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From cropland to concrete: GIS evidence on the unaccounted fiscal cost of urbanisation in Setif, Algeria

Khoula Arif
Final-year student, Teacher Education College of Setif, Algeria

Tahar Kharchi
University Lecturer and Researcher, Teacher Education College of Setif, Algeria.
LAGAM Lab, Montpellier, France.
Corresponding Email: m.kharchi@ens-setif.dz
Orcid: https://orcid.org/0009-0003-1751-7567

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Abstract---Rapid urbanisation in resource-dependent developing economies routinely converts productive agricultural land into built-up surface, imposing substantial fiscal costs that remain largely invisible to public budgets and investment law frameworks. This article examines the case of Setif (Algeria), where GIS-based spatial analysis reveals that 1,787 hectares of fertile cropland were irreversibly sealed between 2000 and 2025, primarily as a consequence of state-directed mass housing programmes and industrial zone expansion financed through hydrocarbon revenues. Drawing on land economics, public finance theory, and comparative fiscal law, the study advances three original contributions. First, it constructs a multi-component fiscal cost framework — comprising opportunity costs of lost agricultural production, infrastructure extension expenditures, land-value appreciation uncaptured by public revenue, and long-term environmental externalities — and applies it to the Setif case, yielding conservative estimates of unaccounted fiscal losses equivalent to 2–3.4% of provincial GDP annually. Second, it analyses the structural gaps in Algeria's investment and land-use law (Laws 90-25, 90-29, 22-18, and 23-17) that systematically incentivise land conversion while failing to recover the public value generated by infrastructure investments. Third, it proposes an original Land Value Capture (LVC) framework adapted to the Algerian institutional context, combining betterment levies, agricultural conversion taxes, and development impact fees as instruments to internalise spatial externalities into investment decision-making. The findings contribute to international debates on urban fiscal governance, investment law reform, and sustainable land management in post-rentier economies.

Keywords---urban sprawl, urban land conversion, land value capture, Setif, GIS.

1. Introduction

Every hectare of land converted from agriculture to urban use represents a confluence of economic, fiscal, and legal consequences that public budgets rarely capture. In rapidly urbanising cities of the Global South, this conversion is not primarily a market phenomenon: it is the spatial expression of state investment policy, mediated through legal frameworks that were designed to facilitate development but not to price its true social and fiscal cost. The result is a systematic public subsidy to land-use conversion — a hidden tax expenditure embedded in the structure of urban investment law.

Setif, Algeria's dominant inland city on the High Plateaus, provides an unusually well-documented instance of this dynamic. Between 2000 and 2025, the city's built-up surface expanded from 2,763 hectares to 4,464 hectares — a net gain of 1,700 hectares of impervious surfaces — while cropland contracted by 1,787 hectares over the same period (Arif & Kharchi, 2026). This transformation was not spontaneous: it was driven by a succession of state-financed housing programmes (New Urban Housing Zones (ZHUN), Social housing (LSP), Housing Improvement and Development Agency (AADL), Assisted Promotional Housing (LPA)), industrial zone designations,

and infrastructure investments totalling billions of Algerian dinars in public expenditure. Yet the investment framework governing these programmes contained no mechanism to account for — let alone recover — the value generated for private landowners by public infrastructure, nor to charge the social cost of lost agricultural production to beneficiaries of urban expansion.

This article argues that this gap is not incidental but structural: it is embedded in Algeria's investment and land-use law, which was conceived primarily as a tool for stimulating development rather than governing the fiscal geography of urbanisation. The 2022 Investment Law (Law 22-18), the 2023 Economic Land Law (Law 23-17), and the foundational planning legislation (Laws 90-25 and 90-29) collectively create a legal environment that systematically underprices agricultural land, exempts investment beneficiaries from the costs of urban infrastructure, and leaves land-value appreciation — generated by public investment — uncaptured by any public revenue mechanism.

The international fiscal and legal scholarship has developed a rich toolkit for addressing precisely these failures, under the concept of Land Value Capture (LVC). From George's (1879) foundational insight that publicly created land value constitutes an appropriate tax base, through Smolka's (2013) systematic documentation of Latin American instruments, to the OECD's (2022) (Organisation for Economic Co-operation and Development) recent synthesis of global practice, LVC has emerged as one of the most theoretically coherent and practically promising fiscal instruments for sustainable urban finance. Yet its adoption in North Africa has been minimal, partly because the theoretical literature has rarely engaged with the specific institutional constraints of hydrocarbon-dependent, post-colonial legal systems.

This article fills this gap. It makes three original contributions: (1) a multi-component fiscal cost framework quantifying the unaccounted costs of agricultural land conversion in Setif; (2) a systematic legal analysis of the gaps in Algeria's investment and planning law that generate these costs; and (3) a contextualised LVC reform proposal adapted to Algeria's institutional architecture. The article proceeds as follows: Section 2 reviews the theoretical and legal literature on land economics, fiscal cost of sprawl, and LVC; Section 3 documents the spatial and fiscal dimensions of land conversion in Setif; Section 4 analyses the legal framework and its gaps; Section 5 develops the fiscal cost estimation; Section 6 proposes the LVC reform framework; and Section 7 concludes.

