PROSPECTS FOR THE INTRODUCTION OF ENVIRONMENTAL (GREEN) INDIRECT TAXES IN THE REPUBLIC OF KARAKALPAKSTAN

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Abstract. The Republic of Karakalpakstan faces acute environmental and socio-economic challenges stemming from the collapse of the Aral Sea ecosystem. In this context, the introduction of green indirect taxes presents a promising fiscal tool to promote sustainable development. This paper explores the potential for implementing environmental taxes in Karakalpakstan, drawing on global experiences and Uzbekistan's emerging climate policies. It examines the structure and purpose of green taxes—such as carbon taxes, pollution charges, plastic and packaging levies, and water resource taxes—as instruments that can correct market failures, reduce environmental harm, and generate revenue for green investment. International case studies, including those from Sweden, Germany, and Kazakhstan, demonstrate that environmental fiscal reform can yield both ecological and economic benefits. The paper concludes that well-designed green indirect taxes could play a critical role in addressing Karakalpakstan's environmental crisis, especially if tailored to local conditions and integrated into broader policy reforms.

Keywords: Green taxation, environmental fiscal policy, indirect taxes, Karakalpakstan, Aral Sea, pollution charges, carbon tax, water resource tax, plastic tax, sustainable development, Uzbekistan, environmental economics, fiscal instruments.

Introduction. The Republic of Karakalpakstan, located within Uzbekistan, is grappling with severe environmental and socio-economic challenges, most notably stemming from the near-collapse of the Aral Sea ecosystem. This ecological disaster has triggered a cascade of consequences, ranging from widespread soil salinization and acute water shortages to toxic dust storms and public health crises, that continue to undermine regional development and human well-being. In this precarious context, the introduction of green (environmental) indirect taxes emerges as a fiscally and ecologically sound policy instrument capable of realigning economic incentives toward sustainability. By internalizing the external costs associated with pollution and resource overuse, such taxes can help reduce environmental harm while simultaneously enhancing government revenue for reinvestment in green infrastructure and social programs. Building upon international experiences from countries like Sweden, Germany, and Kazakhstan, which have effectively implemented carbon pricing, plastic levies, and pollution charges, this paper evaluates the feasibility of adopting similar measures in Karakalpakstan. The central premise is that well-calibrated, progressively structured green taxes could yield "double dividends": mitigating environmental degradation and stimulating fiscal sustainability. However, considering Karakalpakstan's economic vulnerability, reliance on energy-intensive industries, and limited regional autonomy in fiscal policymaking, any proposed reform must be carefully designed to ensure administrative feasibility, social equity, and political acceptance. This study aims to contribute to the emerging discourse on green fiscal policy in Uzbekistan by offering a localized, evidence-based framework for introducing environmental indirect taxes that are both practical and transformative in nature.

Research methodology. This study uses a qualitative approach combining theoretical analysis, case comparisons, and policy review to evaluate the potential for introducing green indirect taxes in Karakalpakstan. It draws on the principles of environmental economics, particularly Pigouvian taxation, to develop the conceptual framework. The study reviews international case studies from countries like Sweden, Germany, and Kazakhstan to assess the applicability of green tax models in Karakalpakstan's context. It also analyses Uzbekistan's existing fiscal and environmental frameworks, focusing on pollution charges, the Budget Code, and water use laws. Additionally, the study examines the region's environmental challenges, economic reliance on subsidized resources, and administrative capabilities. Finally, scenario-based analysis is employed to predict the impacts of various green tax structures, with a focus on environmental, economic, and social equity outcomes, leading to tailored policy recommendations.

Literature review. The Aral Sea region has been catastrophically transformed by Soviet-era irrigation projects. Once the world's fourth-largest inland lake, the Aral Sea

has mostly dried up. Its southern basin lies in Karakalpakstan, home to roughly 1.5 million people, who have borne the brunt of this ecological disaster [1]. Salt and contaminant laden dust storms now scour the region, and water scarcity is extreme. In Karakalpakstan over 70% of irrigated land is now salinized, cutting agricultural yields by 30–50%. Local drinking water is highly mineralized and polluted, contributing to anaemia and other serious health problems [2]. This background underscores why sustainable fiscal tools are needed: the region's economy and communities cannot thrive under ongoing environmental decline.

