Graduation Plan

Master of Science Architecture, Urbanism & Building Sciences

Graduation Plan: All tracks

Submit your Graduation Plan to the Board of Examiners (Examencommissie-BK@tudelft.nl), Mentors and Delegate of the Board of Examiners one week before P2 at the latest.

The graduation plan consists of at least the following data/segments:

Personal information	
Name	Aparnaa Chandrasekaran
Student number	6204031

Studio		
Name / Theme	Critical Environments: Material Ecologies of Care	
Main mentor	Victor Muńoz Sanz	Urban Design
Second mentor	Daniele Cannatella	Urban Data Science
Argumentation of choice of the studio	As an urbanist, my academic and professional focus in recent years has been on agroecosystems, especially in relation to water and soil. With an extensive understanding of landscapes across India and the Netherlands, I see opportunities for cross-cultural learning. The Dutch agricultural delta, which is automated, subsidised, and export-oriented, operates at the intersection of climate adaptation, nitrogen politics, and techno-managerial control (OECD, 2014). India's riverbank farming systems, along the Sabarmati and Narmada floodplains, for instance, face contrasting pressures: informal land tenure, seasonal farming, riverfront urbanisation, and government-led megaprojects such as the Sabarmati Riverfront Development in Ahmedabad. In both contexts, agriculture is, however, closely linked with water geopolitics, infrastructural futures (such as energy infrastructures), and socio-spatial dispossession. These guide agricultural metabolic flow, especially in the case of riparian agricultural spaces, visible in irrigation networks, groundwater extraction, sedimentation, labour migration, sand mining, and automation technologies. Hence, I intend to study how water, soil, capital, labour, technology, and political ecology shape riverbank agriculture in two highly engineered yet ecologically vulnerable territories: the Dutch Rhine-Meuse delta and the Sabarmati-Narmada-linked agrarian zones around Ahmedabad. A study of typologies of riverbank agrarian spaces as contested spaces can help uncover the spatial manifestations of the Anthropocene and further guide design scenarios and recommendations for the Indian agricultural context,	

	drawing lessons from Dutch deltaic governance while questioning its scalability and ethics.

Graduation project	
Title of the graduation project	Visioning Indian Agro-Urbanism: Futuring Indian agricultural system paradigms for food sovereignty, security, and justice
Goal	
Location:	Western region, India
The posed problem	India's food production system is caught in a compound crisis. Rapid urbanisation is encroaching on productive agricultural land while simultaneously reorganising the flows of labour, water, energy, and governance that sustain it. The country bears a double burden: widespread rural malnutrition alongside urban obesity, rooted not merely in nutritional failure but in territorial inequality embedded in governance, infrastructure, and political economy. Historical trajectories from the Green Revolution's ecological damage (soil salinisation, groundwater depletion) to the emerging Agriculture 4.0 paradigm of precision and drone-based farming risk reproducing structural inequities unless decoupled from questions of access, justice, and place-based ecological knowledge. In the absence of an integrated food planning framework in India, planners and designers lack the tools to address agricultural production as an urbanisation problem, one that spans rural-urban linkages, agro-climatic diversity, governance fragmentation, and socio-ecological vulnerability simultaneously. The area of research: Evaluating and futuring Indian agro-urbanism, situated within the tri-state region of Gujarat, Madhya Pradesh, and Maharashtra, linked by the Narmada and Tapi river systems, tested at the mesoscale of Surat district.
research questions	How can India’s food production achieve resilience in a just manner, improving agricultural productivity to meet the nutritional security, while also ensuring the producers’ liveability and ecological balance? The following sub-questions are proposed to undertake the research question for analysis feasibly: WHAT: Review • What are the systems and subsystems related to agricultural practices and food systems in India?

	• What is the current global discourse on agro-urbanism models aimed at achieving food system resilience? WHY: Reason • What are the current environmental, spatial, hydrological, social, and economic characteristics that impact food production in India? • What are the complexities within the current spatial governance framework that impede food production resilience? WHERE: Region • What are the various agricultural spatial typologies in India? • What are the biophysical considerations for the typologies to make the transformation process of the food production practices across seasons and scales feasible? HOW: Redefine • What agro-ecotechnological solutions can enhance food production resilience to meet food demand? • What are the actions required in urbanised spaces of consumption to establish a symbiotic nature with spaces of production? • Why are the key actors to be introduced and/or empowered in the governance framework? • What is an agro-climatic-oriented and context-sensitive Indian agro-urbanism model?
design assignment in which these result.	Design an Indian Agro-Urbanism Operational Framework: A structured yet flexible planning apparatus for urban planners and stakeholders that embeds participatory methodologies, repositions agriculture as a territorial urbanisation issue, and enables resilient, just food systems across local, meso, and regional scales. This framework: • Classifies India's agricultural spatial typologies based on agro-climatic zone differentiation and biophysical feasibility • Integrates governance structures that empower underrepresented actors: farmers, consumers, and the environment • Progresses through six iterative planning phases: consult → identify → analyse → demarcate → intervene → envision • Balances and spatially combines four scenarios: smallholder agroecology, cooperative automation

	commons, government-led agro-parks, and industrial food hubs, guided by a Pareto-front logic • Tested and demonstrated through the Surat district as an exemplary case, producing a vision plan for decentralised food clusters that reconciles productivity, ecological corridors, and food sovereignty

