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TOWARDS A CONTEMPORARY THEORY OF LAND MANAGEMENT

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Abstract. *The article is devoted to the formation of the modern theory of land organisation as an independent fundamental scientific discipline through the systematic formulation of its subject and object, identification of leading theoretical models, articulation of the axiomatic basis, and organization of methodological tools capable of ensuring the transition from an ecosystem-technocratic understanding of space to its institutional-value comprehension. Building on a critical analysis of the international paradigm of land administration, Ukrainian doctrinal developments, institutional theory, property rights theory, and spatial economics, the object and subject matter of land organisation are clarified: the object is recognized as a multidimensional socio-spatial continuum in which territory is transformed into an ordered space of rights, restrictions, regimes, rents, and risks; the subject matter is the emergence, structure, and dynamics of spatial land-use regimes as a system of*

legal titles, servitudes (easements), zones, corridors, and reservations in multi-layer (surface–subsurface space–air column) and multi-temporal dimensions. An axiomatic core of the theory of contemporary land organisation is formulated. It is shown that land organisation methodology should include institutional analysis, theoretical-legal dogmatics of spatial regimes, spatial-economic modelling of rents, topological and network approaches, environmental accounting, geoinformation and algorithmic modelling, scenario analysis, and procedures of spatial justice. The core of the scientific problems of land organisation theory is generalized and systematized, the solution of which is a necessary precondition for the transition from fragmented normative-technical practice to institutionally mature spatial governance. The practical significance of the results lies in creating a conceptual framework for updating educational programmes, improving cadastral and planning systems, and developing standards for managing the value of space under conditions of digitalization and the growing role of spatial justice.

Keywords: *land organisation theory; spatial land-use regimes; boundaries and borders; spatial value; axiomatic framework of land organisation; land administration methodology; digital cadastre; institutional design; spatial governance.*

Problem statement. In contemporary scholarly and regulatory–practical discourse, land management is often interpreted as a technical–applied activity aimed at forming, establishing and demarcating land parcel boundaries, preparing the relevant planning and cartographic materials, and ensuring cadastral maintenance. Such a reduction to a "technology of parcel formalization" methodologically impoverishes the discipline, marginalizes its theoretical potential, and does not allow an adequate description of the complex nature of the modern spatial order. In essence, land management consists in managing the value of space—a process in which territory is transformed into an ordered space of rights, restrictions, and economic-environmental values. This requires not merely a set of procedures but a full-fledged theory that would describe the ontology of boundaries and regimes, the

axiology of spatial value, and the institutional mechanisms for reconciling interests in space.

The current state of development of land management theory is characterized by fragmentation and eclecticism: individual concepts and approaches are borrowed from cadastral practice, urban planning, land law, land-use economics, ecology, and spatial planning, yet are not integrated into a coherent conceptual framework. The normative core of the theory of modern land management as a generalizing scientific construct that formalizes the rules for transforming the land resources of relevant territories into an ordered space of rights, restrictions, and values is not sufficiently formulated. It is not sufficiently clarified how boundaries and borders acquire ontological status, how exactly “spatial functions” become “assets,” and how flows associated with the use of the land use environment and land use regimes coordinate private, public, and environmental interests in a single institutional field. This generates theoretical uncertainty and practical imbalance in rulemaking and managerial decisions.

The key problem is that contemporary land management, while in fact functioning as a complex of governance practices, still lacks sufficiently clearly articulated fundamental postulates and axioms that would describe it as an autonomous scientific discipline. The subject and object of land management in modern conditions of multi-layered use of land and other spatial resources (all natural biological resources, mineral and energy resources, soil resources and water resources) and multi-temporal dimension (long-term, temporary, conditional regimes) have not been exhaustively defined. At the level of the theory’s subject matter, the study of the emergence, structure, and dynamics of spatial land-use regimes has not been institutionalized as a system of legal titles, servitudes (easements), restrictions, zones, corridors, and reservations that overlap and form a complex configuration of legal, economic, and environmental relations.

The philosophical and categorical apparatus of land management also remains insufficiently developed. The concepts “parcel boundary,” “territorial boundary,” “zone,” and “regime” are used mostly descriptively, without proper ontological and

epistemological reflection. A boundary is routinely equated with a geometric line on a plan, although in fact it is an onto-legal event that creates a distinction between legal statuses and rent opportunities and fixes a new state of collective action and institutional agreement. A border is confined to the notion of a "line between jurisdictions," whereas in reality it acts as a concentrator of regimes where competencies, interests, and constraints of different levels of authority and different actors are layered. The concept of "spatial value" is often reduced to market price, while its essence is composite and includes rent, ecosystem services, option values of future uses, network effects, and regulatory scarcity. Such terminological insufficiency makes it impossible to build a consistent theory capable of explaining the emergent nature of land value as a function of rules and expectations.

At the level of axiomatics, land management theory retains a substantial lacuna. No scientifically validated system of axioms has been articulated to fix that: boundaries constitute rights and rents; any boundary is multidimensional (topological, legal, environmental, temporal); land value is an emergent characteristic of established rules and regimes; the optimum of spatial organization is achieved not by geometry as such, but by institutional design and managed uncertainty; digitalization does not eliminate conflicts of interest but transforms the ontology of boundaries and the mode of recording rights. Without such axiomatization, it is impossible either to construct rigorous theoretical models, or to ensure continuity in the development of doctrine, or to form standardized educational programmes.

A serious scientific problem is also methodological uncertainty. Contemporary land management de facto relies on the toolkit of topography, cadastral technologies, and regulatory planning, while only fragmentarily engaging institutional analysis, property rights theory, public-law regimes, spatial-economic modelling of rents, environmental accounts, topological and network approaches to zoning, the theory of algorithmic governance, and theories of justice in space. The absence of an integrated methodology does not allow land management to be treated as a full-fledged interdisciplinary theory of managing the value of space that would combine

legal, economic, environmental, technical, and ethical dimensions of land-use regulation.

Current transformations associated with the digitalization of the cadastre, the development of geographic information systems, the emergence of algorithmic forms of spatial governance, climate change, and the growing frequency of environmental and socio-economic shocks only exacerbate the above methodological and ontological problems. The digitization of boundaries transforms the way they are recorded (translation into code and geodata databases), but does not remove conflicts of interest and does not eliminate the need for fair, legitimate, and evidence-based establishment of restrictions. On the contrary, “thin” digital boundaries require a profound rethinking of their thickness, vertical stratification, duration, conditions of validity, mechanisms of adaptive updating based on data, and procedural justice in decision-making. However, a theoretical framework that would systematically describe these aspects is currently absent.

