

# URBAN LABORATORY *ETHIOPIA*

by Marc Angélil and Dirk Hebel


With an annual growth rate of almost 7%, the Ethiopian population is one of the fastest growing worldwide. From its approximately 81 million in 2008, Ethiopia's population can reach more than 125 million in 2025. Today, 83% of the population is living in rural areas, obtaining its income from agriculture and relying on a limited resource: land. Because of the limitation of this income source, a major shift from rural to urban area is likely to happen, as other examples around the globe have demonstrated already.

Given the possibility and believing prognosis of the UN — that in the very near future close to 65% of the population is going to live in urban settlements — the question is how to prepare for such a great demand for water, food, energy, security, sanitation, shelter, jobs, physical and social infrastructures like social networks, education, and also capital. All this is to be done without draining the country's resources even more than today or driving the country even deeper into an import-dependent society, by promoting a false image of the building industry, with references to the global boom-markets of China or Dubai. Local materials and technologies have to be revisited and upgraded, alternative energy sources must be developed and, most of all, these concepts have to find their way into the education of

our future planners, architects and engineers.

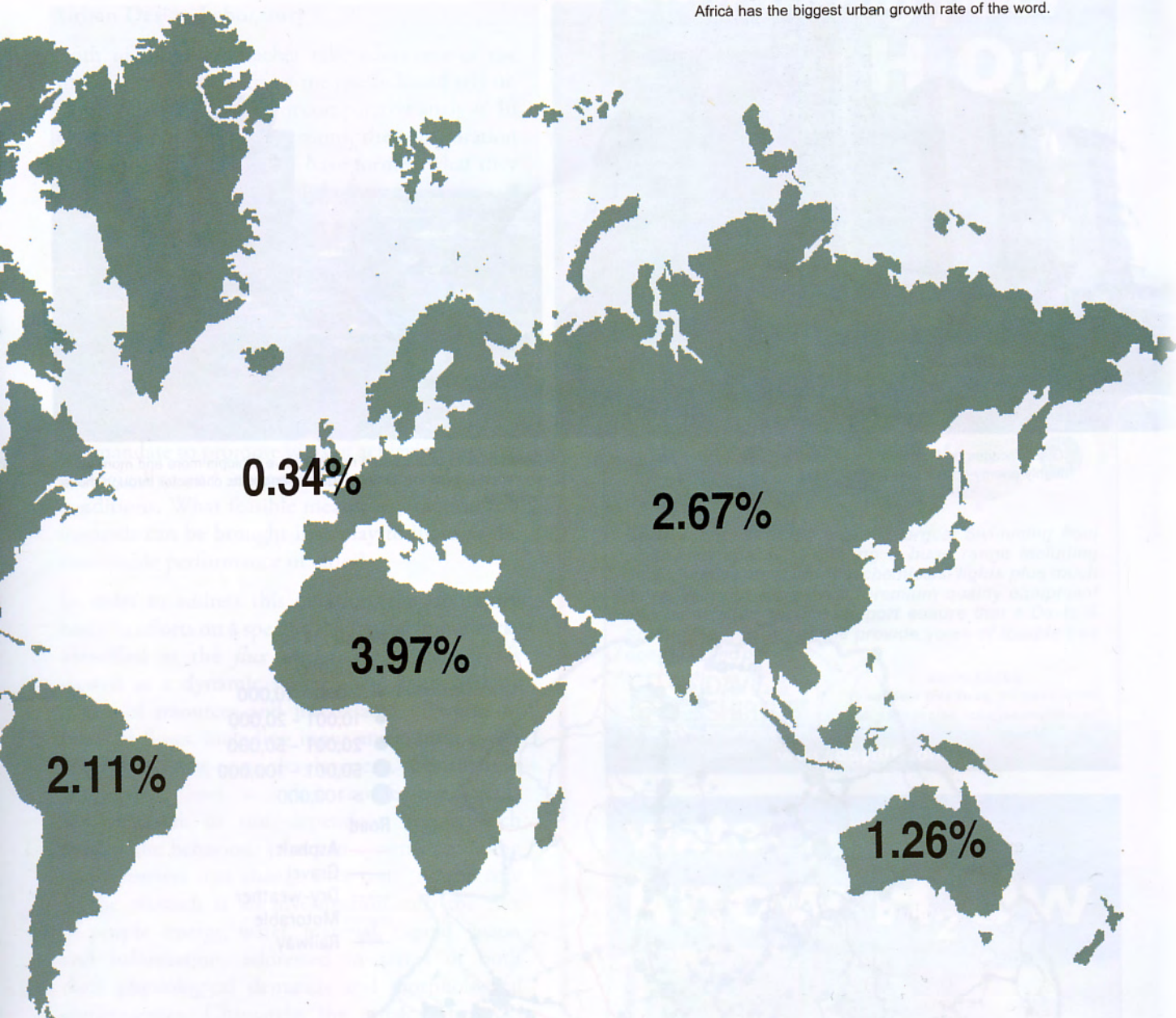
Addis Ababa alone, as the biggest urban development in Ethiopia, will need to house approximately 4 million people more in 2025 than today, if UN predictions hold out correct. In order to be prepared to accommodate such a wave of new urban settlers, new urban settlements need to be planned and developed; the Ethiopian government talks of 100 to be designed. How would they look like? Which underlying concept do they follow?