Fiscal policy can play a vital role in sustainable development. Green fiscal policy uses taxes and budgetary tools to address environmental challenges like climate change, pollution and resource depletion. In effect, environmental taxes shift economic incentives toward cleaner production and consumption. By putting a price on carbon emissions or plastic waste, for example, governments can internalize external costs – aligning private incentives with public environmental goals. Renowned economists describe green taxes as targeting polluters and correcting market failures: "green taxation… seeks to internalize external costs, remediate market resource allocation flaws, and boost economic efficiency" [3]. Practically, these indirect taxes come as levies or excises on harmful inputs or products. For instance, many countries impose carbon or fuel taxes, plastic packaging levies, and pollution charges on industrial emissions or waste. Such measures "correct price signals and help shift consumer and business behaviour towards more sustainable patterns". In line with this approach, Uzbekistan's recent climate strategy explicitly notes that the government "could strengthen market incentives… such as a carbon tax" to reduce emissions [4]. Thus, green indirect taxes are conceived as excise taxes or fees on activities that harm the environment, rather than on income, with the twin goals of reducing harm and raising revenue for green investment.

Analyses and results. Green indirect taxes can take several forms, each targeting a particular pollutant or unsustainable practice. Examples include:

Carbon/Energy Taxes: Levies on fossil fuels or carbon content (e.g. a per-ton tax on CO_2 or higher fuel excises) aim to curb greenhouse gas emissions. Sweden's high carbon tax is a classic example: it helped cut that country's CO_2 emissions by roughly 25% over a decade. Likewise, eco-tax reforms in Germany have driven major investments in renewable energy [5]. In practice, carbon taxes raise the price of gasoline, coal, and other carbon-intensive goods to encourage efficiency and clean energy adoption.

Plastic and Packaging Taxes: These are excise taxes or fees on single-use plastics and packaging materials. Many governments now tax plastic bags or containers to discourage waste. (For instance, Uzbekistan is planning an extended producer responsibility scheme and deposit-return plan for plastics by 2026–2027) [6]. Revenue

from such taxes can fund recycling programs and public awareness campaigns.

Pollution Charges: These are fees imposed on firms for discharging pollutants above legal limits. Uzbekistan's law, for example, already requires industrial polluters to pay for emissions and waste disposal, with 80% of those payments allocated to local budgets (including Karakalpakstan's). Such charges can cover air and water pollution, toxic waste, and other environmental damage.

Waste and Landfill Taxes: Governments often tax landfill use or waste disposal to encourage reduction and recycling. Households and businesses pay higher fees for sending waste to dumps, pushing them toward waste minimization or sorting.

Water Resource Taxes: Since Karakalpakstan suffers severe water stress, a tax on water abstraction or irrigation can also be considered an environmental levy. Indeed, Uzbek law currently includes "taxes for the use of water resources" as a revenue item. Charging for water use internalizes its scarcity cost and can fund water-saving measures.

Each of these taxes is typically built into existing excise or fee systems, making them indirect (paid at point of sale or discharge). They are distinguished from direct taxes (income or property tax) because they target goods or activities. Their effectiveness depends on setting rates high enough to change behaviour and covering as many sources of pollution as practical.

Globally, experience shows that green taxes can reduce pollution and raise revenues, but progress has been uneven. In the European Union, environmental taxes are a well-established tool: on average they account for about 5–6% of total tax revenue. For example, OECD countries devote roughly 6.7% of tax receipts to environmental taxes (about 2.3% of GDP in 2017). These revenues come mostly from energy and transport taxes (72% of environmentally related tax revenue in OECD). Sweden and Germany are classic success stories: Sweden's carbon tax helped cut emissions by a quarter, and Germany's eco-taxes greatly expanded its renewable energy sector. Denmark's environmental taxes similarly facilitated a booming wind industry. In short, countries with long-standing green taxes have seen measurable environmental gains alongside growth in clean industries and jobs.