A separate block of problems is related to the conceptualization of restrictions in land use. They should be considered not as arbitrary prohibitions, but as instruments for reconciling interests and reducing risks, grounded in the public interest, proportionality, evidentiary basis, and procedural justice. However, in existing approaches restrictions are classified predominantly in formal-legal terms (sanitary, nature-protection, protective zones, etc.), without due regard to their institutional content, adaptiveness, and interaction with the economics of rents, ecosystem services, and collective action. The absence of a theory of restrictions as a core category of land management leads to conflict-prone decisions, ineffective regimes, and degradation of spatial value.

Thus, despite the obvious importance of land management for shaping spatial order, managing land and ecosystem resources, and ensuring societal welfare, its theoretical status remains uncertain. Land management is often perceived as a set of applied procedures, whereas objectively it already functions as a complex system for managing the value of space under conditions of multiple interests, risks, and uncertainties. There exists a large, essentially unexplored research space related to

the ontology of boundaries and borders, the categorical apparatus of spatial value, the axiomatics of land-use regimes, and a methodology for integrating legal, economic, environmental, and technical approaches. Hence, the scientific problem lies in the need to develop a contemporary theory of land management as an autonomous scientific discipline with a clearly defined normative core, subject matter, object, categorical apparatus, axioms, and methodology, capable of describing and explaining the management of the value of space under conditions of digitalization, institutional complexity, and the growing role of spatial justice.

Purpose of the article. The purpose of this article is to conceptualize a contemporary theory of land management as an autonomous fundamental scientific discipline by systematically formulating its subject matter and object, identifying leading theoretical models, articulating an axiomatic basis, and ordering a methodological toolkit capable of ensuring a transition from a ecosystem-technocratic understanding of space to its institutional and value-based comprehension.

Within the stated purpose, it is envisaged to:

1. Propose rigorous definitions of the subject matter—as the emergence, structure, and dynamics of spatial land-use regimes in multi-layer and multi-temporal dimensions—and of the object—as an integral governed space formed through onto-legal acts of establishing boundaries, zones, and borders;

2. Analyze key theories that justify land management not as a service, but as a generalizing discipline of governance of the value of spatial functions, in particular - the theory of property rights, the theory of institutional border design, spatial-economic concepts of the emergence of rents and models of spatial justice;

3. Formulate the basic axioms of land management that fix the emergent nature of spatial value, the multidimensional ontology of boundaries, and the priority of institutional mechanisms over purely geometric optima;

4. Define the corpus of core methods, including institutional analysis, spatial-economic modelling, topological and network approaches to zoning, environmental accounting, algorithmic models of governance, and normative procedures for assessing the external effects of spatial transformations;

5. Outline an actual list of core scientific problems, the solution of which is a necessary condition for the establishment of a contemporary theory of land management, including problems of the ontological status of boundaries in the digital environment, the formalization of vertical and temporal spatial titles, the development of a theory of spatial restrictions as a legitimate form of collective action, the modelling of composite rents taking into account ecosystem and option values, the reconciliation of procedural justice with computational governance, as well as the formation of a unified, logically non-contradictory theoretical canon.

Achieving this purpose is aimed at overcoming disciplinary fragmentation and creating a theoretical framework that will allow land management to acquire the status of a full-fledged scientific doctrine capable of explaining and formalizing the regularities of transforming territory into a governed space of values, interests, rules, and risks.

Materials and methods. The material basis of the study comprises a corpus of contemporary scholarly publications on land-use theory, spatial planning, rent economics, the digital cadastre, institutional design, and land law; international doctrinal documents and standards of spatial governance; as well as current conceptual developments in the philosophy of space, property rights theory, theories of justice, and algorithmic governance. Materials were selected according to the criteria of scientific relevance, paradigmatic contemporaneity, interdisciplinary integrability, and the capacity to reflect the fundamental (rather than purely applied) character of land management (zemleustrii). The study takes into account caveats regarding possible methodological distortions related to the normative variability of land policy across jurisdictions, the ontological “thinness” of digital boundaries—which may create an illusion of the final formalization of spatial titles—and the limited comparability of certain national theoretical traditions that are at different stages of conceptual maturity. It is emphasized separately that no empirical data were modelled, and theoretical generalizations were formulated without reference to current conjunctural political cycles.

The research methodology is comprehensive and combines instruments of philosophical-theoretical reflection with formal interdisciplinary analysis. The following were applied: institutional analysis and synthesis of land-use regimes; topological modelling of boundaries and zones as multidimensional relations; spatial-economic interpretation of rents as an emergent outcome of rules; an ecological approach to understanding spatial value through the integration of ecosystem and option values; methods of conceptual axiomatization; as well as elements of algorithmic governance theory for a critical assessment of the transformation of the ontology of boundaries in the digital environment. The research was conducted in compliance with the principles of evidentiary rigor, definitional consistency, proportionality of theoretical assumptions, and procedural justice of interpretations. At the same time, general-theoretical limitations were taken into account: the absence of a single established theoretical canon of land management, the high complexity of integrating vertical and temporal titles into existing models, and the need for further verification of certain postulates in subsequent specialized studies.

Analysis of recent research and publications. In contemporary international scholarship, the *land administration* paradigm predominates, within which land–spatial relations are viewed as an integrated infrastructure for implementing land policy, ensuring sustainable development, and coordinating rights, restrictions, and responsibilities. In the seminal work by Dale and McLaughlin, *land administration* is interpreted as the systemic organization of processes for defining, recording, and disseminating information on rights, value, and the use of land as a basic resource of spatial development [1]. Further development of this framework is proposed in the monograph by Williamson, Enemark, Wallace, and Rajabifard, where *land administration* is treated as the core of “land management infrastructure” ensuring the interaction of four key functions—land tenure, land value, land use, and land development [2]. These authors consistently demonstrate that the cadastre ceases to be merely a cartographic-registration instrument and becomes an institutional mechanism for coordinating spatial regimes in the long term [2; 4]. In the article by Bennett, Wallace, and Williamson, it is substantiated that the organization of land

information should be built on a functional rather than purely geometric logic, taking into account multiple types of interests and encumbrances that are imposed on the same territorial unit [3].

An important step in the transition from the "classical" cadastre to a theory of spatial regimes was made by the *Cadastre 2014* concepts and the associated directions of standardization. In the FIG policy document *Cadastre 2014 – A Vision for a Future Cadastral System*, Kaufmann and Steudler proposed a vision of the cadastre as complete documentation not only of private rights but also of public-law restrictions and responsibilities integrated into a broader spatial information system [5]. The further development of these ideas in the edited volume *Cadastre 2014 and Beyond* (Steudler, ed.) is associated with a move toward multidimensional (3D) and multi-layer models, where the object of administration becomes not area, but a volumetric space of rights and regimes [6]. On this basis, the international standard ISO 19152 *Land Administration Domain Model (LADM)* formalizes the conceptual apparatus of rights, restrictions, and responsibilities (RRR), establishing a model in which a single spatial object may simultaneously carry different types of legal titles in the surface, subsurface, and airspace dimensions [7]. The works of van Oosterom and Lemmen show that LADM is not only a technical standard but also a conceptual framework for describing multi-level land-use regimes, including their institutional and legal aspects [8].