2. Theoretical and Legal Foundations

2.1. Land Economics and the Fiscal Geography of Urbanisation

Land economics occupies a distinctive position at the intersection of public finance, urban planning, and legal theory. Its core premise — that land value is primarily a

social product, created not by individual landowners but by collective action, public investment, and agglomeration — has profound implications for investment law and taxation (*Ingram & Hong, 2012*). Henry George (1879) first systematised this insight, arguing that the unearned increment in land value constitutes an ideal tax base because taxing it neither distorts productive activity nor penalises investment. A century of refinement has confirmed the theoretical efficiency of land value taxation while expanding the menu of practical instruments through which public agencies can recover the value their investments generate (Dye & England, 2010; Spring-Ragain, 2025).

The fiscal cost of unplanned urbanisation has received systematic attention since the seminal work of Burchell et al. (1998) on the costs of sprawl in the United States, subsequently extended to developing-country contexts by Osman et al. (2008), Burchell et al. (2013), Adaku (2014), and more recently by Hajilou et al. (2023). These studies document that unplanned expansion imposes costs in four main categories: (1) direct infrastructure costs — roads, utilities, sanitation — that must be extended to serve new peripheral developments; (2) opportunity costs of lost productive land use, particularly agriculture; (3) land-value increments captured by private landowners rather than the public sector that created them; and (4) long-term environmental externalities including carbon emissions, water-table depletion, and biodiversity loss. In resource-dependent economies, where public investment is financed from hydrocarbon revenues rather than local taxation, these costs are doubly invisible: they neither appear in market prices (because land is sometimes subsidised) (Miossec, 1985) nor in tax revenues (because there is no mechanism to recover them) (Troin, 2006).

2.2. Land Value Capture: Instruments and International Evidence

Land Value Capture (LVC) refers to the set of fiscal and regulatory instruments through which public authorities recover a portion of the land-value increment generated by their investments and planning decisions (OECD & Lincoln Institute of Land Policy, 2022). The OECD (2022) identifies four main families of LVC instruments. Betterment levies charge landowners whose properties increase in value as a result of specific public infrastructure projects. Development impact fees and exactions require developers to contribute to the cost of infrastructure necessitated by their projects. Land conversion taxes apply at the moment of agricultural-to-urban reclassification, capturing part of the windfall gain to the landowner. And land readjustment schemes — widely used in Japan, Korea, and Germany — pool peripheral land, develop it with public infrastructure, and return plots to original owners after deducting a share for public use.

International evidence on LVC effectiveness is substantial. Smolka (2013) documents that betterment levies in Colombia and Brazil have financed major urban

infrastructure while containing sprawl incentives. Hong Kong and Tokyo's development-based LVC schemes have generated the equivalent of billions of dollars in transit investment funding without recourse to general taxation (World Bank, 2020). The International Growth Centre (2023) estimates that annual land and property taxes represent the largest source of untapped municipal revenue in developing cities, potentially yielding 2–4% of GDP if properly designed and enforced. Even partial implementation — a conversion tax capturing 20% of the windfall gain from agricultural reclassification — would, in the Setif context, have generated revenues sufficient to fund the city's tramway system several times over.

The comparative fiscal law literature underscores that LVC instruments function best when embedded in a coherent legal architecture that connects planning law, investment law, and fiscal law (Connellan, 2004; Alterman, 2012). The French taxe d'aménagement and taxe sur la plus-value immobilière, the UK Community Infrastructure Levy, and Brazil's Outorga Onerosa do Direito de Construir all represent attempts to institutionalise this connection. Their common lesson is that LVC design must be technically sound — requiring transparent land valuation, administrative capacity, and legal certainty — but equally that the absence of LVC is never neutral: it constitutes a structural subsidy to land conversion that distorts investment decisions, accelerates sprawl, and erodes the fiscal capacity of urban governments.

2.3 The Post-Rentier Urban Investment Trap

Algeria's urban investment model exhibits a specific variant of the LVC deficit that we term the 'post-rentier urban investment trap'. In resource-rich economies, public investment in urban infrastructure is financed from hydrocarbon revenues rather than local taxation. This creates a structural decoupling between infrastructure provision and fiscal recovery: because the state does not need urban tax revenue to finance investment, it has limited institutional incentive to develop the legal and administrative machinery for LVC. The consequence is a compound failure: public investment creates private land-value windfalls without recovery; land conversion accelerates without fiscal constraint; and when hydrocarbon revenues decline — as they did after 2014 and again in 2020 — the urban fiscal base is insufficient to maintain the infrastructure previously built (Kharchi, 2025a; Belaid et al., 2021; World Bank, 2023).

Setif's trajectory over 2000–2025 embodies this trap with precision. The city's urban expansion was financed overwhelmingly from central government transfers — an estimated 15 billion dinars in a single infrastructure package during the period 2000–2010 — while the land-value windfalls generated by this investment accrued entirely to private landowners on the urban fringe. The 2022 Investment Law and the 2023 Economic Land Law represent the latest iteration of a legal framework that

prioritises investment facilitation over fiscal recovery, offering extensive tax exemptions to investors on designated land while providing no mechanism to capture the value those exemptions create (United Nations Conference on Trade and Development (UNCTAD), 2024; EY, 2024; Algerian Investment Promotion Agency (AAPI), 2024). Breaking this trap requires not merely technical fiscal reform but a reconceptualisation of the relationship between investment law and urban fiscal governance.

