# Deep Zoning

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# DEEP ZONING: THE PLANETARY ORGANIZATION OF LIFE

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How can the geographical organization of the planet be conceived beyond the spatial dimension? Can zoning, a familiar planning tool for shaping cities, be a relevant device for organizing the non-city landscapes that support urban life? What kind of zoning would that be?

By the beginning of the twenty-first century, processes of planetary urbanization have transformed more than 70 percent of Earth's surface. Less than 3 percent of global land cover corresponds to human settlements of any size or form. The rest consists of a variegated web of landscapes of agriculture, grazing, forestry, mining, circulation, and waste disposal which constitute the material basis of humanity. Thus, coordinating these non-city "operational landscapes" of planetary urbanization becomes a key challenge. Sparsely inhabited and mostly activated through the appropriation of extra-human work (nature, machines...), these extensive landscapes cannot be conceived solely through their discrete spatial dimensions, since the processes through which they construct the bio-geo-chemical foundations of the planet exceed the spatial domain. It is exactly the constant expansion of this bio-geo-chemical frontier that will need to be negotiated, as spatial frontiers have become increasingly saturated since the middle of the twentieth century, leading to a constant process of intensification of land uses. Yet, operational landscapes are deeply rooted in the geographies that constitute them. Specific in their locations and finite in their geometries, they require a rethinking of zoning as an instrument of planetary governance, in a way that would coordinate not just their spatial extents, dimensions, and arrangements, but also the intensity of the bio-geo-chemical processes through which they are interwoven with the unavoidably anthropogenic system of life. This short intervention explores the potentials of a hybrid zoning approach of both space—a finite (?) resource—and the bio-geo-chemical processes that constitute the material foundations of human life on Earth, and their limitless (?) promise.

## DOXIADIS & FULLER: TWO APPROACHES TO PLANETARY GOVERNANCE

Two examples in the prehistory of planetary governance help lay the ground for our exploration. In the late 1960s, architect and planner Costantinos Doxiadis devised a plan for zoning the planet as part of his vision for an "Ecumenopolis," a planetary city emerging out of the rapid population growth and urbanization trends observable at the time. In his view, setting the guidelines for the "skeleton" of the Ecumenopolis—the zones of concentrated human settlement—was only one side of the coin. The other was organizing the productive landscapes required to support it. Doxiadis aimed to address the unprecedented questions of this planetary "hinterland" through the familiar planning tool of spatial zoning. Land, water, and atmosphere were devised into twelve zones, regulating human presence, activity, and the construction of buildings and infrastructures, with around 50 percent in every case dedicated to untouched nature. While such an approach could be easily disregarded as reductionist, Doxiadis was convinced about its timeliness and need for implementation: A global land use plan could not only be possible, but would be unavoidable given the urgency of demographic and environmental pressures. The planetary government that would implement it would be no other than the United Nations. However, Doxiadis died before managing to present his vision during the first UN Habitat Conference. Instead, his approach was presented by Richard Buckminster Fuller, another visionary and intellectual comrade.

Fuller had a very different interpretation of planetary governance, however. Whereas Doxiadis emphasized the need for structuring land-use patterns across Earth's surface, Fuller was concerned primarily with the question of efficient production and circulation of material and energy flows. For Doxiadis, the worldwide thickening of the urban fabric was a challenge that required new forms of spatial planning. In contrast, Fuller envisioned an almost immaterial world of dynamic flows of interaction, largely freed from spatial constraints. Unlike Doxiadis, who expected Ecumenopolis to reach an eventual point of balance due to the constraints associated with Earth's physical size, Fuller believed that the efficient application of design principles could permit the accommodation of ever-increasing needs, through advancements in technological efficiency that would reduce humanity's "footprint" upon the planet. Fuller devised a series of research trajectories and projects to develop his vision—the famous Dymaxion maps being among them, as was his world game, a simulation platform for resource allocation supported by the emerging capacities of computational modeling and geospatial data. Most importantly, while Doxiadis structured his planning scheme in anticipation of a future equilibrium state of world urbanization, Fuller believed that the world could be managed dynamically, through real-time, information-based and participatory decision-making, within a technoscientific condition that would allow humanity to do "more with less" through the ever more efficient production and allocation of resources.

