Green Development in the Seven Provinces

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Abstract

Nepal is an extraordinarily biodiverse country, ranking among the top 50 globally, and this ecosystem vitality offers a wide range of opportunities for green development. However, like many countries, Nepal has traditionally followed narrow, extractive, and agriculture-based development models that often overlook long-term environmental and social resilience. This short-term thinking toward economic development, coupled with high susceptibility to natural disasters, puts Nepal in a vulnerable position in the face of climate change. By strengthening governance and emphasizing climate adaptations in external and internal investments rather than focusing solely on mitigation, Nepal can build more resilient communities while protecting the natural capital on which its development is built. Prioritizing socially-responsible renewable energy resources and ecotourism would not only reduce environmental harm, but also create inclusive, sustainable economic opportunities.

Introduction

As climate change becomes more widely recognized as the dire issue it is, countries face different levels of emergency. Due to its location, infrastructure, and economy, Nepal "has both a great need for investment and innovations to improve readiness and a great urgency for action" (NDGAIN, n.d.). Maplecroft's Climate Change Vulnerability Index ranked Nepal as 4th most vulnerable to the impacts of climate change. Despite its vulnerability, Nepal remains one of the lowest contributors to greenhouse gas emissions, emitting only 0.027% of total global emissions. Due to Nepal's dependence on agriculture and status as a landlocked country, "remaining low carbon is not a choice but a necessity" (Karki, 2014).

Nepal has already faced many disasters, both from climate change and poor planning. As temperatures rise, glacier melt in the Himalayas is flowing into flood plains. Massive flooding in 2008 affected 50,000 in Nepal and 3.5 million in North Bihar, damaging infrastructure and rendering fields unfit for crops for years to come. This flood, however, was not due to abnormal rains; mismanagement had left the flood control embankments without repairs since being built in the 1950s. In 2015, earthquakes killed more than 8,900 people - 33% of which were children. UNICEF found that "over 86% of households in the country [have] reported [experiencing] droughts … in the past 25 years" (UNICEF, n.d.). Natural disasters have led to degraded lands and disappearing biodiversity.

As the frequency of natural disasters increases, the poor adaptive capacity of the population leads to exacerbated social inequalities. There is widespread poverty among mountain inhabitants, with 25% of households in rural Nepal living below the poverty line (Prasain, 2024). The environment of the mountain regions has been the most abused; facing deforestation for road

building, residential construction, and industrial development - leading to slope instability and increasing the risk of landslides.

To appropriately adapt to climate change, Nepal must prioritize green development. Green development is defined as an approach that "considers economic growth, the environment and energy conservation" (Hu & Zhou, 2014). This requires considering the context of each country - what is sustainable for its region, what its economy requires, and what its starting point is. Green growth will foster "economic growth while reducing environmental degradation, increasing resource efficiency and promoting biodiversity" (Fan, 2023). Green development generally refers to the building / financing of green infrastructure, green cities, green businesses, sustainable mobility, renewable energy, and more.

With the National Adaptation Plan (NAP), Nepal has introduced green development as a national priority. This is essential, as Nepal is a highly biodiverse country, ranking among the top 50 globally; biodiverse countries are often more vulnerable to the effects of climate change. However, the country has faced persistent gaps between policy, implementation, and completion of projects. This paper aims to analyze the needs of Nepal's seven provinces, perform a comparative analysis between Nepal and notable countries, and make informed policy and development recommendations.

Background on the Seven Provinces

Koshi province (Province 1) often suffers from water-related environmental challenges; in many areas of the province, flooding and drought affect human development and agriculture. Due to Mount Everest's location in the Koshi province, the government's priority is the impact of climate change on the mountaineering tourism industry. The allure of Everest brings in "more than 52,000 trekkers and climbers annually [to the] national park … [and roughly] 450 climbers attempt to summit Everest every year" (Mongabay, 2024). According to the most recent Koshi Darpan Journal, preserving the mountains is a top concern in the face of climate change. Mount Everest is a popular tourist destination that could be developed toward ecotourism. Abundant rivers provide immense potential for the development of hydropower capacity. However, because of the prevalence of natural disasters and the mountainous region, it is difficult to set up hydropower systems. In May 2025, the first Koshi Investment Conference was held. The vast majority of investment commitments - which totalled 7.5 billion USD for 46 projects - went toward waste management projects. While this is a significant commitment, there is no indication of when these projects will begin.

Madhesh province (Province 2) is notably dependent on small-scale farming, and agriculture is a main concern in the face of climate change. As rising temperatures, flooding, and droughts become more prevalent, many citizens will face food and economic instability. These environmental issues are worsened by poor development practices; in June 2025, a representative from the United Nations Development Programme asserted that "disaster risk is being increased, not reduced, by the way development is currently being carried out" in Madhesh, highlighting how poorly planned projects have threatened natural resources and amplified community-level vulnerabilities (The Kathmandu Post, 2025). The current opportunities being pursued in

Madhesh largely focus on agriculture; for example, a project funded by the National Farmers' Group Federation aimed to train women and girls in rural Madhesh on climate-smart agricultural practices (Care Nepal, 2024). Research supports women-focused development, as environmental degradation disproportionally affects women and girls (Women's Environment and Development Organization, 2021). However, this project was completed in February 2025, and few green development initiatives have emerged in Madhesh since. The most prominent barrier to progress in Madhesh is poor coordination between local government, national government, and development agencies. Madhesh also faces several challenges related to information and data. While projects from larger NGOs and IGOs provide some insight into community-level resilience efforts, there is little data on the long-term impact of most recent development projects.