3. Spatial Dimensions of Land Conversion in Setif municipality (2000–2025)

3.1 The Three-Phase Pattern of Urban Expansion

As illustrated by Arif & Kharchi (2026), GIS-based cartographic analysis of satellite imagery (Spatial Thoughts & Earth Engine Data Catalog, 2026, processed with ArcGIS) permits precise documentation of Setif's land conversion dynamics across three distinct phases (Table 1; Figure 1). This phasing is not merely descriptive: each phase corresponds to a specific investment policy configuration that determined both the volume and the spatial direction of agricultural land loss.

Table 1

Setif municipality: Urban expansion vs. agricultural land loss (2000–2025)

Land-use Category	2000 (ha)	2010 (ha)	2025 (ha)	Change 2000–2025
Impervious surfaces (urban built-up)	2,763.79	3,770.64	4,464.54	+1,700.75 (+61.9%)
Cropland (agricultural land)	13,112.19	12,075.12	11,325.06	–1,787.13 (–13.6%)
Forest & shrubland	352.17	374.67	440.01	+87.84 (+24.9%)

Source: Arif & Kharchi, 2026.

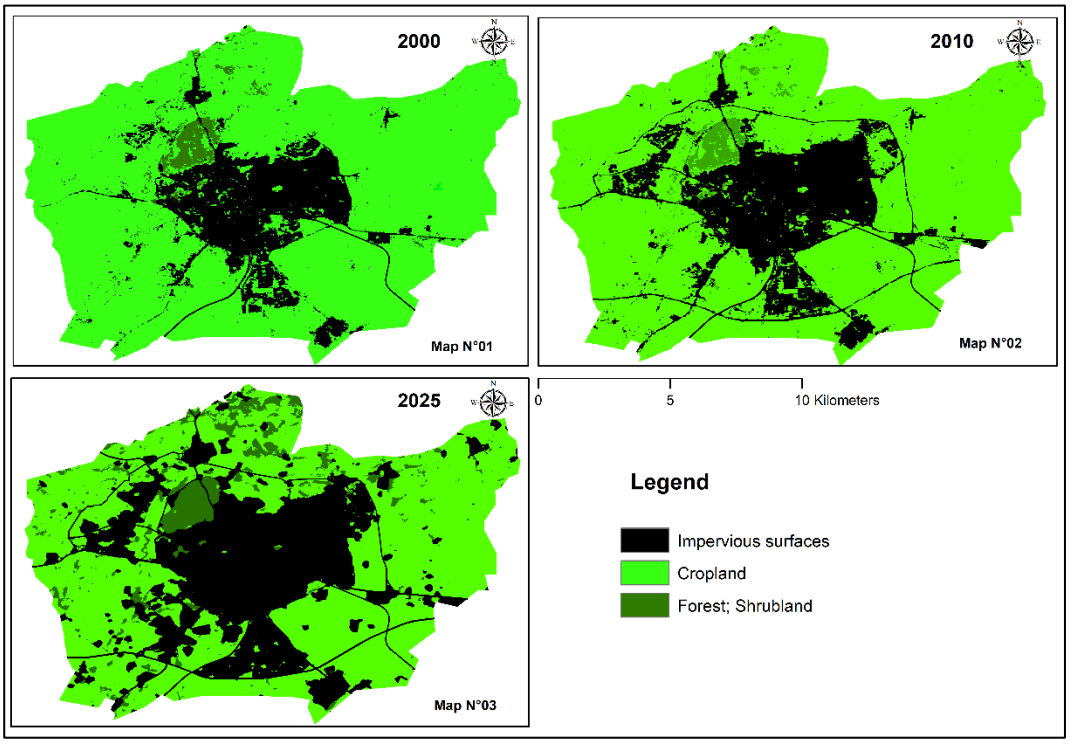

Figure 1. Urban sprawl and the depletion of agricultural land in Setif municipality (2000–2025)

Source: Arif & Kharchi, 2026. Slightly revised map for improved accuracy

Realised by: The authors, 2026.

Phase I (pre-2000) established the structural preconditions for subsequent conversion. The colonial grid (283 ha) was progressively engulfed by ZHUN (New Urban Housing Zones) mass housing estates and informal peri-urban settlements, bringing the built-up area to 2,763 ha by 2000 (Arif & Kharchi, 2026). Critically, the 1990 planning law (Law 90-29) introduced the PDAU (Master Plan for Development and Urban Planning) and POS instruments (Land Use Plan) — theoretically capable of governing land conversion — but was implemented too late and with insufficient enforcement capacity to constrain the informally-driven expansion already under way (Abu Qarin, 2020; Tajine, 2025).