The more elaborate presentation and critique of the approaches of Doxiadis and Fuller is beyond the scope of this contribution. What is central to this short essay, however, is the way the closed- and open-ended nature of their worldviews influenced their approaches to the question of planetary governance. The two approaches could be summarized as follows: For Doxiadis, space was both the basis and device of geographical organization; by organizing space, he was envisioning organizing social and ecological interaction, the flows of people, resources, and economic activities. Since space is finite, his approach depended on an end state of "global ecological balance," where population growth would stabilize and land use patterns would crystallize according to his optimal zoning scheme. In Fuller's case, the assumption was that technological evolution decouples material productivity from its geographic basis, making spatial arrangements irrelevant, as locational specificities can be fluidly reassembled in a seamlessly connected web of flows. It is resource productivity and circulation that needs to be governed, not space. Furthermore, since resource productivity could be largely considered endlessly expandable through technological means, Fuller's scheme transcended any balanced state or limit condition.

Before examining the contemporary state of things, it is worth highlighting the centrality of the question on limits behind any notion of planetary governance. While planetary space is a theoretically finite resource (at least in a Euclidean sense), the limits of the material basis of humanity have been a point of debate and remain contested.

## FROM EXPANSION TO INTENSIFICATION: TOWARDS DEEP ZONING

More than half a century after Doxiadis' and Fuller's speculations, the state of the world confirms the centrality of the planetary governance question. Within this context, the growth of the global population is not considered to be such a pressing issue—at least in the long term—as it was half a century ago. Most projections expect the global population to plateau at around 11 billion in the year 2100. But the anthropogenic pressure upon the planetary ecosystems remains a thorny challenge, amplified by the asymmetric demographic dynamics and development trends across different regions of the world.

From a land use perspective, the current distribution of major land use forms is already pushing the limits of available space. The challenge is not so much accommodating the growth of cities and agglomeration zones in general, but rather dealing with their expanding footprint: due to their high densities and concentrated forms, human settlements of all types and sizes cover no more than 3 percent of the land surface (around three million square kilometers). The majority of the used part of the planet corresponds to the "operational landscapes" that support these areas of concentrated urbanization: landscapes of primary production (agriculture, mining, fishing, grazing, forestry), circulation (transport networks, pipelines, air, and shipping routes), and waste disposal. These modes of operationalization cover around 70 percent of Earth's land area, or 100 million km2 of the 150 million km2 of land, excluding the maritime and oceanic extractive and circulative modes of operationalization. The map in figure 01 offers an overview of this variegated land use pattern at the beginning of the twenty-first century.