Outside Europe, several nations have adopted green levies. Many OECD members have carbon or fuel taxes (Canada, Japan, Korea, etc.), and some levy plastic or landfill fees (Ireland, France, and others have plastic bag taxes). Notably, China launched a national emissions trading system, and Asian countries like Singapore apply carbon taxes on power plants. In Central Asia, Kazakhstan introduced a cap-and-trade system in 2013, and Uzbekistan has begun piloting carbon trading and considering carbon taxes in sectors like mining and transportation. A recent study for Kyrgyzstan found that a carbon tax (e.g. $50/ton) could generate hundreds of millions of dollars annually for reinvestment in clean energy and social programs. In summary,

international practice suggests substantial potential for environmental taxes – but also highlights the need for careful design.

Karakalpakstan, as an autonomous republic within Uzbekistan, shares its national fiscal framework. The state budget is divided into two levels: the republican (national) budget and a regional budget for Karakalpakstan (along with regional and city budgets). Karakalpakstan thus has a formal budget, with revenue sources partly determined by national law. Local budgets receive a share of many "national" taxes according to set standards, plus genuinely local taxes (such as property and land taxes, and local excise shares). Uzbekistan's Budget Code explicitly credits taxes on water use to the local budgets. In practice, Karakalpakstan's revenue comes from centrally-collected taxes (VAT, corporate and individual income tax) apportioned by formula, and from local levies set by regional authorities.

Importantly, Uzbekistan's laws already impose some environmental fees. For example, firms must pay charges for discharging contaminants or waste beyond allowed limits. By law, 80% of such pollution charges are transferred to the budgets of Karakalpakstan and other regions. Thus, Karakalpakstan does receive funds when local businesses pollute above norms. Likewise, water use charges are collected from irrigators and allocated to local budgets. However, these mechanisms are relatively narrow: they address acute polluters rather than broad consumption.

Currently, there are no dedicated green taxes on carbon emissions or plastic goods in Karakalpakstan (nor in Uzbekistan). Most energy and water prices remain heavily subsidized, so market signals for conservation are weak. For instance, Uzbekistan's long-standing fuel and electricity subsidies have kept prices far below cost, encouraging wasteful energy use. The government has only recently begun tapering these subsidies. As a result, introducing a carbon tax or new excise on plastic products would be a significant shift. On the revenue side, Karakalpakstan's local authorities have limited scope to raise new taxes unilaterally – major rates and excises are set at the national level. In sum, the existing fiscal framework offers some environmental fees (polluter charges, water taxes) but lacks the broader green tax instruments found elsewhere. This gap points to an opportunity: designing new indirect taxes could strengthen Karakalpakstan's own budget (in a progressive way) while advancing sustainability.

Benefits: Introducing green indirect taxes could yield multiple gains for Karakalpakstan. First, they would help reduce environmental damage directly. International experience shows that carbon pricing and pollution fees can cut emissions and improve air and water quality. For example, Sweden's carbon tax drove a 25% cut in its emissions, and Germany's eco-tax reforms spurred renewable energy growth [5]. Karakalpakstan could similarly curb dust and toxic runoff by taxing industrial emissions and fossil fuels. Second, green taxes generate revenue that can be earmarked

for environmental and social projects. In the Kyrgyz study, a moderate carbon tax was projected to raise the equivalent of several percent of GDP (hundreds of millions of dollars). In Karakalpakstan's context, even a smaller carbon or plastic levy could finance water treatment, healthcare, or rural investment. Third, green taxes spur innovation and efficiency. Countries with mature green tax systems often see growth in clean-tech industries. In Denmark and Germany, for instance, green levies have accompanied a surge in wind and solar power production. Karakalpakstan's economy (which includes agriculture and some energy extraction) could diversify as businesses seek cleaner methods to lower their tax burden. Finally, environmentally, fewer pollutants would mean public health benefits – potentially reducing the anemia and respiratory illnesses now linked to the Aral crisis.