In parallel with the development of conceptual cadastral models, the normative paradigm of *fit-for-purpose land administration* is taking shape, aimed at scalable provision of tenure security and inclusive access to space. The joint FIG–World Bank publication *Fit-For-Purpose Land Administration* formulates principles for designing systems oriented to people's needs and context rather than to rigid technical accuracy standards [9]. In the later work by Enemark, McLaren, and Lemmen, *Fit-for-Purpose Land Administration—Providing Secure Land Rights at Scale*, the FFPLA concept is interpreted as the evolution of land administration toward flexible, incrementally improvable institutions capable of covering both formal and informal forms of tenure and use [10]. At the same time, FAO's *Voluntary Guidelines on the Responsible*

Governance of Tenure of Land, Fisheries and Forests (VGGT) set a global ethical and legal framework in which tenure security, equitable access, and the protection of vulnerable groups are treated as criteria of good territorial governance [11]. The UN-GGIM *Framework for Effective Land Administration (FELA)* закріплює the link between effective land administration, the Sustainable Development Goals, and integrated geospatial management, emphasizing that "people–land relationships" must be captured in all forms—formal, customary, individual, and collective [12].

A significant contribution to the understanding of land management as the management of spatial regimes of the land use system is made by scientific works that focus on tools for land redistribution and restructuring, primarily on consolidation. In the article by Pašakarnis and Maliene, the application of land consolidation is interpreted as a key instrument for sustainable rural development in Central and Eastern European countries, combining the correction of fragmented landholding structures with environmental and social objectives [15]. This work shows that spatial transformations (parcel enlargement, formation of corridors, zones, and servitudes) cannot be reduced to "technical" planning tasks: they are always an intertwining of legal titles, use regimes, compensation instruments, and mechanisms of collective action. Through numerous FAO manuals on the design of pilot consolidation projects, this logic is embedded in international standards of rural space governance, strengthening the understanding of land management as a polycentric and institutionally dense practice rather than merely a set of geodetic works [10; 15].

Ontological and normative dimensions of spatial regimes are indirectly elaborated in interdisciplinary research on property rights, commons governance, and spatial justice. In E. Ostrom's *Governing the Commons*, it is shown that sustainable regimes of common-pool resource use are formed as evolutionary institutional constructs in which rules of access, monitoring, sanctions, and conflict resolution are no less important than the physical characteristics of the resource [13]. This provides grounds for treating "spatial value" as an emergent property of institutional design rather than a purely natural or market status of land. In O. Alexander's article on "the public interest in planning," it is argued that the legitimacy of territorial planning

cannot be limited to a formal reference to “public benefit,” but must be grounded in procedural criteria of justice, transparency, and reasoned balancing of private and public interests [14]. Although these works do not belong directly to “land management theory,” they set contemporary philosophical and methodological ориентири for conceptualizing boundary, zone, and regime as institutional phenomena that combine legal, economic, environmental, and ethical dimensions.

Within the global discourse, a distinct niche is occupied by approaches oriented to vulnerable groups and informal rights. The works of Zevenbergen, Bennett, and co-authors formulate principles of *pro-poor land administration*, according to which rights-recording systems should cover the full spectrum of actual relationships to land, including customary, temporary, and group rights, through such instruments as the Social Tenure Domain Model (STDM) and the continuum of land rights [19]. In combination with the VGGT and FELA, these approaches emphasize that governing space cannot be reduced to a rigid binary “formal/informal” distinction; rather, it concerns a network of overlapping regimes that require flexible but conceptually clear descriptive models [11; 12; 19]. From the standpoint of a contemporary theory of land management, this means that boundaries and borders must be conceptualized as onto-legal events that simultaneously record, legalize, and transform the structure of spatial opportunities and values.

The Ukrainian scholarly tradition has also developed a number of approaches to the theoretical understanding of land management (zemleustrii), although they largely remain within a regulatory-legal and organizational framework. A. Tretyak and R. Kuryltsiv conducted research on the theoretical and methodological foundations of the formation of a system of ecological and economic administration of land use. The results of the research were highlighted in the monograph “Land resources and land use management: basic principles of theory, institutionalization, practice” [16]. A. Tretyak’s monograph “Land management in Ukraine: development on the basis of the latest institutional and behavioral theory” investigated the institutional and behavioral theory of land management development [17]. In the article “Paradigm of development of modern theory of land management in Ukraine”

A. Tretyak outlines the transition from planning and administrative approaches to the institutional and behavioral paradigm, in which land management is considered as a tool for coordinating the interests of subjects of land relations and spatial modernization of territories [18]. The works of A. Tretyak, V. Tretyak "Estimation of the cost of subtypes of agricultural land use in land consolidation projects" highlight aspects of estimating the cost of subtypes of land use, which are considered as the basic territorial and spatial basis for the consolidation of agricultural land in combination with ecosystem services [19]. In the textbook "Land Administration System: Fundamentals of Modern Theory", V. Shipulin considers the basic concepts of the land administration system as a promising direction for the further development of the existing practice of regulating land relations and managing the use of land resources in Ukraine [20]. Y. Dorosh in the article "Land management as a fundamental mechanism for the formation of land relations in the conditions of a transformational economy" positions land management as a systemic mechanism that ensures the organization of land, the formation of land plots and the establishment of rights, and focuses on how land management regulates relations between owners, users and the state [21]. In the textbook *Theoretical Foundations of Land Management*, L. Perovych, V. Sai, and M. Malanchuk provide a systematized view of the content, tasks, principles, and objects of land management, emphasizing its role in ensuring rational land use and the spatial organization of production [22]. At the same time, even in these works the main emphasis is placed on functional-normative aspects (tasks, functions, principles, organizational procedures), whereas the ontology of boundaries and borders, the axiomatization of spatial regimes, and the formalization of the category "spatial value" remain only fragmentarily developed.

Thus, the existing corpus of international and domestic studies demonstrates significant progress in developing concepts of land administration, next-generation cadastre, fit-for-purpose approaches, and instruments of land consolidation and restructuring [1–3; 5–12; 15–23]. A holistic theory of modern land management is needed as a science of the emergence, structure, and dynamics of spatial land-use regimes is still lacking-one in which the subject matter and object of research, the

basic categorical apparatus (boundary, zone, regime, spatial value, collective action, risk, resilience), and a system of axioms describing the multidimensional nature of boundaries and the emergent character of spatial value are clearly defined. It is precisely this lacuna - the gap between the high level of development of instrumental-normative approaches and insufficient theoretical reflection on the ontology and axiomatics of land management - that defines the scientific niche in which the proposed study is situated.