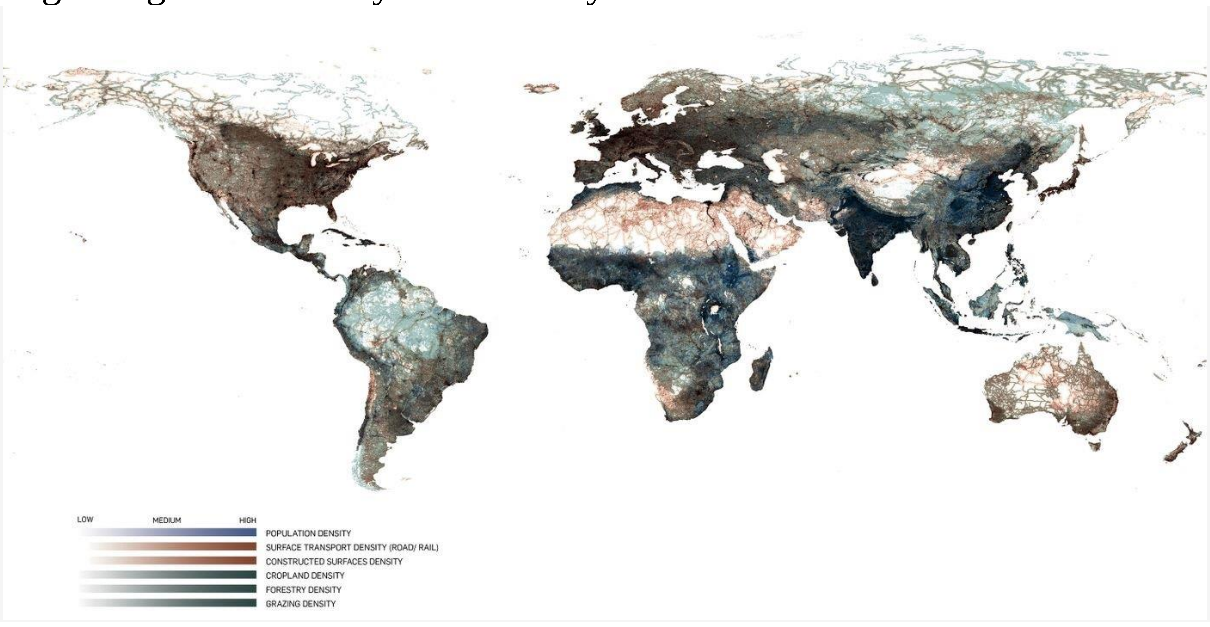



Figure 01: The used part of the planet at the beginning of the 21st century as an overlay of major land uses.

Notably, the growth of operational landscapes has been slowing down considerably since the 1950s. Up until then, their expansion was happening at a higher rate than the rate of population growth. However, after the 1950s, while the global population kept growing at high rates, expansion over previously unused land slowed down. This signaled a shift from what can be conceived as a period of expansion to one of intensification (Figure 02). Since the middle of the twentieth century, while population has almost tripled, total used land has only grown less than 0.5 times. At the same time, global material extraction (biomass, fossil fuels, minerals, construction materials) has seen a five-fold increase, from around 15 billion tonnes in 1950, to almost 70 billion tonnes in 2010.