Since 2006, the Master's program in urban design at the ETH Zürich has been investigating these questions in close working relationship with Addis Ababa University and now follows two directions: first of all, how can questions of urban sustainability be integrated in the design process at a very early stage? This work can be seen as an in-depth academic work in specific fields of interest, highlighting particular themes and integrating input from supporting disciplines. Second, how can system thinking be the main force of design, rather than the outdated concept of typology? This requires a more complex mode of network thinking and relies on a methodology of stocks and flows, that is an urban model in flux. Here, the city is seen as a dynamic system according to parameters that shift over time.



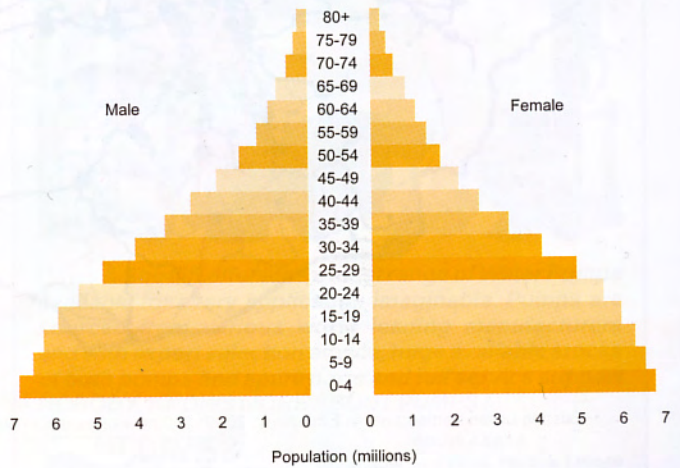
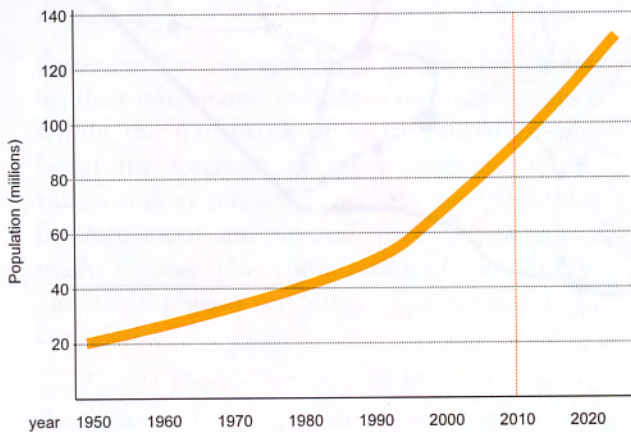
In 2008, Ethiopia's population was approx. 81 million people; in 2025 this number could reach more than 125 million. More than 50% of those people will be under the age of 35.