Bagmati province (Province 3), home to Nepal's capital city, Kathmandu, ranks highest among all provinces in many socio-economic indicators. However, the province also faces significant vulnerabilities. Notably, undernourishment and stunting rates exceed the national average, with the stunting rate nearly triple the national figure. These health indicators are closely tied to persistent challenges in agricultural productivity and food security, especially in rural areas (SDG Road Map - Bagmati Province, 2020). In addition, districts in the province—such as Sindhuli, Ramechhap, and Makwanpur—suffer from extremely low household electrification rates, with access reaching only about 25% in some remote areas, according to the province's SDG report. This energy poverty has ripple effects on health, particularly for women and children, and limits educational and economic opportunities for low-income households. Furthermore, Bagmati is highly prone to natural disasters, which pose serious risks to agriculture, infrastructure, and overall public safety. Despite these challenges, the presence of Kathmandu

positions Bagmati as a hub for innovation in sustainable infrastructure, waste management, and clean energy. Ongoing initiatives like GreenShift Nepal (Restless Development, 2024) aim to promote a circular economy and achieve carbon neutrality through improved waste practices. The province also has potential to expand ecotourism, leveraging its urban and natural landscapes to attract environmentally conscious visitors. The severe disparities between urban and rural access to services poses an important barrier to progress. Limited agricultural capacity continues to undermine food security and nutritional outcomes. Finally, there are significant challenges with information and data. While Bagmati province has articulated many green development goals, such as building poor communities' resilience to natural disasters or drastically decreasing malnutrition rates, it is unclear how much progress has been made toward these goals.

Gandaki province (Province 4) faces several vulnerabilities that limit sustainable development. Limited access to electricity remains a major concern, leading to high household reliance on fossil fuels for cooking and heating. This dependence contributes to environmental and health risks. Similarly to other provinces in Nepal, Gandaki also experiences widespread malnutrition and stunting among children, reflecting systemic issues in public health and nutrition. Despite these issues, Gandaki has considerable opportunities for green development. The province is home to Pokhara, recognized as the Tourism Capital of Nepal by The Kathmandu Post, and benefits significantly from nature-based tourism due to its stunning geography, including the Annapurna and Dhaulagiri mountain ranges. These ranges also provide exceptional potential for hydropower development. As of March 2023, there are 196 expected hydropower projects in Gandaki, alongside 8 solar and 2 wind energy projects. Notably, the province already produces nearly 50% (SDG Report - Gandaki Province, 2019) of Nepal's total hydropower, indicating its

role as a key contributor to the national energy grid. Gandaki faces barriers to fully realizing these opportunities; the transition from fossil fuels to renewable energy remains difficult due to ingrained household energy practices and a lack of infrastructure in rural and mountainous areas. In terms of challenges with information and data, Gandaki is relatively strong, as it has the most extensive material on research priorities among Nepal's provinces. However, while many energy projects are planned, more detailed information is required to evaluate their timelines, feasibility, and sustainability.

Lumbini province (Province 5) is the birthplace of the Buddha and has been a UNESCO world heritage site since 1997; this status means it has been developed as a pilgrimage site and is protected by UNESCO's management. Lumbini's biggest vulnerability is its forests, as the province has been dealing with degradation at the hands of the lumber industry. To combat deforestation, the government implemented the Lumbini Province Forest Act and Forest Management Standards in 2022-23. The act's goal was to replace harvested, mature trees with saplings to promote forest density. To further this goal, the World Wide Fund for Nature (WWF) launched the Green Lumbini Initiative, inviting organizations to purchase trees in their name. The province's government has released policies on environmental goals, including becoming fully organic within 10 years. These policies focus on building domestic industries and strengthening local entrepreneurship. As a pilgrimage and world heritage site, Lumbini is a prime place to build out ecotourism.

Karnali province (Province 6) is the largest of the provinces of Nepal. Due to its extreme geography - three mountains, the largest national park, etc. - it is highly vulnerable to the effects of climate change. Its residents face issues with food insecurity, weak internet connectivity, and multidimensional poverty (which stands at over 50%, according to The Rising Nepal, 2023).