Main research material. The establishment of a contemporary theory of land management as an autonomous scientific discipline requires, first and foremost, a clear delineation of its object and subject matter, since it is precisely these that set the ontological boundaries of the reality under study and the epistemological framework of admissible explanations. Whereas in the classical tradition land management was reduced to the treatment of "land use - territory" as a set of parcels, lines, and contours, the contemporary understanding concerns not territory as such, but space that acquires the status of an ordered field of rights, restrictions, and values. Accordingly, the object of the contemporary theory of land management is not land in the physical-geographical sense and not a set of land parcels in a legal register, but a **socio-spatial continuum** in which territory is transformed into a multidimensional space of legal titles, use regimes, collective actions, and spatial values. This is a space structured by onto-legal events of establishing boundaries, borders, zones, corridors, and reservations, which simultaneously constitute legal facts, material markers, information records, and the results of institutional agreements.

The object of contemporary land management is fundamentally multidimensional. First, it is **multi-layered**: it encompasses the surface, subsurface, and above-ground/airspace with their vertically stratified interests, rights, and risks. Second, it is **multi-temporal**: spatial regimes have duration, deferred consequences, option opportunities, conditions of validity, and may be temporary, transitional, or adaptive. Third, this object is **multi-actor**: private, public, and collective (in particular environmental and intergenerational) interests intersect and conflict within it, imparting to space a pronounced political-economic and ethical dimension.

Finally, the object of land management is **axiologically saturated**: it contains not only market price but also ecosystem services, cultural meanings, network effects, regulatory scarcity, and option values of future modes of use. In this sense, land and space appear as "carriers of rules" and "carriers of expectations," that is, as the substrate of emergent spatial value.

Against this background, the subject matter of the contemporary theory of land management may be delineated as the **emergence, structure, and dynamics of spatial land-use regimes**, i.e., such ordered configurations of legal titles, restrictions, servitudes (easements), zones, corridors, and reservations that are situated in the aforementioned multi-layered and multi-temporal space and determine who, how, when, and under what conditions may use particular spatial opportunities. The subject matter is not merely a static map of regimes, but above all **processuality**: how boundaries are established, changed, digitized, and contested; how new rules generate or alter rents, risks, and system resilience; how institutional design transforms configurations of access and constraints. Land management theory investigates the logic of transforming territorial differences into legal and value differences: how "lines on a plan" become onto-legal events that constitute new states of justice/injustice, benefits/costs, and risk/security.

In philosophical terms, this means that the subject matter of contemporary land management lies at the intersection of the ontology of space, institutional theory, and the axiology of spatial justice. Land management is concerned not only with "where the boundary runs" of its objects, but also in what its formation means: what difference it creates, what forms of collective action it makes possible or impossible, what scenarios of the future it opens and closes. A boundary appears not as a geometric abstraction, but as a relational entity that has "thickness" (a buffer space between regimes), "height/depth" (vertical extension into the subsurface and the air column), "duration" (term of validity), and "institutional hardness" (the cost of altering it). This is precisely why the subject matter of land management theory is not cartographic descriptiveness, but an explanation of how, through institutionalized

boundaries and regimes, space acquires the ontological status of an asset, a field of conflict, and, at the same time, a potential field for the just reconciliation of interests.

Next, it is necessary to proceed to the formalization of the **axiomatic core** of the contemporary theory of land management, without which it is impossible either to build a coherent theory or to transform the practice of land management from a set of procedures into a reflexive science of space (space - territory - land use system - land use regimes - land plots).

In the general scientific sense, axioms are neither empirical generalizations nor normative slogans, but fundamental statements about the structure of the reality under study that are accepted as initial, since without them a holistic description and explanation of the system is impossible. In the contemporary theory of land management, axioms are basic postulates about the ontological status of boundaries, the nature of spatial value, and the way in which institutions transform territory into an ordered space of rights, restrictions, and rents. They do not substitute for legal principles or political slogans; rather, they set the "deep grammar" of the discipline—what is always already presupposed when a land-management engineer designs a boundary, zone, corridor, regime, or restriction.

In the authors' view, the key axioms of contemporary land management can be presented as a concise system in which each statement captures a critical aspect of spatial reality—from the constitutive role of boundaries to the emergent nature of value and the specificity of the digital environment (see Table 1).

Table 1. Axioms in the Theory of Contemporary Land Management

No.	Axiom of the contemporary land management theory	Content	Illustrative example of applying the axiom
1	**Boundaries constitute rights, restrictions, and rents**	A boundary is not merely a geometric line but an onto-legal event: at the moment it is established, a legal title is attached, rent opportunities emerge or disappear, and the structure of risks and responsibilities changes. A boundary "switches on" or	Establishment of a new boundary between a land parcel for residential development and an adjacent parcel reclassified into a public-use development zone: the owner of the first parcel obtains additional rent due to proximity to social infrastructure, while the owner of the second faces restrictions on

No.	Axiom of the contemporary land management theory	Content	Illustrative example of applying the axiom
		"switches off" access to spatial opportunities.	intensity of use. Rents and risks arose precisely as a result of establishing the boundary and changing its legal significance.
2	**Any boundary is multidimensional: topological, legal, ecological, and temporal**	A boundary always has at least four dimensions: geometric (where it runs), legal (which titles it separates), ecological (which flows of matter, energy, and species it alters), and temporal (how long it is valid and under what conditions it can be changed). Ignoring any dimension leads to erroneous decisions.	Establishment of a riparian protective buffer strip along a river: topologically— a setback line; legally— a development-restriction zone; ecologically— a barrier against erosion and pollution; temporally— a regime that applies permanently or until the plan is amended. Formally "one" boundary is in fact a multidimensional regime object.
3	**Land value is an emergent characteristic of rules and expectations**	Spatial value is not a property of "soil" or "coordinates" as such; it arises from the combination of rules (zoning, servitudes/easements, restrictions, permitted functions) and expectations regarding future use. A change in rules (even without physical transformation) can radically change value.	Inclusion of an agricultural parcel within a residential zone in the master plan: physically the land does not change, but due to the new permitted-use regime its market value increases several-fold. Value is the result of a change in the "rules of the game," not a change in the soil.
4	**The optimum of spatial organization is achieved not by geometry, but by institutional design and managed uncertainty**	An "ideal" parcel layout does not guarantee either efficiency or justice. What is decisive are mechanisms: how regimes change, how benefits and costs are allocated, how appeal and re-negotiation procedures operate. Land management operates not with static form but with the system's ability to respond adaptively to change.	Two villages have equally "neat," geometrically attractive land-use schemes. In one, effective mechanisms of land consolidation, voluntary exchange, and easements exist; in the other, they do not. The first can flexibly optimize land-use structure for new crops, logistics, and environmental requirements; the second remains trapped in fragmentation, although "on the plan" it appears orderly.
5	**Digitalization changes the ontology of boundaries, but does not eliminate conflicts of interest**	Transferring boundaries into the digital environment (GIS, cadastral databases, smart contracts) changes their mode of existence: they become simultaneously legal and algorithmic entities. However, conflicts of interest, information asymmetry, and the need for institutional legitimation do not	Digitization of the state land cadastre: parcel boundaries become available online, but disputes between neighbours over the "correct" line do not vanish. Instead, new questions arise: which digital trace to trust, how to correct data errors, and who is responsible for translating legal reality into code.

