects. Researchers from at least 3 Science Groups (and often more) are involved in each project by default. The thematic areas including the projects within the thematic areas are presented below. Each of the projects developed a specific Theory of Change that is linked to the general ToC for KB35. In this way the outputs and projected outcomes of the individual projects are clearly linked to the general ToC for the KB35 Food Security and Valuing Water programme. The fourth Thematic Area focusses on enabling and speeding up exchange, connection and building synergies within the projects in KB35 as well as with other stakeholders.

3.1 Land – water interfaces

Interfaces between different types of ecosystems offer opportunities and challenges. The interfaces between land and water as can be found in delta rivers and estuaries, for instance, have the highest economic value of all ecosystems, of which food production is one of the major contributors to this high value. Drivers such as food production, space for housing, economic activities and climate change adaptation result in an increasing battle for space and resources. Also dietary changes will lead to changing demand for others crops and (more) livestock-based products which often rely on crops with higher water requirements than traditional staple food diets. Here the value of water for Food Systems will be researched: how can we improve the amount of food from water (in increasingly dryer conditions) and how can we make more use of multiple 'qualities' of water, such as saline water and re-use of water. The goal of this thematic area is to increase our understanding of: how food systems can be adapted to changing conditions (diets-demand, salinity, drought), how integrated (poly culture) aquatic production can support food system development and what the trade-offs and synergies of nature positive food systems are.

Three projects are identified under this thematic area:

- *Integrated Aquatic Production for healthy, sustainable and equitable food systems.* The research is focused around the question on opportunities and how we can create/find synergies between multi species cultivation-systems and natural ecosystems where both production- and ecosystems profit and that contribute to inclusive and equitable value chains? Focus will be on Indonesia to collect data and carry out field tests. On a global level, the role of seaweed in food system will be elaborated. In 2022 WUR created a specific PhD position to be aligned with this research topic. Additional knowledge on polyculture-production and environmental aspects will be derived from this PhD work. The PhD candidate will be part of the research team for this KB project.
- *Food Systems in Deltas and testing strategies for dealing with salinisation and drought.* Central in this research is the question 'How can farmers, practitioners, processing industry, retail and consumers adapt food systems in deltas to a saline and dry environment?'. The Mekong delta in Vietnam and the Brahmaputra Delta in Bangladesh are selected as study areas. In Vietnam, the approach will be bottom-up, involving field level transitions on nutrient dense crops; where in Bangladesh the approach will be more top-down to closely aligning with governmental bodies and improve coping with saline and dry conditions. In these deltas the researchers work closely together with NGO's, governments, fellow researchers (a.o. form the Asian Mega Deltas project of CGIAR) and farmers.
- *Nature Positive Food Systems.* The questions "What are the risks and opportunities of Nature Positive Production to improve SDG2 (Food Systems)" and "How is general biodiversity related to genetic variety and diversity of species used in our food systems?" are central here. This project will include the Food System approach (hence taking into account outcomes of production, diets, equitability and environmental aspects) and include Low and Middle Income Countries (LMIC). The researchers will work closely together with KB34 and KB36 projects that cover Nature Positive aspects of agriculture and food systems.

3.2 Changing role of (informal) actors, consumers and rural-urban linkages in transitions

The proportion of people living in cities is expected to increase from 54% to 66%. Yet the urban societies are linked with rural areas in many ways. However, the uncoupling of production and consumption and the long transportation distances of food have instigated the societal concern with its social and environmental performance, including dependence on resources from other regions (such as water) that are used to produce food and consumed elsewhere. KB35 research showed an important role of the informal sector in food system transitions (Ayuya et al., 2021 and Mekonnen et al., 2022), that we want to understand better. We also will look into the role of consumers, consumer demand and retail in transition pathways towards healthy and sustainable food systems.

The three project under this thematic area are:

- *Food and nutrition security for low-income groups in rural-urban food systems in the Global South*. The overall aim is to contribute to resilient and sustainable rural-urban food systems providing food and nutrition security for low-income groups. This is done by investigating the complexity of rural-urban food systems,

implications for low-income groups, and by developing approaches to improve consumer access to nutritious food and water, with a focus on Sub-Saharan Africa and Southeast Asia. The study areas include primary cities, such as Kampala, Dhaka and Accra, as well as secondary cities, where extensive economic growth is expected to occur, including peri-urban areas of Arua and Fort Portal in Uganda, a slum called Kibera in Nairobi, and a new rural settlements with previous slum settlers called Solio in Kenya.

- *Develop evidence based concepts on how to include midstream and informal sector actors in Food System Transitions.* The main research question is: how to connect with, motivate and support informal midstream actors to contribute to sustainable (economic, environmental and social) and structural impacts on improved food system outcomes? Networks and results of other projects in Africa and Asia will be used.
- *Improve our understanding on role of consumers in Food System Transitions.* Obviously this research will include LMIC, but it will also include analyses of the role of consumers in High Income Countries (HIC). The research is focused on understanding the role of consumers better in order to include the consumer perspective better in Food System decisions and transitions.

3.3 Future scenarios and navigating trade-offs and synergies

Evidence based models and simulations support scientists and decision makers to navigate synergies and trade-offs in food systems across domains, geographical and temporal scales. We will focus on increasing inter-operation ability of WUR models and developing simulations. We will focus on SDG2 and align with KB34 and Wageningen Modelling Group. To foster long term vision development we will also develop some 'Food System 2100' scenarios and approaches to foster vision making processes.