Africa has the biggest urban growth rate of the world.



### Ethiopia Population Projections (1950 - 2026)

Source: UN Population Division (1990 proj. includes Eritrea)

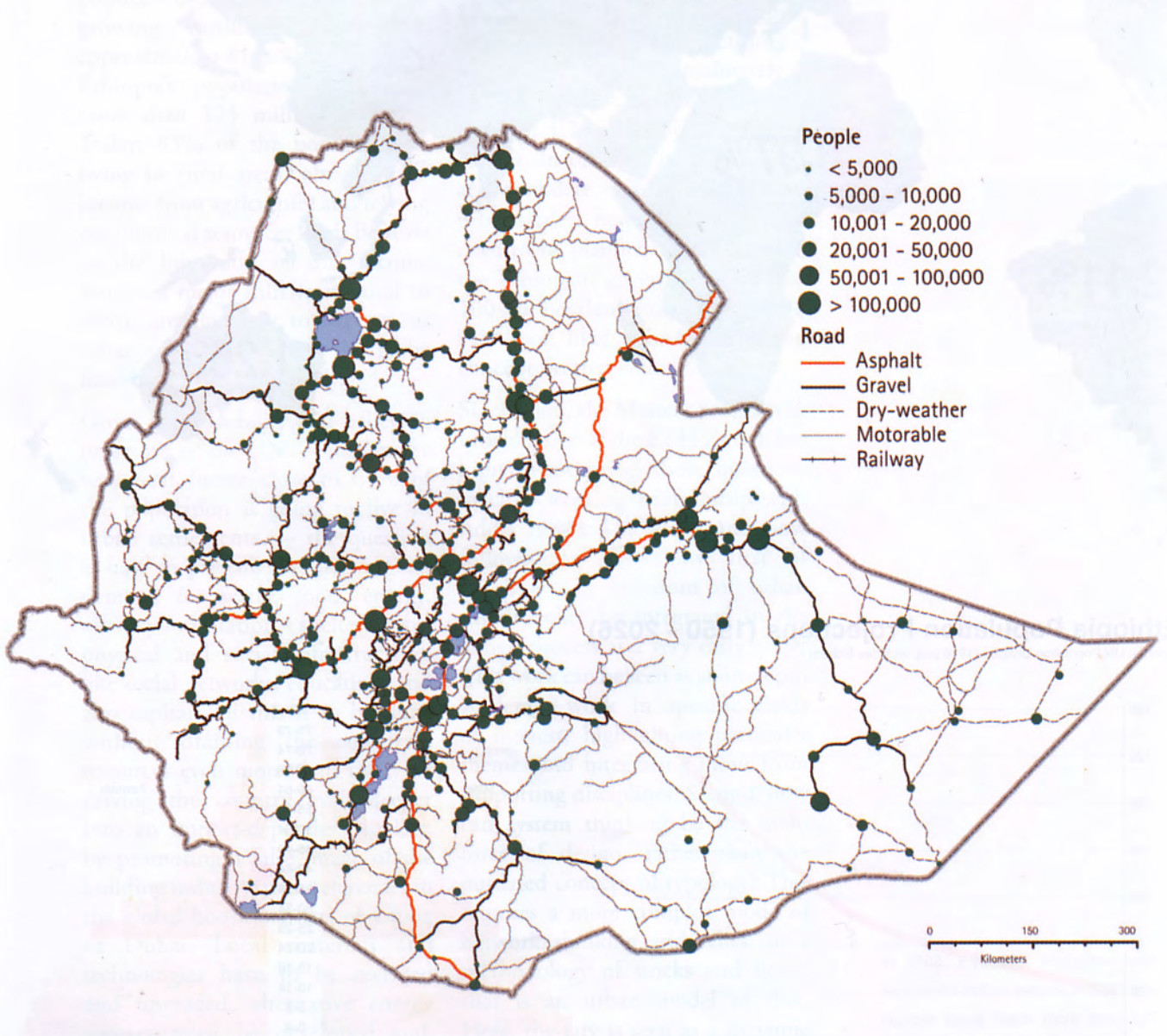




Glass facades on Bole road represent the tendency in design towards highly energy-consuming constructions



References to global boom markets drive Ethiopia more and more in an import-dependent society. Addis changes its character through those buildings.



Existing urban settlements in Ethiopia in 2009: 100 new ones are in planning

## Urban Design Laboratory

Both of those approaches take advantage of the interdisciplinary nature of the research and rely on empirical data gained from comparative analysis. In order to address these questions, the collaboration between ETHZ and AAU have formed what they have called Urban Design Laboratory.

Central to the undertaking is the involvement of multiple experts and stakeholders. A network of collaborators — members of the academic community, professionals from a range of disciplines, and representatives of governmental agencies — frame the dialogues and negotiations pertaining to potential transformations of the built environment. These transformations are guided by the mandate to promote ways of achieving socially, ecologically, and economically balanced urban conditions. What feasible means, techniques, and methods can be brought into play to increase the sustainable performance of cities?