Phase II (2000–2010) produced the most dramatic land conversion. Enabled by post-2001 hydrocarbon revenue recovery and a 15-billion-dinar infrastructure allocation, the built-up area expanded from 2,763 to over 3,770 ha — consuming 1,008 ha of predominantly cropland in a decade. The LSP programme alone delivered 45,887 housing units. Each of these locations required the extension of road networks, utility connections, sanitation infrastructure, and public transport — all financed from

central government allocations and none recovered from the private landowners whose land appreciated dramatically as a result (Arif & Kharchi, 2026).

Phase III (2010–2025) formalised a polycentric growth strategy through the 2012 inter-municipal PDAU, designating five peripheral growth poles totalling thousands of hectares. The AADL and LPA programmes delivered over 75,365 additional housing units. The 2018 tramway commissioning restructured urban mobility corridors and — consistent with well-established international evidence on transit-oriented development (TOD) (Calthorpe, 1993; OECD, 2022; Djouani et al., 2022) — generated substantial land-value appreciation along its route, entirely uncaptured by public revenue.

3.2. The Quality of Lost Agricultural Land

The fiscal significance of the cropland loss cannot be assessed without attention to land quality. Setif province is situated in one of Algeria's primary cereal production zones, where the region's characteristic black soils (terres noires) — deep, fertile, moisture-retaining vertisols — are recognised as among the most productive in the Maghreb (Camborieux, [1978]). Historical agricultural data from the DSA (Directorate of Agricultural Services) of Setif confirm that the irrigated area within the municipality declined from 488.75 ha in 2010 to just 286 ha by 2025 (DPAT and DPSB — Directorate of Planning and Land Use Management and Directorate for Budget Programming and Monitoring —, 2025), a 41.5% reduction in active agricultural operations against a backdrop of 1,787 ha of total cropland loss. This pattern suggests that conversion preferentially targeted the most accessible — and typically most fertile — peri-urban agricultural parcels (Figure 2), consistent with Brueckner's (2000) theoretical model of urban fringe dynamics in which agricultural land adjacent to urban infrastructure commands the highest conversion premium.

The agricultural productivity baseline matters for fiscal cost estimation. Setif province's average wheat yield of approximately 18–22 quintals per hectare (ONS, 2023), combined with current producer prices, implies annual agricultural output foregone in the range of 2.8–4.2 million dinars per converted hectare per year under continuous cultivation — figures that accumulate dramatically when compounded over 25 years of conversion. More critically, once sealed under concrete and asphalt, these soils cannot be reclaimed: the loss is permanent and intergenerational in its consequences.

3.3. The Infrastructure Extension Cost

Each wave of peripheral expansion required commensurate extension of urban infrastructure (Côte, 1979; Kharchi, 2023; Kharchi & Miossec, 2024): road networks, public transport, schools, universities, healthcare, sports facilities… (Figure 2). These achievements represent genuine public investment of substantial magnitude. They also

represent costs — both capital and recurrent — that were borne entirely by central government transfers, without any recovery mechanism from the private landowners and developers whose assets appreciated as a result.

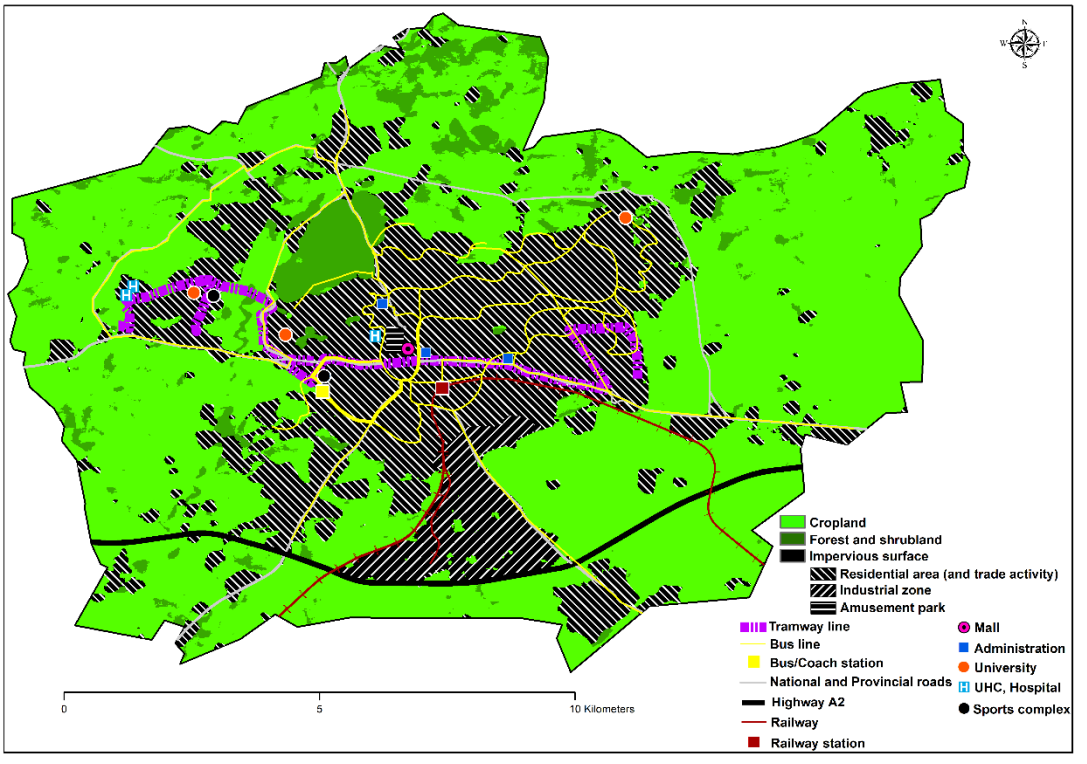

Figure 2. Spatial organization in Setif municipality: Infrastructure networks and land-use dynamics (2025)