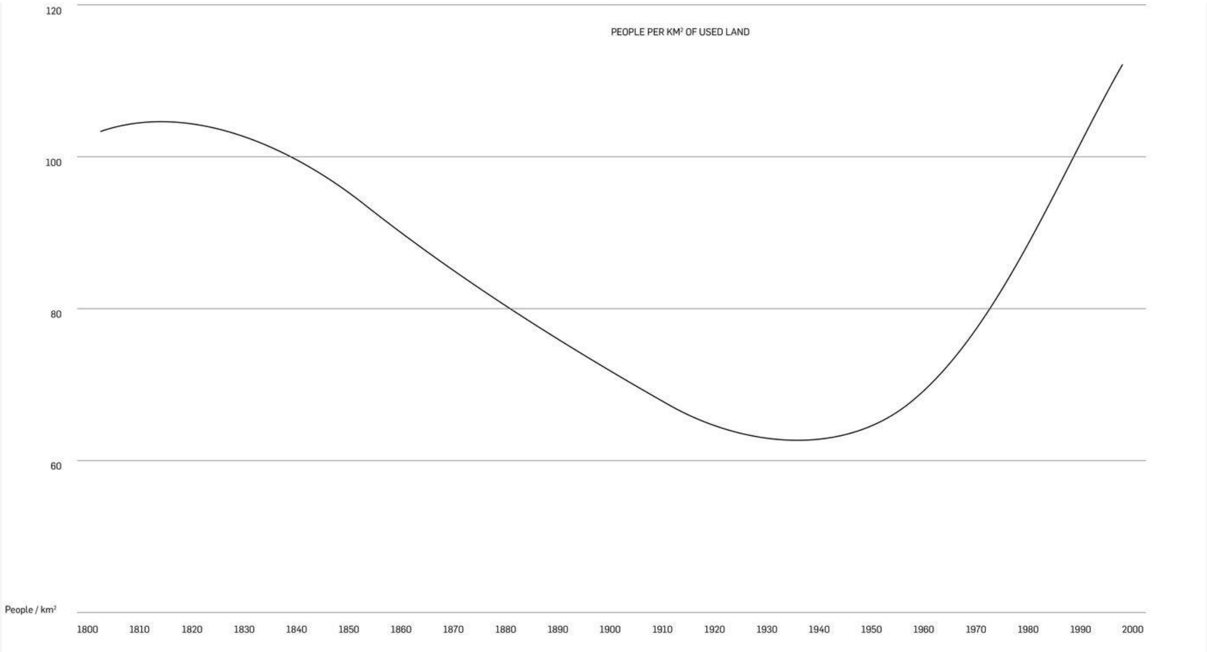
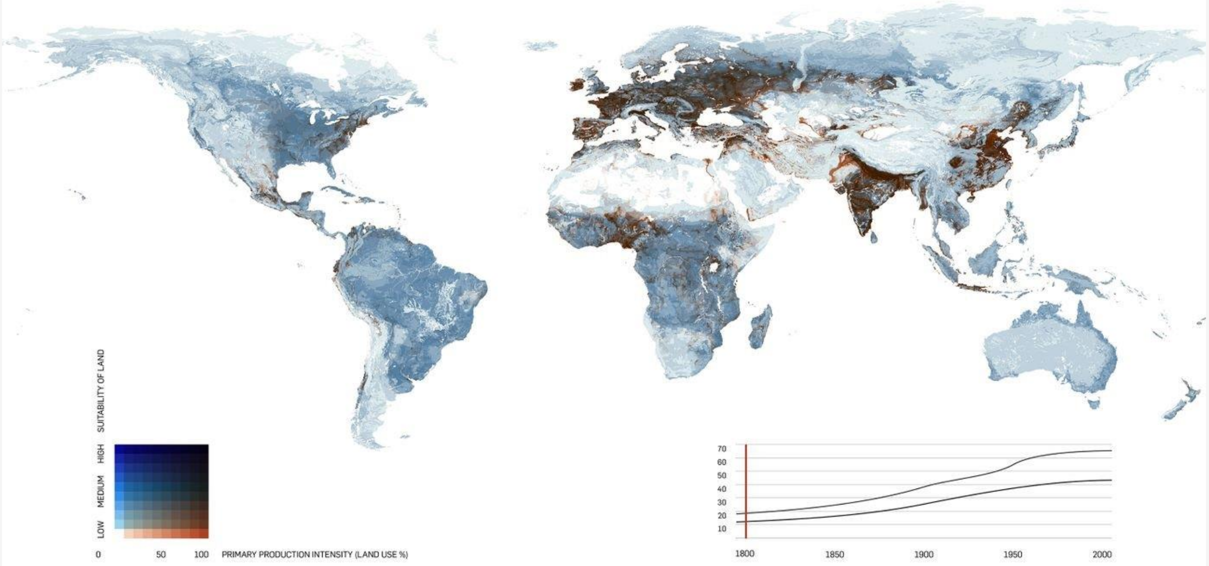