Challenges: There are significant hurdles to implementing such taxes. A prime concern is economic competitiveness and equity. Karakalpakstan's economy still relies on energy-intensive activities (e.g. cotton ginning, regional manufacturing) and many poor households depend on cheap energy. A sudden jump in energy or fertilizer prices could hurt those sectors and families. Studies of Russia (a resource-driven economy) warn that high environmental taxes can raise costs for industries and risk job losses if not managed carefully. Likewise, green taxes are often criticized as regressive, impacting low-income people disproportionately. If a carbon tax raises fuel or electricity bills, poor families could bear a heavier share of the burden. Without countermeasures, this could exacerbate poverty in an already vulnerable region. Administratively, the government would need new capacity: measuring emissions, collecting new taxes, and enforcing compliance. As analyses from Central Asia note, weak legal frameworks and low public awareness can slow implementation. Indeed, Uzbekistan's officials themselves stress the need for clear rules and pilot programs when introducing carbon pricing. There is also a political dimension: residents accustomed to subsidized energy may resist price hikes. Overcoming skepticism will require transparency and effective communication. Finally, there is the risk of fiscal trade-offs: if the green tax base (like fuel sales) shrinks too fast, revenues might fall, so careful calibration and medium-term planning are needed. In summary, while the environmental and fiscal "stick" has power, it must be wielded with supportive measures (subsidy reform, credits, international aid) to succeed.

Conclusion and suggestions. Introducing green indirect taxes in Karakalpakstan has the potential to advance sustainable development, but success will hinge on thoughtful design and complementary policies. Based on global evidence and the local context, the following measures are recommended:

Phase in taxes gradually, targeting high-impact sources. Start with pilot schemes on a few sectors (e.g. industrial energy use or trucking fuel) to test administration and gauge effects. This aligns with regional advice to begin carbon pricing in key industries

and build up over time.

Use revenues strategically. Earmark tax income for environmental and social programs. For instance, a portion could fund irrigation efficiency, dust-control projects, or healthcare clinics. As in Sweden, some carbon tax proceeds should be recycled to protect households and stimulate green growth. In practice, that means reducing other taxes or providing rebates so that the overall system remains progressive.

Implement compensatory measures for equity. To shield the poor, introduce targeted relief (such as tax credits, utility bill subsidies, or direct transfers) for low-income families and small farmers who might otherwise struggle with higher energy or plastic costs. Such measures ensure that the burden of green taxes does not fall unfairly on those least able to pay.

Strengthen administrative capacity and legal framework. Develop clear legislation and institutional arrangements for green taxes. Train tax and environmental officials to monitor emissions and collect the new levies. Implement robust reporting and verification systems. This approach follows experts' recommendations to build the necessary technical foundation.

Engage stakeholders and raise awareness. Involve businesses, farmers, and civil society early on to explain the rationale and benefits of green taxes. Public dialogue can build trust and preempt opposition. Educational campaigns can illustrate how pollution taxes improve health and local environments, creating buy-in for the reforms.

Coordinate with national reforms. Align Karakalpakstan's measures with Uzbekistan's broader climate and fiscal strategies. For example, as the country phases out energy subsidies, ensure that new price signals are coupled with green taxes so they reinforce each other. Seek international technical and financial support (e.g. from the World Bank, UN, or regional donors) to help fund the transition and apply best practices.

Monitor and adapt. Establish mechanisms to evaluate the environmental and economic impacts of the taxes. Adjust rates or exemptions as needed. This adaptive management will help ensure that green taxes remain effective and fair over time.

In summary, while Karakalpakstan faces unique challenges (the legacy of the Aral disaster and economic hardship), it also has a strong incentive to innovate. Well-designed indirect green taxes – introduced incrementally and combined with supportive policies – can help transform economic incentives, protect health, and finance ecological recovery. Global evidence and regional analyses underscore that this path can yield "double dividends" of better environmental outcomes and sustainable growth. For Karakalpakstan, taking these steps could mark a turning point: leveraging fiscal policy to restore the land and foster a greener, more resilient future for its people.

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