Source of data: Authors, Spatial Thoughts global land cover data, Earth Engine Data Catalog, Humanitarian Data Exchange, DPAT-DPSB of Setif

Realised by: The authors, 2026.

International comparative data provide an order of magnitude for these extension costs. OECD (2022) estimates that the average cost of extending full urban infrastructure services to peripheral development in developing-country contexts ranges from USD 25,000 to USD 80,000 per hectare depending on topography, density, and distance from the urban core. For Setif's 1,787 hectares of Phase II–III expansion (2000–2025), applying this range at the prevailing USD/DZD exchange rate yields a conservative infrastructure extension cost estimate in the range of 6–19 billion Algerian dinars over the period — equivalent to approximately 2–6 times the annual resources of Setif municipality.

4. Algeria's Investment and Land-Use Law: A Fiscal Governance Gap

4.1. The Architecture of Non-Recovery

Algeria's legal framework governing urban land use and investment has evolved significantly since 1990, yet its fiscal architecture systematically fails to connect investment facilitation with fiscal cost recovery. Four legislative layers define this architecture (Table 2).

Table 2

Summary of fiscal governance gaps in Algeria's urban investment law

Legal Instrument	Relevant Provision	Fiscal Governance Gap
Law 90-25 (Land Policy)	Agricultural land protection; annual property tax 3–10% assessed value	No conversion tax; no betterment levy; property tax disconnected from planning decisions
Law 90-29 (Urban Planning)	PDAU/POS master plans; agricultural buffer zones; EIA requirements	No financial charge on land reclassification; no development impact fee; plan revision routinely retroactive
Law 22-18 (Investment, 2022)	Corporate tax exemptions; customs duty waivers; property tax exemptions in designated zones	No infrastructure cost recovery; no agricultural land premium; exemptions create negative LVC incentive
Law 23-17 (Economic Land, 2023)	State land allocation to investors via AAPI digital platform; streamlined access	No land-value capture mechanism; state land sold/allocated below market value; no betterment clause
Finance Acts 2022–2024	TAP abolished; IFU reduced to 0.5%; CIT at 10% for reinvesting firms	Progressive erosion of non-hydrocarbon fiscal base; no compensating urban land revenue mechanism

Source: Authors' analysis of Official Journal of the People's Democratic Republic of Algeria (JORADP), EY (2024), UNCTAD (2024), AAPI (2024), Globalex (2024).

Law 90-25 on Land Policy (1990) established the foundational framework for land ownership, transfer, and use. It distinguishes between state, collective, and private land, and mandates the protection of agricultural land. In practice, however, the law's agricultural protection provisions have been routinely overridden by investment and housing decisions taken under other legislative frameworks. The law contains no betterment levy, no conversion tax, and no mechanism for capturing the value generated by infrastructure investments in private land values (Globalex, 2024; World Resources Institute, 2020). Its property tax provisions — a 3–10% annual tax on assessed value (AAPI, 2024) — are structurally disconnected from land-use planning and generate insufficient revenue to influence conversion incentives.

Law 90-29 on Urban Planning (1990), introducing the PDAU and POS instruments, created the legal architecture for master plans and land-use regulation. The law mandates agricultural buffer zones and requires environmental impact assessment for major conversions. However, plan revision has systematically lagged behind development pressure, creating a pattern of retroactive legitimisation rather than prospective regulation (Arif & Kharchi, 2026; Tajine, 2025; Abu Qarin, 2020). The law imposes no financial charge on land reclassification: reclassifying agricultural land as urbanisable under a PDAU revision triggers no fiscal consequence for the private beneficiary of the planning gain, despite the fact that this reclassification decision is taken entirely by public authorities.

Law 22-18 on Investment (2022) and its implementing decrees represent Algeria's most recent attempt to attract private investment through fiscal incentives. The law provides extensive exemptions from corporate income tax, customs duties, and property tax for investment projects in designated zones (UNCTAD, 2024; EY, 2024).

The 2023 Economic Land Law (Law 23-17) further streamlined access to state-owned land for investors through AAPI's digital platform (AAPI, 2024; U.S. State Department, 2024). Neither law contains any mechanism to recover the infrastructure costs generated by investment projects, to charge investors for the agricultural land value consumed, or to capture the land-value increments created by public infrastructure investments on adjacent private parcels.