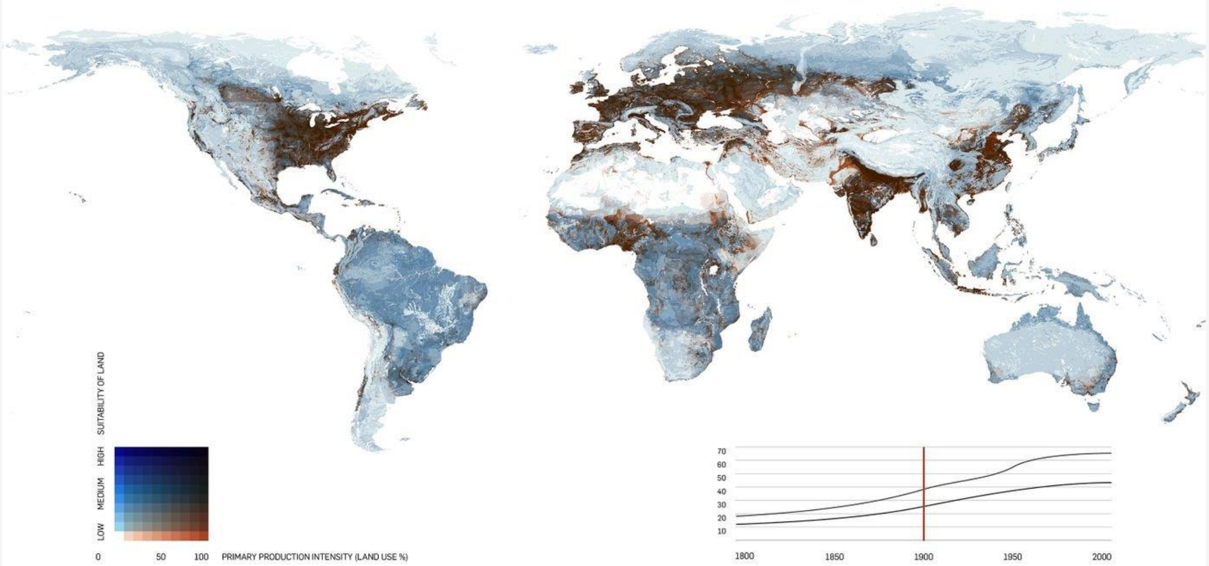

Figure 02: Planetary expansion - intensification curve as the changing ratio of people per km2 of used land.

This resulting intensification of land uses has only been possible through the deepening of techno-scientific driven human control over the biological, chemical, and geological domains (e.g. molecular and genetic engineering) as a means to increase productivity per area-unit, allowing an increase in population densities. It also signals a rather simple thing: We are running out of land. The maps in figure 03 reflect one strong aspect of this condition, revealing the expansion of cropland over almost all available, fertile agricultural land over the past century (the last remaining areas being mostly around the planet's tropical rainforests).