No.	Axiom of the contemporary land management theory	Content	Illustrative example of applying the axiom
		disappear—only the form of their manifestation changes.	
6	**Land-use restrictions are a legitimate instrument for reconciling interests and reducing risks, provided procedural justice is ensured**	Any restriction is not a "punishment of the owner," but an attempt to balance private benefits and public/collective costs (environmental, social, infrastructural). It is axiomaticaly admissible only when: (a) justified by the public interest, (b) proportionate, (c) evidence-based, and (d) adopted through a fair procedure.	Introduction of a restricted development zone near an airport: the owner loses the ability to build high-rise buildings, while society obtains lower risks of aviation incidents and reduced noise exposure. If the owner was informed, losses were compensated (or alternative opportunities provided), and the decision was taken transparently, the restriction is a legitimate instrument of spatial governance.
7	**Collective action is a necessary condition for resilient spatial regimes**	No spatial regime (from an irrigation system to green infrastructure) can be maintained solely through individual decisions of owners. Institutional mechanisms of cooperation, allocation of costs and benefits, oversight, and sanctions are required. Land management engages space precisely as a field of organized collective action.	Establishment of a shared field road or a protective shelterbelt: an individual owner has no incentive to sacrifice part of the area if not confident neighbours will do the same. Only through land-management instruments (a consolidation plan, agreements, servitude corridors, compensation) is it possible to create and maintain a spatial regime beneficial to all but requiring collective action.
8	**Risk and resilience are internal characteristics of spatial regimes, not external "factors"**	Each land-use regime embeds a certain configuration of risks (floods, landslides, market volatility, regulatory changes) and resilience reserves (buffer zones, alternative use scenarios, the ability to promptly adjust rules). Land management must assess and shape these configurations, rather than merely "record" the existing situation.	Locating new residential development in a river floodplain: under a purely geometric approach, only the physical possibility of placing buildings matters. Under an axiomatic approach, the land manager analyses flood risk, the need for buffer zones, and alternative development options on more resilient territories. The regime is viewed through the lens of embedded risk and resilience.

Note: developed by the authors.

The proposed system of axioms performs two interrelated functions. On the one hand, it disciplines theoretical discourse by preventing the conflation of land management with purely cartographic or registration activity: any decision concerning a boundary, zone, or regime must be conceived as an onto-legal event

with emergent consequences for value, risks, and justice. On the other hand, the axioms create a framework for professional practice: they require the land manager to think multidimensionally (vertically, temporally, institutionally), to recognize the inseparability of digital instruments from conflicts of interest, and to treat restrictions and collective action as core instruments of spatial governance rather than as an "add-on" to technical design. It is precisely through such an axiomatic core that land management appears not as an applied service but as a full-fledged theory of governing the value of space.

Continuing the logic of the axiomatic exposition, it is necessary to move to the methodological dimension of the contemporary theory of land management. If axioms set the "deep grammar" of spatial reality, then methods are ordered ways of knowing, describing, and transforming it. In this sense, methods in the contemporary theory of land management are not reducible to a set of technical techniques or individual procedures (surveying, mapping, calculations), but function as integral epistemological schemes through which the discipline transforms territorial facts into meaningful spatial regimes, norms, and projects of the future.

Methods of researching land management theory can be defined as systems of techniques and procedures aimed at identifying, modelling, and evaluating spatial land-use regimes in their legal, economic, ecological, and institutional dimensions. They provide the link between axioms (the understanding of the multidimensionality of boundaries, the emergent nature of value, and the role of institutional design) and practice (the design of boundaries, zones, corridors, restrictions, and mechanisms of collective action). For contemporary land management, it is fundamental that the methodological toolkit is interdisciplinary: it combines legal analysis, economic modelling, institutional diagnosis, spatial statistics, topology, environmental accounting, algorithmic approaches, and procedural mechanisms of justice. It is precisely such a methodological "bundle" that makes it possible to regard a boundary not only as a line on a map but as a complex event that changes the distribution of rights, rents, risks, and responsibilities.

For the purposes of discussion, the authors propose a systematized list of key methods in the contemporary theory of land management as a scientific discipline (see Table 2).

Table 2. Methods of researching Theory of Contemporary Land Management

No.	Methods of researching in land management theory	Method content	Typical tasks and outcomes
1	**Institutional analysis of spatial regimes**	Study of formal and informal rules that determine access to space, modes of use, sanctions, and conflict-resolution mechanisms. The method focuses on who, under what conditions, and how exactly can change boundaries, regimes, and restrictions, as well as what transaction costs and information asymmetries arise in the process.	Identification of "bottlenecks" in procedures for changing land use designation, analysis of conflicts between public authorities and owners regarding the establishment of protection zones, development of the institutional architecture of land consolidation projects.
2	**Theoretical-legal (doctrinal/dogmatic) method**	Systematic analysis of legal norms, doctrine, and case law in order to identify internal contradictions, gaps, and the potential for formalizing spatial regimes as objects of law. The method allows harmonizing the conceptual apparatus (parcel, zone, corridor, servitude/easement, restriction) with the actual spatial reality.	Clarification of the legal status of subsurface and above-ground volumes (3D real property), development of models of easement corridors for infrastructure facilities, formulation of legal regimes for "buffer" and adaptive zones.
3	**Spatial-economic modelling of rents and value**	Assessment and modelling of spatial value as a function of rules and expectations: combining market prices, regulatory scarcity, network effects, ecosystem services, and option values. The method makes it possible to analyze how changes in regimes (zoning, restrictions) transform the structure of rents and incentives.	Assessment of the impact of zoning changes on land values in an urban agglomeration, modelling the effects of introducing green infrastructure, analysis of distributive fairness in allocating value uplift between private owners and society.
4	**Topological and network analysis of space**	Treating space not as a set of isolated parcels but as a network of relations (adjacency, access, flows), where boundaries determine not only "contours" but also the structural position of objects. The method reveals how network configurations (roads,	Optimization of the configuration of field roads and easement corridors, analysis of the impact of a new transport artery on the spatial structure of rents, planning a connected ecological network