4.2. The Perverse Incentive Structure

The interaction of these four legislative layers produces a coherent — if unintended — incentive structure that systematically encourages agricultural land conversion. Consider the position of a peri-urban landowner in Setif in 2010. Her agricultural parcel, assessed at approximately 200,000 dinars per hectare for agricultural use, is subject to a nominal annual property tax of 6,000–20,000 dinars. A PDAU revision reclassifies the parcel as urbanisable. Its value immediately increases to 2–5 million dinars per hectare — a tenfold to twenty-fivefold appreciation — as a result of a public planning decision. The property tax assessment is not automatically updated to reflect this windfall. No betterment levy is triggered. No conversion tax is imposed. The entire planning gain accrues to the private landowner, who contributed nothing to the infrastructure investment that made urbanisation viable.

Meanwhile, the state that created this value — through road construction, utility extension, and tramway investment — must finance those investments from hydrocarbon revenues, since the local fiscal base is too narrow to support them. This is the post-rentier urban investment trap in its purest form: resource revenues subsidise private land appreciation while the public sector internalises the costs.

When hydrocarbon revenues decline, as they did after 2014 and again in 2020 (World Bank, 2023; International Monetary Fund (IMF), 2023; Kharchi, 2025a), the infrastructure previously extended to peripheral developments cannot be maintained, degrading the urban environment that the original investment was intended to create. The 2022 Investment Law deepens this perversity by adding a layer of tax exemptions on top of the existing LVC vacuum. An investor who develops an industrial zone on converted agricultural land benefits from property tax exemption, CIT (Corporate Income Tax) reduction, and customs duty waiver — public subsidies on public subsidies — while contributing nothing to the agricultural land value consumed, the infrastructure required, or the environmental externalities generated. The Finance Act 2024's abolition of the Taxe sur l'Activité Professionnelle (TAP — Professional Activity Tax) removes the last significant local business tax, further eroding the fiscal capacity of municipalities to address the consequences of the expansion they are administratively required to service (EY, 2024).

5. Estimating the Unaccounted Fiscal Cost: A Multi-Component Framework

5.1 Framework Architecture

We propose a four-component fiscal cost framework for quantifying the unaccounted public cost of urban land conversion in Setif (Table 3). The framework is explicitly conservative, using lower-bound estimates wherever parameter uncertainty exists, and its components are designed to be measurable from available data rather than dependent on heroic assumptions. The four components are: (C1) opportunity cost of lost agricultural production; (C2) infrastructure extension cost not recovered from beneficiaries; (C3) uncaptured land-value increment (planning gain); and (C4) long-term environmental externalities. Components C1–C3 yield annual monetary estimates; C4 is assessed qualitatively.

Table 3

Multi-Component Fiscal Cost Framework: Unaccounted Costs of Urban Land Conversion in Setif municipality (2000–2025)

Component	Definition and Measurement	Conservative Estimate (annual)	Data Basis
C1: Agricultural Opportunity Cost	Net annual value of agricultural production foregone on converted cropland (1,787 ha at average productivity of Setif's black soils)	5.0–7.5 bn DZD/yr (avg. yield 18–22 qt/ha; producer price ~150 DZD/kg)	DSA Setif; ONS (2023); DPAT-DPSB Setif
C2: Infrastructure	Annual amortisation of public infrastructure	28–45 bn DZD/yr (infrastructure	DPAT-DPSB Setif; OECD

Component	Definition and Measurement	Conservative Estimate (annual)	Data Basis
Extension Cost (Unrecovered)	extended to peripheral developments, with zero cost recovery from private beneficiaries	stock at OECD lower-bound $25,000/ha; 25-yr amortisation)	(2022); Authors' calculations
C3: Uncaptured Land-Value Increment	Planning gains accruing to private landowners from PDAU reclassification and proximity to public infrastructure, without betterment levy or LVC	12–22 bn DZD/yr (conservative 15% annual capture rate on estimated fringe appreciation of 1,200 DZD/m²)	Commercial real estate data; Kharchi (2025b); Authors' calculations
C4: Environmental Externalities	Carbon sequestration loss, water-table depletion, biodiversity loss, urban heat island effect — assessed qualitatively given measurement limitations	Not quantified (conservative exclusion); estimated global average 8–15% of C1+C2+C3	IPCC (2023); Burchell et al. (1998)
TOTAL (C1+C2+C3, annual)	Annual fiscal cost not reflected in public budgets or investment law frameworks	45–74.5 bn DZD/yr (~2–3.4% of Setif provincial GDP)	Provincial GDP: ~2,200 bn DZD (2023, ONS)

Notes: All figures are conservative lower-bound estimates in Algerian dinars (DZD). Exchange rate: 1 USD ≈ 135 DZD (2025 average). The framework is designed to be measurable from available administrative data. Authors' calculations based on sources cited.

5.2 Interpreting the Estimates

The aggregate annual fiscal cost of 45–74.5 billion dinars — equivalent to 2–3.4% of Setif provincial GDP — is striking not for its precision (which is necessarily approximate) but for its order of magnitude. It implies that the unaccounted cost of agricultural land conversion in a single provincial capital is comparable in scale to the entire annual education budget of Setif province. Cumulated over 25 years at compound interest, the total unaccounted fiscal loss approaches the equivalent of the tramway investment and the AADL housing programme combined. These are not marginal inefficiencies: they represent a structural transfer of public wealth to private landowners, institutionalised in the design of investment law.