COMPOSITE MAP OF PRIMARY PRODUCTION LANDSCAPES AND SUITABILITY GRADIENT IN THE YEAR 1800




COMPOSITE MAP OF PRIMARY PRODUCTION LANDSCAPES AND SUITABILITY GRADIENT IN THE YEAR 1900




COMPOSITE MAP OF PRIMARY PRODUCTION LANDSCAPES AND SUITABILITY GRADIENT IN THE YEAR 2000

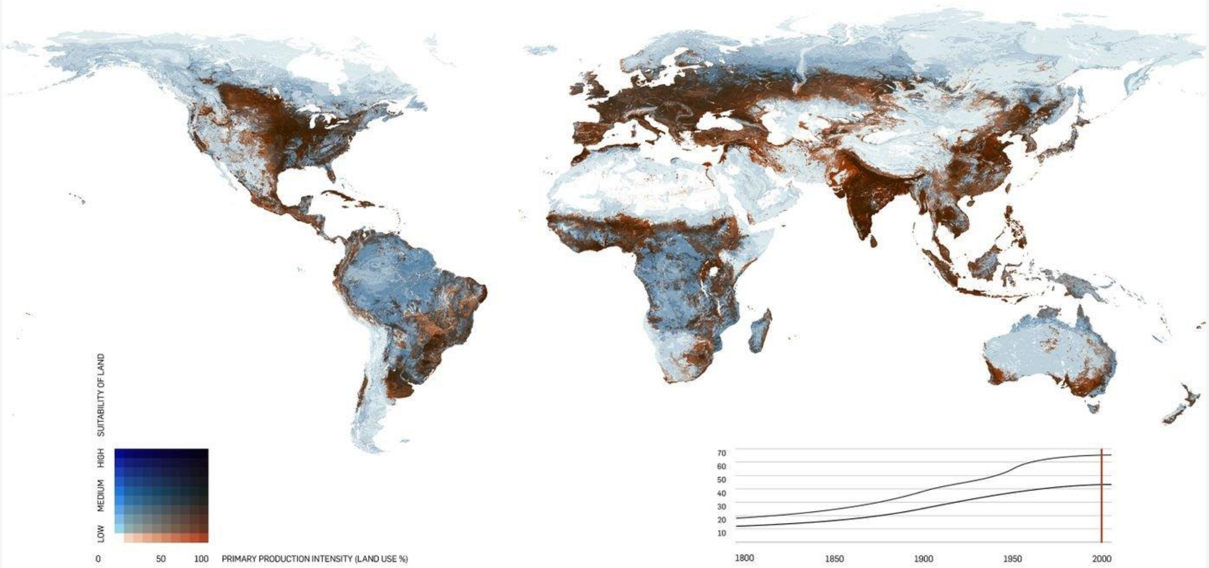


Figure 03: The gradual exhaustion of the agricultural land frontier as an overlay of cropland over suitable agricultural land, 1800, 1900, 2000.

The question of growth and limits has been at the core of the environmental debate from Malthus to *The Limits to Growth*, with one side arguing that there are natural limits (be them hard or contingent) and another side arguing that, for practical purposes, the limits can be pushed back through techno-managerial means. “Decoupling”—the notion that somehow the economy can become less dependent on the biophysical world (i.e. “doing more with less”)—is central to the pro-growth argument. The fact that since the 1950s land use operationalization has grown by only 50 percent, while population has almost tripled, would seem to prove that decoupling the economy from the biophysical environment is in fact possible. But that would be the wrong conclusion. What we argue is quite the opposite: It is precisely thanks to intensification—a deepening of humanity’s imbrication in geographically grounded, biogeochemical processes, and not a decoupling from them—that extraction and productivity have increased.

In order to address the complex relationship between resource limits—specifically land—and the struggles to overcome the capacities of geographical operationalization, we need to take a closer look at what this operationalization means. As operational landscapes are predominantly dedicated to the production and circulation of primary commodities, they are deeply interwoven with “natural” (i.e. biogeochemical) processes. They are the terrains where nature becomes a universal means of production. Nature is produced through the operationalization of landscapes, but production across the operational landscapes also happens through nature. It is important to be able to conceptualize how nature is put at work across these landscapes, beyond the generic notion of ecosystem services. To the extent that they are interwoven with supporting the planetary system of life, all processes of the natural environment can be considered a form of labor. Some examples of this form of labor are photosynthesis, the geological processes that produce minerals, or the water cycle, all of which imply some kind of “work” that, when appropriated as part of a larger human production process, remains unpaid. The struggle for the successful appropriation of this unpaid labor is what has historically allowed, and still allows, capitalism to develop upon the exploitation of cheap natures. This has led to the multidimensional operationalization of production and circulation landscapes across scales and territories, but also to patterns of uneven social and ecological development.

As primary production is to a large degree grounded to the specificities of natural geographies and processes, the construction of operational landscapes of primary production can be conceptualized as a constant effort to exploit two frontiers: on the one hand, through the expansion of geographical frontiers, allowing access to areas of untapped resources; and on the other hand, through the conquest of biochemical frontiers (such as through genetic engineering), allowing access to the processes of natural work, and thus its exploitation. The “frontier condition” can be conceptualized as a condition that allows the appropriation of high amounts of unpaid labor for relatively low amounts of capital investment, a condition that is questionable to what extent it can be sustained. As the capacity of nature to contribute free labor to the system is exhausted and negative externalities are generalized, the ecological surplus tends to fall. Resource deposits are exhausted, soils cannot be replenished, and forests are logged, leading to the need to substitute the exhausted “productivity” of natural systems through capital investment, which decreases the amount of ecological surplus and creates more pressure to reinvent novel bundles of cheap natures. The observable decoupling of growth from geographic constraints is just an illusion obscuring the limits of expansion over necessarily grounded bio-geo-chemical processes.