The three projects in this Thematic Area are:

- *Trade-offs and synergies in food system transition pathways.* This project increases our understanding and capacity to assess trade-offs & synergies for development of transition pathways towards sustainable and healthy food systems, in the context of supporting multi-stakeholder processes. First the relevant trade-offs and synergies, methodologies and metrics will be identified. Secondly these requirements will be compared to existing tools and knowledge gaps will be identified, followed by development of new methodologies. Three case areas will be defined.
- *Modelling Food Systems Across Multiple Scales.* We will focus on developing integrated quantitative modelling for SDG2 within the context of other SDGs. We will focus on increasing the inter-operation ability and developing simulations, This will support Food System research, decision and policy making. Close collaboration with modeling work in other KB programmes is pursued (KB34, KB 36 and KB38). With Wageningen University alignment will be pursued with Yield Gap Atlas and Circular Food systems research.
- *"Food System Map 2100". From visioning on future-proof food systems to an approach for transformative strategies.* The main research question here is how (inter)national dialogues about food system transformations can be supported by vision building and action-oriented food system transformation strategies. The

approach includes the “how-to” question on how to come to a clear, inspiring and shared vision of a food system and a selection of how several future scenarios of food systems could look like (and what the related trade-offs and synergies are).

3.4 Synthesis & Connection

Activities in this area include the organisation of Food System Community events, dialogues with others like FAO, CGIAR, EU(-AU), UNFCC and UN Water Conference and developing synthesis reports and presentations. It also includes specific contributions to projects within INREF (seed money) and EU programmes (co-financing). It consists of three components:

- Creating synthesis and overview from scientific papers, co-created products and stakeholder interactions
- Organising active dialogues on adoption and co-creation
- Connection, cooperation & co-funding

4 Links with Investment Themes, INREF, BO

KB35 Food Security and Valuing Water is linked to all three of the WUR Investments Themes. It delivered (and will deliver) through direct outcomes and indirect outcomes. An example of direct relation is through the Nature Positive Food System project (part of Thematic area 1 Land – Water Interfaces) and the Biodiversity in Food Systems theme. The (just) transitions outcomes feed into the Theme covering transition aspects and. Several KB35 project deliver input, or deliver future research questions to the Climate change and data Investment theme, as all KB35 projects will have to assess their contributions towards climate mitigation and adaptation.

The Wageningen University Fund for Interdisciplinary Research for SDGs (INREF) and KB35 delivered a successful conference on Transdisciplinary research (held in June 2022). This provides a solid base for ongoing participation and joint proposal formulation. It is projected to have 2 joint SEED money projects within INREF in 2023.

The BO programme on Food Security (BO-43-113) is aligned with the KB35 Food Securtiy Valuing Water. The programme leader of this BO is part of the KB35 Core Team.

5 Communication, dissemination and valorisation

5.1 Target groups

Cooperation with strategic partners and programmes within and outside WUR is a key element of the Theory of Change for KB35. Among the partners are local research institutes like Can-Tho university, Egerton university and also CGIAR (for instance for the Asian Mega Deltas Initiative), Clim-Eat (for outreach in the UNFCC and Food

System follow-up), ministries, embassies as well as NGO's. Within WUR; Wageningen Student Challenges, Wageningen Academy, all three new Investment Themes and the INREF research programme provide opportunities for joint research (WU+WR) and stimulate uptake of results of our research by students, scholars and companies. In the past 4 years, impact and value creation was often directed externally (with significant success). WUR internal knowledge dissemination should be improved to avoid that researchers working on KB projects have a knowledge advantage over their WUR colleagues who do not. Making sure that all WUR researchers can benefit from the knowledge developed in the themes is therefore an important priority and a requirement for maintaining broad support for the Research Themes throughout the WUR organisation.

In short the following target groups are identified: Local and international research institutes, FAO (a.o. for their coordination role in developing and reporting on Food System Pathways), NGOs and network organizations (Netherland Food Partnership, Netherlands Water Partnership, Clim-Eat), Dutch and foreign ministries, Dutch embassies, WU and WR colleagues, Student challenges (to reach out to and involve youth globally), Investment Themes, investors, International Financing Institutes

Each detailed research proposal sets out specific target groups, partners, stakeholders and value creations opportunities and activities.

5.2 KB35 - Overall dissemination and value creation activities

External outreach and value creation will include:

- Preparation and participation to the UN Water Conference 2023 (22-24 March 2023, New York)
- Preparation and participation to the UN FSS Food System Pathways preparation (led by FAO coordination hub)
- Contribution to UN FCCC COP28
- Contribution to strategy and programme development of the EU Partnership on Food System
- Follow-up of the INREF-KB Event (June 2022), perhaps in the format of a 'Wageningen Week'
- Cooperation on Programme development with a.o. World Food Programme East and West Africa.
- Development of Programmes with foundations (like IKEA, Bill&Melinda Gates)
- Joint organization of exchange events and presentations with CGIAR, Milan Urban Food Pact, ...
- Organising or supporting juries of students or innovation challenges

Examples of ways to increase knowledge dissemination within WUR include:

- Organizing WUR Food System Community Day (annually)
- Link with INREF programming by providing budget for 2 INRE-SEED money project

- By connecting with a wider pool of relevant WUR researchers (Research and University) at the stage of forming project teams, during the project (as a sounding board) and by actively recruiting ‘new faces’ as project leaders/researchers WR-wide. By ensuring that each project has a communication plan that includes dissemination of knowledge within WUR through seminars, news items, links to publications and reports, etc.
- For KB knowledge development to be integrated into education, in particular via the involvement of MSc and PhD students in projects.