Process

Method description

The project employs a multi-method approach structured across four phases: Problematisation, Defining the Approach, Decoding Indian Agro-Urbanism, and Testing Grounds, combining analytical, cartographic, and design-based methods to address the research question at multiple scales.

Critical and narrative cartography forms the backbone of the spatial analysis. It is used to map agricultural landscape typologies, trace flows of labour, water, and governance, and reveal power relations and territorial inequalities embedded in India's food system. This goes beyond conventional mapping to construct spatial arguments about who controls productive landscapes and under what conditions.

Multi-Criteria Decision Analysis (MCDA) is employed to evaluate agricultural typologies and planning scenarios against a structured set of criteria derived from the three thematic pillars of the research: agricultural productivity, liveability, and ecological balance. Sub-criteria are defined and weighted to assess the impact of spatial interventions across planning stages, enabling a comparative and evidence-based evaluation of design alternatives.

Geospatial synthesis integrates hydrological, ecological, socio-economic, and governance data layers to develop a comprehensive understanding of the study region, the tri-state territory of Gujarat, Madhya Pradesh, and Maharashtra, and the Surat district at mesoscale.

Scenario mapping is used to construct four plausible territorial futures, each embodying a distinct spatial logic, from decentralised smallholder agroecology to large-scale industrial food hubs, which are then evaluated using the MCDA framework to inform the final vision.

Ethnographic study and policy review ground the research in lived realities of producers, contextualising quantitative spatial data with qualitative insight into governance constraints and farmer practices.

Finally, design toolkit development translates research findings into an actionable Operational Framework, tested through Surat district as an exemplary case for spatial intervention and replication.

Literature and general practical references

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Reflection

1. What is the relation between your graduation (project) topic, the studio topic (if applicable), your master track (A,U,BT,LA,MBE), and your master programme (MSc AUBS)?

   The graduation project occupies the intersection of urbanism, food systems, and spatial justice, a positioning that is not coincidental but foundational to what the MSc Architecture, Urbanism and Building Sciences programme at TU Delft asks of its graduates. The Urbanism track, in particular, directs its inquiry toward the territorial and systemic scales at which cities, landscapes, and infrastructures converge, calling on the graduate to function concurrently as analyst, designer, and critical theorist. By approaching agricultural territory not as the inert backdrop against which urbanisation unfolds, but as an active, contested, and ecologically constituted space with trans-scalar and interdisciplinary ramifications, the research foregrounds precisely the category of complex spatial problem that urbanism, as a discipline, is distinctively positioned to engage. The MSc programme's grounding in research-by-design, multi-scalar analysis, and socially

embedded planning practice supplied both the conceptual architecture and the methodological latitude to pursue a project that actively resists the separation of the technical from the political, and the spatial from the systemic.

2. What is the relevance of your graduation work in the larger social, professional and scientific framework.

The academic contribution of the project lies in its engagement with an emerging body of scholarship on agro-urbanism and territorial food systems planning in the Global South. By advancing the Indian Agro-Urbanism Operational Framework as a transferable planning instrument, the project offers not merely a regional case study but a conceptual and methodological prototype adaptable not only across the Indian subcontinent but across other contexts in the Global South where agricultural territory faces analogous pressures from urbanisation, climatic instability, and market restructuring. The societal value of the project is inseparable from its ethical orientation: it explicitly refuses to reduce food system resilience to a technocratic optimisation problem, insisting instead on the centrality of producer justice, ecological sovereignty, and community agency in any credible planning response, a commitment reflected in the operational framework's explicit articulation of stakeholder roles at each phase. The ethical stakes are considerable. India's 1.46 billion people depend on a food system that currently displaces its costs most harshly onto those least positioned to absorb them: smallholder farmers, displaced communities, and ecologically degraded landscapes. A planning framework that fails to reckon with this structural injustice risks inadvertently reproducing the very conditions it professes to contest. The project's insistence on co-designed interventions, participatory governance, and the positioning of farmers and communities as agents rather than objects of planning is therefore not a methodological stylistic choice but an ethical commitment structurally embedded in the research design.
Simultaneously, the project remained clear-eyed about India's complex negotiations between historical legacies of colonialism and contemporary ambitions of global economic positioning, proposing mechanisms that support

financial resilience and enable a gradual, rather than abrupt, transition toward more equitable productive models.