## DEEP ZONING FOR THE 22ND CENTURY

As more than 70 percent of the planetary terrain is already operationalized (with most of the remaining “unused” areas corresponding to tropical rainforests and sensitive arctic and subarctic ecosystems), it becomes evident that the expansion over the spatial frontier is largely over—thus the tendency towards continuous intensification of land use. The question of planetary zoning cannot be framed anymore as only in terms of spatial limits and arrangements (in the way Doxiadis envisioned), nor can it suggest an endless potential for growth through the technoscientific expansion of biogeochemical frontiers (as Fuller suggested). With the negative externalities of unchecked interventions over the biogeochemical domains already proliferating, a different kind of zoning needs to address the unavoidable anthropogenic transformation of the material world.

Thinking of space in intensive rather than extensive terms allows us to reconsider the concept of planetary zoning. Our proposition for deep zoning does not aim to cancel the proven capacities of traditional “extensive” spatial zoning, but rather complement it in a way that would ground regulatory schemes—presently too generic—into the geographic specificities that constitute them. Elements of regulation of the biogeochemical domain are already trying to catch up with the negative externalities of associated processes: from regulations on genetically modified organisms (GMOs), to limits on emissions (such as CO2), and the discharge of chemical elements (such as nitrogen), to processes around the production of cultured meat and even cloning. These schemes are often universal and are more attuned to sector- or state-specific conditions (such as economic development levels), rather than to the actual conditions on the ground, which can be largely variegated due to the persistent diversity of ecological and social contexts. In fact, by responding to the general tendency of techno-scientific interventions towards homogenization (resulting from the logics of economies of scale), regulatory schemes often end up amplifying an overall trend towards universal solutions.

Deep zoning means adding geographic sensitivity and specificity to the necessary regulation of the interventions over the biogeochemical domain. It aspires to bring forward the variegated capacities of natural systems to adapt, respond, or react to anthropogenic transformations and requires a deep understanding of the site-specific composition of the work of extra-human agents—natures and machines. Deep zoning proposes a pluralistic planetary landscape reflecting a gradient in the intensity of anthropogenic transformation according to nature’s capacity to sustain and reproduce itself. With advancements in AI and remote sensing allowing for a high-resolution monitoring of this synthetic landscape, the question of planetary zoning becomes less about the efficient application of technologies (the means), but the ends that will need to be collectively negotiated in a necessarily postcapitalist state.

The end of population growth towards the end of this century is no trivial milestone. Though further growth will be driven by increasing living standards for some time, the plateauing of world population signals a state in which the search for new frontiers does not need to be a necessity, but rather a choice. Endless growth discourses could become considerably harder to justify, and the efficient allocation of resources based on use values and not the search for profit could be better aligned with modes of planetary governance that appreciate not just the work of humans, but also extra-human agents. To a large degree, deep zoning attempts a dynamic balancing act between this organic composition of work.

Ultimately, deep zoning suggests an alternative form of planetary governance that aims to shift the focus from planning for growth and decoupling to moderating intensification, which is to say, from the exhausted geographic frontier of space to the biogeochemical frontier of molecules. Notwithstanding the argument that “space” is not finite since extra-planetary geographies provide limitless opportunities for expansion, here, at last, we argue that an extractivist impetus to appropriate cheap natures is not necessary as a justification for space exploration. Thus, deep zoning can be understood as a counter-narrative to the capitalist imaginary of space colonization. The twenty-second century won’t be about going big, but about going deep.

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