No.	Methods of researching in land management theory	Method content	Typical tasks and outcomes
		corridors, green infrastructure) affect accessibility, rents, risks, and resilience.	(ecological corridors, protected areas).
5	**Environmental accounts and ecosystem services assessment**	Quantitative and qualitative assessment of ecosystem functions (water regulation, biodiversity, recreation, etc.) as an integral component of spatial value. The method integrates environmental indicators into land-management projects, treating restrictions and regimes as instruments for conserving and reproducing ecosystem services.	Comparison of land-use scenarios in terms of loss/preservation of ecosystem services, justification of nature-protection and water-protection restrictions, development of compensation schemes for environmental damages.
6	**Geoinformation modelling and digital cadastral analysis**	Use of GIS, spatial databases, and digital cadastres to model multi-layer spatial regimes, analyze the overlay of rights, restrictions, and risks, and visualize scenarios of boundary transformation. The method operationalizes the axiom regarding the transformation of the ontology of boundaries in the digital environment.	Creation of integrated cadastral maps showing private rights, public restrictions, and risk zones simultaneously; modelling 3D/4D real-property objects; assessment of conflicts arising from overlapping regimes (e.g., development–flooding–protection zone).
7	**Algorithmic-analytic methods of governance (data-driven governance)**	Application of algorithms (including machine learning) to analyze large volumes of spatial data, forecast land-use trends, detect anomalies, and support decision-making. The method requires continuous reflection on transparency, accountability, and non-discrimination of algorithms.	Automated detection of "hot spots" of illegal development, forecasting land-use change under infrastructure projects, decision support for prioritizing land consolidation or land remediation measures.
8	**Scenario-based and strategic-forecasting analysis**	Development of alternative scenarios of spatial development considering different combinations of rules, investments, and environmental and social trends. The method enables evaluation of long-term consequences of decisions on boundaries, zoning, and restrictions, proceeding from the axiom of the multi-temporality of space.	Comparison of urban expansion scenarios (densification, suburbanization, corridor-oriented development), modelling the consequences of agricultural policy changes for rural territorial structure, assessment of long-term risks of floodplain urbanization.
9	**Methods of procedural and spatial justice (participatory planning)**	Organization of stakeholder engagement, public consultations, mediation, and collective decision-making regarding spatial	Conducting public hearings on establishing sanitary protection zones, facilitated negotiations in joint land

No.	Methods of researching in land management theory	Method content	Typical tasks and outcomes
		regimes. The method provides legitimacy for restrictions and for the distribution of benefits/costs, implementing the axiom of collective action as a condition of resilient regimes.	consolidation projects, formation of a "social contract" on use regimes for riparian areas or green zones.
10	**Integrated land-management project method**	Integration of legal, economic, environmental, social, and technical analyses into a single land-management project that translates theoretical axioms and methods into a concrete spatial configuration of boundaries, regimes, and implementation mechanisms. This is a "composite" method that synthesizes the results of the preceding ones.	Preparation of a land-management project for territorial ordering of a community: definition of functional zones, easement corridors, nature-protection restrictions, mechanisms for rent redistribution and compensation, and implementation instruments (agreements, local rules, digital services).

Note: developed by the authors.

The proposed list of methods demonstrates that contemporary land management (zemleustrii) as a scientific discipline extends far beyond the "classical" technical–cadastral paradigm to the modern one (space - territory - land use system - land use regime - land plot). Here, methods are not merely a set of operational steps, but a way of thinking about space as a complex, multidimensional, and axiologically saturated system. The institutional, legal, economic, ecological, digital, and procedural dimensions complement one another, enabling the land surveyor to act not as a "drafter of boundaries" but as an architect of spatial regimes, capable of consciously governing value, risks, and justice in space. It is precisely through such a methodological optics that land management theory acquires the status of a full-fledged fundamental science rather than merely an applied technical activity.

Today, land management theory finds itself in a situation of "accumulated practice and fragmentary conceptualization": significant progress has been achieved at the level of instruments and regulatory frameworks, yet the ontological, axiological, and methodological foundations remain incompletely defined. For this reason, it is necessary to delineate an indicative range of theoretical problems whose

resolution is a prerequisite for establishing an internally consistent contemporary theory of land management as a science of spatial regimes, boundaries, value, and risks.

For the purposes of discussion, the authors attempt to generalize the key scientific problems formulated directions of research in the theory of land management regarding boundaries, spatial value management and legitimate restrictions in land use. Each of them can be considered not only as an abstract intellectual task, but also an "explanatory node", the solution of which determines the quality of decisions in land management practice, the fairness of the distribution of benefits and costs in space and the stability of territorial systems to shocks and uncertainties (see Table 3).

Table 3. Key scientific problems in the Theory of Contemporary Land Management

No.	Scientific problem	Essence of the problem	Relevance of the problem
1	**Ontological "thickness" of boundaries**	The vast majority of models treat a boundary as a line without thickness, whereas in reality boundaries function as volumes with different regimes within and on both sides (buffers, sanitary and protection strips, riparian zones, etc.). There is no formalism that would allow "thick boundaries" to be described as three-dimensional (or even four-dimensional) objects with their own internal regime structure.	Without a theory of "thick boundaries," any zoning inevitably simplifies adjacency conflicts (industrial zone–residential area, agriculture–ecosystem), which increases risks and litigation. Formalizing boundary thickness is needed for correct design of buffers, calculation of compensation, and modelling of real spatial interaction among regimes.
2	**Vertical stratification of rights**	Land is in fact used as a multi-layer resource: the surface, subsoil, underground structures, subsurface flows, and airspace (including drone corridors). There is no single theoretical model that would reconcile these layers within one space of rights, restrictions, and rents.	The absence of a coherent model leads to collisions (e.g., between a surface parcel owner, an underground infrastructure operator, and an air-corridor user), complicates implementation of 3D/4D cadastre, and slows the development of new forms of spatial use (geothermal systems, underground urbanism, unmanned logistics).
3	**Temporal dynamics of spatial regimes**	There is a lack of formalism for "temporal boundaries" and "phase transitions" of regimes: temporary zones, phased changes in functional	Contemporary land-management decisions increasingly must be implemented in phases and under uncertainty. Without a theory of