In order to address this question, the laboratory bases its efforts on a specific theoretical framework, identified as the *flux model*. In it, the city is viewed as a dynamic system, one delineated by stocks of resources and interrelated networks of material flows, including input and output cycles relative to long-term development. Considering that stocks, flows, and their transfer coefficients are temporal, or time-dependent, the research models the behaviour of urban systems according to parameters that change over time. At the core of the research is an investigation into the flux of people, energy, water, material, capital, space, and information, addressed in terms of both their physiological demands and morphological consequences. Ultimately, the impact of stocks and flows on the constitution of cities — and the potential for steering their performance toward the principles of sustainable development — form the main thrusts of the endeavour. Based on this flux model, seven research streams have been delineated:

*Stocks and flows of people:* Since cities are settlements for their inhabitants, the role of individual subjects within the framework of social collectives must be at the forefront of urban research. Within this, sociology offers insights into the relationship between social and physical space. Developments in the demographic composition of communities and their impact on forms of urbanization are considered.

*Stocks and flows of energy:* With sustainable city development forming a primary investigatory arm of the laboratory, energy—in terms of resources and

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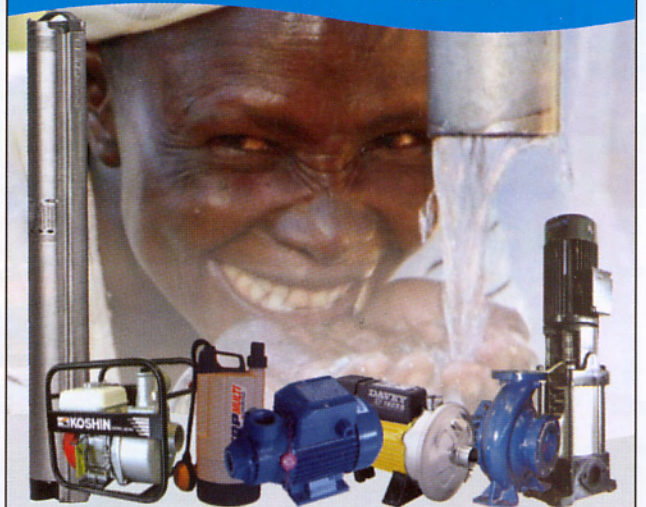