Two features of the estimate deserve particular attention. Component C3 — the uncaptured land-value increment — is theoretically the most tractable for fiscal recovery, since it represents a gain that the public sector itself created and could straightforwardly claim through LVC instruments without distorting productive investment. The 127% increase in night-time light intensity documented around El Eulma (Kharchi, 2025b) and the 255% increase in commercial real estate prices documented in the same corridor indicate that land-value appreciation from public infrastructure in the Setif region is not marginal: it is explosive. A betterment levy capturing even 20% of this appreciation would represent a transformative source of urban fiscal revenue.

Component C1 — the agricultural opportunity cost — illustrates a different dimension of the fiscal governance failure. Algeria spent billions of dinars annually on agricultural subsidies under the PNDAR (National Agricultural and Rural Development) programme to support cereal production (Bessaoud et al., 2019; Bouzid et al., 2018; Kharchi, 2025a), while simultaneously failing to prevent the conversion of the country's most productive cereal-growing land to urban uses (Colin & Daoudi, 2022) . This contradiction reflects the compartmentalisation of policy — agricultural, urban, and investment — in separate ministries with uncoordinated mandates. An integrated fiscal framework would internalise the agricultural opportunity cost into urban land conversion decisions, making the contradiction visible and financially consequential.

6. A Land Value Capture Framework for Algeria: Institutional Design

6.1 Design Principles

Designing effective LVC instruments for Algeria requires departing from the implicit assumption that the relevant model is that of advanced economies with mature land markets, sophisticated cadastral systems, and independent judiciaries. Algeria's institutional architecture — a centralised state, an underdeveloped banking and real estate data infrastructure, a large informal sector, and a legal tradition inherited from the French civil law system — calls for instruments that are simple to administer, legally robust within the existing framework, and politically feasible given the distributive sensitivities of urban land reform.

Four design principles guide the framework proposed here. First, incrementalism: the framework should build on existing legal instruments rather than requiring wholesale legislative overhaul. The existing property tax, registration fees, and PDAU system provide foundations that can be adapted. Second, automaticity: LVC should be triggered by observable legal events (PDAU reclassification, building permit issuance, infrastructure commissioning) rather than requiring case-by-case administrative discretion, which creates rent-seeking opportunities. Third, revenue earmarking: LVC revenues should be constitutionally or legislatively earmarked for urban infrastructure and green space, creating a visible fiscal link between land conversion

and its consequences. Fourth, progressivity: the burden should fall primarily on windfall gains rather than on productive investment, preserving the investment facilitation objectives of the 2022 Investment Law.

6.2 Three Proposed Instruments

Building on these principles, we propose three complementary instruments, each designed to address a specific component of the fiscal cost framework (Table 4).

Table 4
Proposed Land Value Capture Instruments: Design Parameters and Revenue Estimates

Instrument	Trigger Event	Rate / Base	Revenue Estimate (Setif, annual)	Legal Vehicle
Agricultural Conversion Tax (ACT)	PDAU reclassification: agri → urbanisable	25–30% of planning gain (post-minus pre-reclassification assessed value)	3–6 bn DZD per PDAU cycle	Amendment to Code de l'Enregistre-ment
Development Impact Fee (DIF)	Building permit issuance above minimum threshold	Per-hectare charge by zone type; higher for peripheral locations	8–15 bn DZD/yr at current development rates	New implementing decree under Law 90-29
Transit Betterment Levy (TBL)	Commissioning of major infrastructure (tramway, motorway, campus)	15% of documented land-value appreciation within 500m impact zone	Tramway alone: 4–8 bn DZD over 20 years	Contribution spéciale in infrastructure programme legislation
Combined Revenue Potential	—	Conservative aggregation; no double-counting	15–25 bn DZD/yr (0.7–1.1% prov. GDP)	Earmarked to Urban Infrastructure Fund

Notes: Revenue estimates are conservative and based on current development rates and land values. DZD = Algerian dinars. Authors' calculations based on DPAT-DPSB Setif data, Kharchi (2025b), and comparative international benchmarks.

Instrument 1 — Agricultural Conversion Tax (ACT). Applied at the moment of PDAU reclassification from agricultural to urbanisable land, the ACT would charge landowners a percentage of the difference between the pre- and post-reclassification assessed value. Set at 25–30% — a rate consistent with Colombian and Brazilian betterment levy practice (Smolka, 2013) — the ACT would generate an estimated 3–6 billion dinars per major PDAU revision cycle in Setif, while preserving most of the planning gain for landowners. The ACT would be collected by the Direction des Impôts de Wilaya and credited to a provincial Urban Infrastructure Fund. Legally, it can be structured as an extension of the existing droits d'enregistrement (registration duties), requiring amendment to the Code de l'Enregistrement rather than new primary legislation.

Instrument 2 — Development Impact Fee (DIF). Applied at the building permit stage for all residential, commercial, and industrial developments above a minimum threshold, the DIF would charge developers a per-unit or per-hectare contribution to the cost of infrastructure extensions required by their project. The French taxe d'aménagement provides the immediate legal precedent, given Algeria's civil law inheritance. The DIF would be calibrated by infrastructure type and development location, with higher rates for peripheral locations requiring longer infrastructure extensions. Conservative estimates suggest a DIF generating 8–15 billion dinars annually in Setif municipality at current development rates, without materially affecting the economics of compliant projects.