No.	Scientific problem	Essence of the problem	Relevance of the problem
		designation, conditional regimes triggered by thresholds (risk, investment, environmental condition) are described fragmentarily.	temporal dynamics, it is impossible to properly design temporary restrictions, moratoria, adaptive regimes, and mechanisms of "soft transition" between incompatible uses.
4	**Multi-jurisdictional overlay of regimes**	The same space simultaneously falls under national, regional, municipal, and special (environmental, infrastructure, protective) regimes. There is no stable "compatibility algebra" for combining them without collisions and "dead zones" of governance.	Under decentralization and polycentric governance, regime overlay becomes the norm. The absence of formalized rules for combining them leads to legal uncertainty, delays in decision-making, duplication of controls, and gaps where in practice no one bears responsibility.
5	**Pricing of spatial externalities**	Noise, congestion, heat islands, flooding, biodiversity loss, and other spatial externalities are not systematically accounted for in land-management decisions and rent models. There are no established methods for internal pricing of these effects in specific land-management projects.	Without internalization of externalities, decisions that appear "beneficial" locally generate substantial societal costs in the future. Theoretically grounded pricing methods would allow environmental and social costs/benefits to be integrated into rent structures and compensation mechanisms.
6	**Accounting for ecosystem services in rent and cadastre**	Ecosystem services (water regulation, recreation, soil support, biodiversity) largely remain "invisible" in cadastral valuation and contracts. Standardized approaches to integrating them into value models and legal regimes are lacking.	Without incorporating ecosystem services into rent, land management effectively incentivizes their degradation, because market logic "does not see" their value. Solving this problem is a key condition for a transition to genuinely sustainable land use.
7	**Optionality and deep uncertainty in land use**	Real options (the possibility to change the use regime later) and deep uncertainty (climate, technology, demographics) are scarcely considered in classical planning and valuation schemes. There are no land-management-adapted models for governing optionality.	Ignoring optionality leads to overly rigid or, conversely, overly inert regimes that respond poorly to shocks. Theoretical conceptualization of optionality enables designing space so as to preserve "corridors of possibility" for future generations and new technologies.
8	**Fair distribution of spatial value uplift (value capture)**	Land value increases caused by public investment or rule changes (zoning, infrastructure) are predominantly appropriated by private owners. Clear principles and instruments for fair distribution of this uplift among private persons, communities, and the	Without a theory of fair value capture, land management reproduces spatial inequality and speculative bubbles. Transparent benefit-sharing mechanisms are key to societal legitimacy of decisions on zoning, consolidation,

No.	Scientific problem	Essence of the problem	Relevance of the problem
		state have not been formed.	and large-scale spatial transformations.
9	**Conflicts of rights and collective action**	Many spatial regimes (irrigation, shared roads, green corridors) require collective decisions and joint management. There are insufficiently developed models that combine individual rights with co-management instruments without excessive transaction costs.	Without theoretically grounded collective-action mechanisms, projects of consolidation, ecological networks, or shared infrastructure stall despite evident benefits for all parties. This critically limits communities' capacity to implement complex spatial projects.
10	**Algorithmic governance of boundaries and regimes**	Increasingly, decisions (zoning, permitting procedures, monitoring) are delegated to algorithms and information systems. A theory of verification, audit, accountability, and prevention of systemic bias of such algorithms in the context of land management is lacking.	If algorithms remain "black boxes," they may reproduce or amplify spatial inequality, discrimination, and corrupt practices. Theoretical foundations of algorithmic governance are a condition for trust in digital land-management and cadastral systems.
11	**Legal interoperability of spatial data**	Digital records of rights and restrictions migrate between systems (cadastre, property rights register, urban-planning cadastre, community GIS). There is no completed theory of how to ensure legal force, traceability, and stability of these records under technical change.	Without legal interoperability, boundaries and titles "break" with each modernization of systems, undermining trust and generating risks for all actors. An interoperability theory is the foundation for "live cadastre" models and long-term stability of rights.
12	**Resilience of spatial regimes to climate shocks**	Classical land-use schemes were built on the assumption of a relatively stable climate. Under increasing frequency of floods, droughts, and landslides, there is no developed theory of adaptive boundaries and regimes that change depending on risk triggers.	Without incorporating climate dynamics into regime theory, land management reproduces vulnerable configurations that become dangerous to life, infrastructure, and the economy. Models are needed in which changes in risk are automatically translated into corrections of boundaries, restrictions, and regimes.
13	**Buffer and transitional spaces ("soft zones")**	Intermediate spaces between incompatible uses (industry–housing, intensive farming–natural habitats) have almost no dedicated theory. Criteria for optimal width, duration, and compensation mechanisms for buffer zones are lacking.	Poorly designed or absent buffers lead to conflicts, environmental degradation, and reduced value of adjacent real property. A theory of "soft zones" is key to reducing spatial conflict and increasing resilience.
14	**Rights of Indigenous and local communities in static cadastres**	Traditional, seasonal, and mobile uses (grazing routes, fishing grounds, sacred territories) do not fit well into the static "parcel–owner" logic. There is no agreed theory for formalizing	Ignoring such rights generates deep conflicts, delegitimizes resource-governance projects, and leads to loss of cultural and ecological heritage. A theoretical solution is

No.	Scientific problem	Essence of the problem	Relevance of the problem
		collective and non-classical rights within a cadastre.	key to inclusive and just land management.
15	**Infrastructure corridors and easement networks**	Linear infrastructure (roads, power lines, pipelines, fiber-optic networks) and related easement rights form complex corridors with multi-rent use. General models for designing them with minimal conflict and maximum compatibility are lacking.	Without such a theory, infrastructure corridors often create excessive territorial fragmentation, block future uses, and generate major socio-economic conflicts. Optimized corridor models can radically increase the efficiency and fairness of spatial decisions.
16	**Balancing public access and private protection**	Openness of landscapes (access to shores, forests, recreational spaces) constantly conflicts with interests of private exclusivity and security. Theoretically validated standards of access, compensation, and insurance in such situations are lacking.	Failure to resolve this problem results in chronic conflicts between communities and owners, restriction of social justice, and degradation of public space. High-quality balance models can minimize conflicts and ensure legitimacy of access regimes.
17	**Anti-speculative spatial regimes**	Speculative strategies (holding "empty" plots, artificially blocking development, bubble formation) undermine the logic of rational land use. There is no agreed theoretical arsenal of anti-speculative rules that would not destroy investment incentives.	Without balanced anti-speculative regimes, cities and communities lose significant resources, spatial development becomes chaotic, and land markets become unstable. A theory of such regimes is the basis for long-term stability and fairness of the market.
18	**"Live cadastre" models**	A traditional cadastre functions as a periodically updated "snapshot" of boundaries and rights. In the digital environment, a near real-time continuous-update model is possible, but there are no theoretical foundations for such a "live cadastre" with an evidentiary change log and reliable "data oracles."	Without the concept of a "live cadastre," digitalization is limited to cosmetic improvements. A theory of continuous updating is necessary for timely reflection of factual changes, reduction of legal uncertainty, and support of dynamic regimes (temporary restrictions, adaptive zones).
19	**Quantification of legal uncertainty in space**	Boundary uncertainty, inconsistencies of titles, and incompleteness of records affect decisions but mostly remain "qualitative" characteristics. There are no generally accepted metrics for measuring legal uncertainty and incorporating it into valuation and risk-management models.	If legal uncertainty cannot be measured, it cannot be systematically accounted for in pricing, insurance, investment decisions, and prioritization of public interventions. Developing metrics of uncertainty is a necessary condition for mature governance of spatial risks.
20	**Ethics of spatial regulation and spatial justice**	Land-use regimes are rarely neutral: different neighbourhoods, communities, and population groups receive different bundles of rights, restrictions, and risks. There are no established ethical criteria for	Without a clearly articulated ethics of spatial regulation, land management risks becoming a technical screen for reproducing inequality and spatial segregation. Developing such criteria is key to