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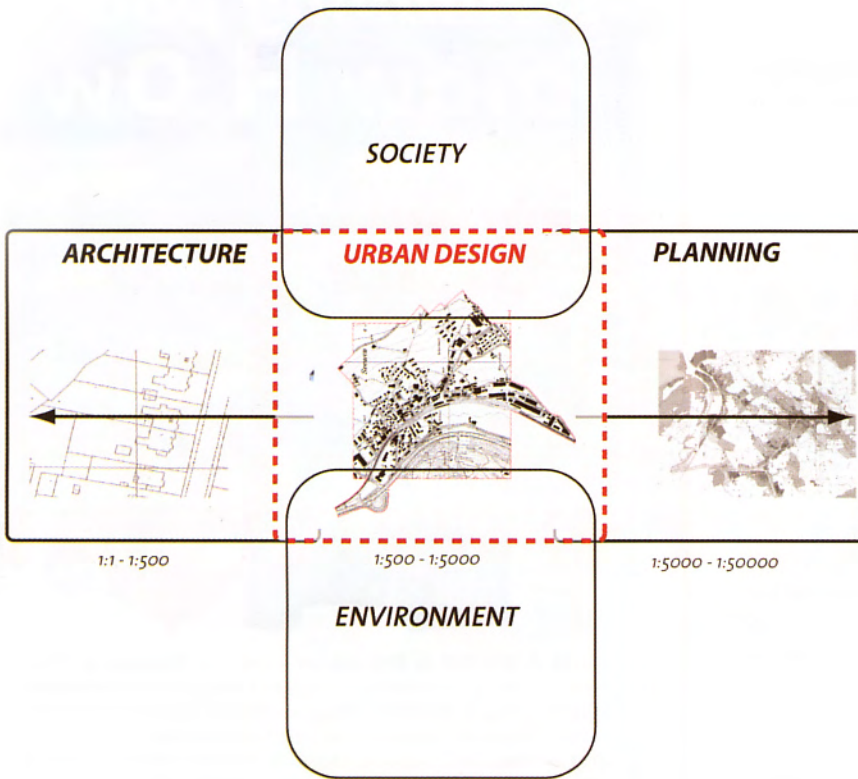
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Urban Design between architectural design, urban planning, society and most of all: our cultural and physical environment.

their attendant emissions—plays a prominent role in the research. Taking into consideration that the ecological footprint of cities must be minimized, renewable energy sources and technologies for reducing emissions are promoted.

*Stocks and flows of water:* This increasingly contested resource has a significant impact on future city development; thus, the environmental potential of water in urban ecosystems is addressed. Specific emphasis is placed on the management of water, including its retention, collection, reuse, and discharge, in order to minimize consumption and maximize the effectiveness of water distribution and irrigation systems.

*Stocks and flows of material:* As cities are physical artefacts, investigations into material behaviour and means of construction play a considerable role within the research. Re-framing questions of recycling



Existing models of urban development in Addis Ababa: Slums, Grand Housing Project, Suburbs

and waste management in connection with circular metabolisms, the impact of materials throughout the life cycle of structures as well as the material stocks found in cities are taken into account.

*Stocks and flows of capital:* Although cities generate money, they likewise require significant financial investments. By bringing together questions of urbanism with those of economics, the ramifications of financial models on the constitution of cities are assessed in an effort to strike a balance between the public and private sectors, local and global economies, and formal and informal structures.

*Stocks and flows of space:* Considering space as a resource, urban research must address questions of territorial allocation, organization, logistics, and use. Specific attention is given to infrastructural systems and the optimization of flows of people, goods, and materials. Means are identified for maximizing the capacity of limited spatial resources in view of qualitative demands.

*Stocks and flows of information:* Acknowledging that the flow of information plays a key role in urban formation, emphasis is given to communication within the social body and the participation of stakeholders in decision-making processes. Methods of territorial governance that are oriented towards consensus among the various actors are highlighted.