Instrument 3 — Transit Betterment Levy (TBL). Specific to infrastructure projects of demonstrable land-value impact — tramways, motorways, university campuses, hospitals — the TBL would capture a share of the documented land-value appreciation within a defined radius of the infrastructure project. Given the 127% and 255% land-value appreciations documented in the Setif corridor (Kharchi, 2025b), a TBL capturing 15% of this appreciation within 500m of the tramway route would represent a transformative revenue source, potentially recouping 30–40% of the tramway's capital cost over a 20-year period. The legal instrument can be structured as a 'Contribution spéciale d'infrastructure', integrated into the implementing legislation for future infrastructure programmes.

6.3 Integration with Algeria's Investment Law Reform Agenda

The three instruments are designed to be compatible with — and in some respects reinforcing of — Algeria's current investment reform agenda. The 2022 Investment Law's fiscal exemptions for productive investment need not be repealed: they can coexist with LVC instruments if the exemptions are restructured to apply to taxes on productive income rather than taxes on land-value windfalls. An investor developing a manufacturing facility retains full CIT exemption on profits; she pays a DIF for the infrastructure her development requires and an ACT if her land was recently

reclassified. This design preserves investment incentives while eliminating the subsidy to land conversion — precisely the distinction that productive investment law should make.

The 2023 Economic Land Law's AAPI digital platform provides a potentially powerful administrative foundation for LVC implementation. A platform that tracks land allocations, permits, and infrastructure investments could be extended to calculate and collect ACT, DIF, and TBL obligations automatically at the relevant trigger events. The World Bank's (2020) experience with digital LVC platforms in East Africa and South Asia suggests that automated calculation significantly reduces the administrative burden and rent-seeking opportunities associated with manual assessment. For Algeria, where administrative capacity is a genuine constraint, this digital route to LVC implementation may be more feasible than conventional paper-based approaches.

Finally, the framework addresses a structural weakness in Algeria's fiscal decentralisation. The abolition of the TAP (Finance Act 2024) removed the principal local business tax without providing a substitute for municipal revenue. LVC revenues earmarked to provincial and municipal Urban Infrastructure Funds would partially offset this loss, while creating a fiscal incentive structure that aligns local government interests with sound land-use governance. A municipality that can capture a share of the land-value appreciation its planning decisions create has a direct fiscal interest in preventing wasteful conversion — the inverse of the current perverse incentive that rewards expansion without accountability.

7. CONCLUSION

This article has demonstrated that the fiscal cost of urban land conversion in Setif municipality is not a marginal inefficiency but a structural feature of Algeria's investment law architecture — one that transfers 45–74.5 billion dinars of public value annually to private landowners while leaving municipalities without the fiscal resources to maintain the infrastructure they have been required to extend. The 1,787 hectares of cropland lost between 2000 and 2025 represent not merely an environmental loss but a permanent fiscal asset destroyed without recovery.

Three original contributions emerge from the analysis. The multi-component fiscal cost framework provides, for the first time, a systematic quantification of the unaccounted fiscal consequences of urban land conversion in an Algerian city, using conservative assumptions and publicly available data. The legal analysis identifies the specific provisions of Laws 90-25, 90-29, 22-18, and 23-17 — as well as the Finance Acts 2022–2024 — that together create what we term the 'post-rentier urban investment trap'. And the three-instrument LVC reform proposal — Agricultural Conversion Tax, Development Impact Fee, and Transit Betterment Levy — offers a technically feasible, legally grounded, and institutionally compatible path to reforming

Algeria's urban fiscal governance without dismantling its investment promotion framework.

The implications extend beyond Algeria. Any hydrocarbon-dependent economy where public infrastructure investment generates private land-value windfalls without LVC mechanisms faces a version of this trap. The Gulf states, with their vast state-funded urban expansion programmes, the North African economies navigating post-Arab Spring institutional reform, and sub-Saharan African countries deploying Chinese infrastructure loans without domestic fiscal recovery mechanisms all share the structural vulnerability identified here. The post-rentier urban investment trap is a general feature of a specific investment law design, and its resolution requires the same combination of fiscal, legal, and administrative reform in each case.

Three directions for future research follow from this analysis. First, a cross-country comparison of LVC instrument performance in Maghreb economies — extending the framework to Morocco's TDU (taxe sur les droits d'urbanisme) and Tunisia's recent municipal finance reforms — would test whether the Algerian case represents a regional pattern or an outlier. Second, a firm-level survey of investor behaviour in Setif's industrial zones would permit direct estimation of the elasticity of investment to LVC charges, providing the empirical foundation for calibrating DIF and ACT rates to balance fiscal recovery with investment facilitation. Third, a longitudinal tracking study of land values along the Setif tramway corridor, using the night-time luminosity methodology employed by Kharchi (2025b), would generate the empirical basis for calibrating the Transit Betterment Levy and evaluating its revenue potential as the network matures.

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