No.	Scientific problem	Essence of the problem	Relevance of the problem
		evaluating the legitimacy of unequal regimes, principles of non-discrimination, and mandatory participation.	trust, social cohesion, and long-term political stability of spatial decisions.

Note: developed by the authors.

The set of problems outlined demonstrates that a contemporary theory of land management deals not only with the "technique" of defining boundaries and developing plans, but with deeply ontological, axiological, and ethical questions: what is a boundary as a relation; how rights, rents, risks, and forms of collective action crystallize in space; how digital and algorithmic systems change the very nature of spatial order; where the line between permissible restriction and spatial injustice lies. Awareness of these problems and their systematic theoretical elaboration are a necessary condition for land management to finally emerge from the shadow of an applied discipline and to establish itself as a full-fledged contemporary science of governing the value of space.

Conclusions. The study has demonstrated that, in its substance, contemporary land management has long gone beyond the limits of a technical and applied discipline in terms of determining the boundaries of land management objects and should be considered as a fundamental science of the formation and management of the value of space. It is shown that the object of land management theory is not a “land plot” as a geometric contour, but “land” as a unique natural resource, but a multidimensional socio-spatial continuum in which the system (space - territory - land use system - land use regime - land plot) functions, which is characterized by a field of rights, restrictions, regimes, rents and risks. The subject of the theory is outlined as the emergence, structure and dynamics of spatial land use regimes - configurations of legal titles, easements, zones, corridors and reservations that function in the system (space - territory - land use system - land use regime - land plot) and multi-temporal dimensions. In this context, the border is interpreted not as a line, but as a relation – an onto-legal event that creates a difference in access, rents, risks, and opportunities for collective action.

The axiomatic core of the theory of modern land management is formulated, which fixes the constitutive role of the boundaries of land management objects for rights and rents, the multidimensional nature of any boundary (topological, legal, ecological, temporal), the emergent nature of spatial value as a function of rules and expectations, the determining role of institutional design and managed uncertainty, as well as the transformative, but not "pacifying" nature of the digitalization of boundaries. On this basis, a system of methods for researching the theory of land management is substantiated - from institutional analysis and theoretical and legal understanding of regimes to spatial and economic modeling of rents, topological and network approaches, ecological accounting, geoinformation and algorithmic analysis, scenario planning and procedural justice. It is shown that it is the integration of these methods that transforms land management practice from “drawing the boundaries of land management objects” into a rationally organized process of designing and maintaining spatial regimes capable of combining efficiency, sustainability, and justice.

It is demonstrated that the theoretical development of land management is currently constrained by a number of systemic scientific problems - from the ontological "thickness" of the boundaries of land management objects, vertical stratification of rights and temporal dynamics of regimes to multi-jurisdictional overlap, pricing of spatial externalities, incorporation of ecosystem services into rent, optionability under deep uncertainty, fair distribution of spatial value gains, algorithmic governance, legal interoperability of data, resilience to climate shocks, rights of indigenous and local communities, "living cadastre" and ethics of spatial regulation. Their systematic theoretical development should become the core of further research aimed at forming an internally consistent and methodologically coherent theory of modern land management. Ultimately, it is this theory that can ensure the transition from a fragmented regulatory and technical approach to institutionally mature spatial governance, where land as a unique natural asset is perceived as a carrier of rules, expectations, values, and responsibilities, and not just as objects of accounting and transactions.

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ДО ПИТАННЯ ПРО СУЧАСНУ ТЕОРІЮ ЗЕМЛЕУСТРОЮ

Анотація. *Стаття присвячена формуванню сучасної теорії землеустрою як самостійної фундаментальної наукової дисципліни шляхом системного формулювання її предмета й об'єкта, ідентифікації провідних теоретичних моделей, артикуляції аксіоматичного базису та впорядкування методологічного інструментарію, здатного забезпечити перехід від*

екосистемо-технократичного розуміння простору до його інституційно-ціннісного осмислення. На основі критичного аналізу міжнародної парадигми land administration, українських доктринальних напрацювань, інституційної теорії, теорії прав власності та просторової економіки уточнено об'єкт і предмет землеустрою: об'єктом визнано багатовимірний соціально-просторовий континуум, у якому територія перетворюється на впорядкований простір прав, обмежень, режимів, рент і ризиків; предметом – виникнення, структура і динаміка просторових режимів землекористування як системи правових титулів, сервітутів, зон, коридорів і резервувань у багатошаровому (поверхня–підземний простір–повітряний стовп) та багаточасовому вимірах. Сформульовано аксіоматичне ядро теорії сучасного землеустрою. Показано, що методологія землеустрою повинна включати інституційний аналіз, теоретико-правову догматику просторових режимів, просторово-економічне моделювання рент, топологічні та мережеві підходи, екологічне рахівництво, геоінформаційне та алгоритмічне моделювання, сценарний аналіз і процедури просторової справедливості. Узагальнено та систематизовано ядро наукових проблем теорії землеустрою, розв'язання яких є необхідною умовою переходу від фрагментарної нормативно-технічної практики до інституційно зрілого просторового врядування. Практична значущість результатів полягає у створенні концептуальної рамки для оновлення освітніх програм, удосконалення кадастрових і планувальних систем, а також для розроблення стандартів управління цінністю простору в умовах цифровізації та зростання ролі просторової справедливості.

Ключові слова: *теорія землеустрою; просторові режими землекористування; межі й кордони; просторова цінність; аксіоматика землеустрою; методологія land administration; цифровий кадастр; інституційний дизайн; просторове врядування.*