One of the laboratory's primary objectives is to encourage the interaction of the disciplines that are relevant to the formation of the built environment, for it is only through their interface that new ideas can arise pertaining to the sustainable development of cities. Of significance within this framework is the role attributed to the design research studio, understood as a platform for the mining of knowledge, its synthesis, and its production through design.

Contemporary city design requires new approaches and special methods. State-of-the-art research in architecture, urbanism, and planning has recently advocated the instrument of the design research studio as the place for investigatory work in which ideas are tested in models, plans, diagrams, statistics, renderings, animations, and the like — with design as the core discipline that integrates the findings of other fields of inquiry. Such studios provide a forum for teaching, collaborative research, and discussions with and among stakeholders.

In order to tackle the complexity of urban systems, the work is structured according to different scales of analysis, ranging from the territory of a region to building assemblies—taking into account, however, that the allocation of land, energy, material, capital, and other resources must cut across distinctions



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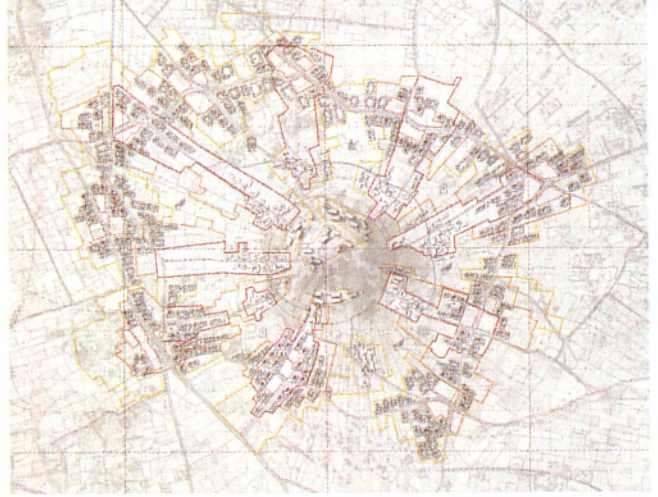
Stocks and Flow of information: a dynamic master plan, based on time-related parameters



Stocks and Flow of space: developments based on land division concepts and infrastructural upgrades



Stocks and flow of material: concepts of urban forest protection form a symbiotic relationship between the resource of wood and the city



Stocks and Flow of people: social structures form an urban settlement, clearly divided in neighborhoods in order to keep social and cultural bounds.

of scale. The inquiries specifically advance along three vectors: territorial design (large-scale), urban design (medium-scale), and building design (small-scale), aiming at sustainable developments of the city as an entity, of urban neighborhoods, and of architectural structures. The intermediary role of urban design as a bridge discipline between regional planning and architecture is central to this approach. Since measures taken in the small scale have an effect at the large scale, and vice versa, sustained communication among the various levels of investigation is paramount. Thus, design studios pursue a twofold objective: to link the different scales and to concurrently synthesize findings from a range of disciplines.

Using Addis Ababa as a case study, various hypotheses and propositions for its future development are assessed. While working with real conditions, the explorations are speculative—predicting forthcoming challenges and identifying potential solutions. An important objective is to foresee how Addis Ababa might evolve in the future. The design of anticipated developments offers a practical means to identify prospective transformations. Mindful that the only constant is change, the urban fabric of a given site is understood not as an entity fixed in time, but as an incessantly evolving system. Thus designing also entails the design of processes. A form of projective investigation is promoted, combining strategies for analysis, design, and realization.

Considering that cities are highly complex amalgamations—the results of multifaceted and, to some extent, contradictory forces—design studios must be driven by a plurality of viewpoints generated through interdisciplinary discourse and team collaboration. The crossing of conventional boundaries is precisely what needs to be promoted and practiced. In doing so, research must bring to the forefront questions of method and procedure that can be transferred to other conditions, while still focusing on proposals for specific solutions. Studios are, in this sense, places of knowledge production, exposing design, whether of buildings or entire territories, to an array of methods from other fields of knowledge. ■