Karnali province lags behind the national average for many human development metrics, such as literacy rate and average life span. There are consistent issues with water, with 35.9% of the population lacking access to safe water. Though the Karnali province has had governments with environmental focuses, they have fallen short on actually delivering on their goals. There are projects, such as "Green Karnali," aiming to promote "climate and gender-friendly agroecology-based farming approaches," but this is purely educational. In 2024, UNDP finished creating a digital database of development projects in the Karnali province. Currently, this database reflects over 7000 projects. Many, including UNDP, believe that "Karnali province has major prospects in eco-tourism, high value organic agriculture, and hydropower" but will be unable to accomplish these without large shifts (SDG Report - Karnali Province, 2020). The most vital shift is to maintain coordination between federal, provincial, and local governments in the province.

Sudurpaschim province (Province 7) has been limited in opportunities for green development because of its lack of infrastructure. 45% of its citizens live below the poverty line, with an average income substantially lower than the rest of Nepal. The province struggles with undernourishment, multidimensional poverty, lack of access to healthcare, illiteracy, and more. The industry in Sudurpaschim, while limited, is primarily agriculture and forestry. Its top products are sugarcane, rice, and milk. While agriculture is its main industry, "Sudurpaschim province has a number of notable tourist attractions such as Khaptad National Park and Shuklaphanta National Park" (UNDP, 2020). These parks could be of interest for ecotourism efforts. The Asian Development Bank has sought to explore these ecotourism opportunities, and presented a comprehensive strategy for this in June 2025.

Across all seven provinces of Nepal, there are common areas identified for green development opportunities, with a dominant focus on waste management, hydropower/clean energy, and tourism. These priorities are well aligned with Nepal's National Adaptation Plan (NAP), reflecting both global and national commitments to green development. However, despite these ambitions, many green development projects in Nepal remain stalled—either stuck in the "under implementation" phase, just recently initiated, or still at the level of financial commitments. Striking a balance between development aimed at climate change mitigation and that focused on adaptation remains a significant challenge, especially given Nepal's high vulnerability and ongoing exposure to climate impacts. Between 2015 and 2016, 93% of the Climate Finance (CF) was directed toward mitigation efforts to reduce greenhouse gas emissions, with 74% of that funding allocated specifically to the renewable energy sector (Buchner, 2017). To build climate resilience, Nepal must reorient its climate finance strategy to better support adaptation efforts that directly protect vulnerable communities and ecosystems.

Country Comparisons

To effectively assess Nepal's current and future green potential for development, it is helpful to contrast it with other countries. The countries selected are Costa Rica, Bhutan, India, and Ethiopia. Costa Rica was selected because of its standing as a global model for green development. Bhutan and India were selected as regional comparisons - Bhutan because it is a regional leader in green policies for the Eastern Himalayas, and India because it is an economic and environmental influence on Nepal. Ethiopia was selected because it is a peer in its development level and has similar green ambitions to Nepal.

Costa Rica has often been lauded as a standard for green development practices; since the 1980s, it has experienced an amazing transformation propelled by extreme policy decisions. Prioritizing their environment is vital for Costa Rica, as it is the most biodiverse country in the world. Prior to their transformation, Costa Rica experienced extreme deforestation, primarily due to agriculture. Like Nepal, it continues to face challenges with water quality, waste management, and natural disasters. Nonetheless, since 1986, it has seen a nearly triple increase in GDP per capita, slightly more than double increase in forest coverage, and "over 99% of power generation derives from renewable sources" (IRENA, 2023). The Costa Rican army was disbanded in the 1940s and the budget was redirected toward social development, including education, healthcare, and environmental programs. They established national parks and protected areas, which now cover 25% of the country. Because a country's economic growth usually comes at the price of its environmental health, Costa Rica was tactical with their approach to economic growth. They recognized the potential behind their ample biodiversity, building a 7 billion dollar ecotourism industry by 2019 (Statista, 2019). By treating tourism as a "tool for social progress," Costa Rica developed programs that provided economic opportunities for low-income citizens while also

promoting environmental sustainability (Gustavo Segura Sancho, Costa Rica's minister for tourism, 2020). Through a Payment for Environmental Services (PES) program, the government incentivized conservation for landowners. While initially from other sources, PES is now funded by taxes on fossil fuels. This program has been wildly successful, with more than 1.5 million hectares of forest protected. The program not only improves carbon sequestration, but helps engage citizens in the region with conservation efforts. Analyzing Costa Rica's success can inform strategies other countries can use to achieve their green development goals. Key elements to ensure the sustainability of their achievements include: investing in climate-focused education; communicating with community stakeholders to encourage grassroots level engagement with environmental initiatives; and fostering a culture of collective responsibility and long-term stewardship. These elements can be adapted to the unique contexts of other countries.

In the East Himalayas, Bhutan is a regional leader for green policies. Bhutan operates their development under three major goals: reaching a middle-income GDP, carbon neutrality, and their Gross National Happiness (GNH) index. The GNH is a metric of Bhutan's invention, rooted in Buddhist values. It is structured around four pillars (Preservation of Culture, Conservation of Environment, Economic Development, and Good Governance) and measured through nine domains across 33 indicators. Environmentally, Bhutan's renewable energy resources "are vulnerable due to the adverse impacts of climate change and environmental degradation" (Uddin, et al., 2007). This is a similar situation to Nepal, which struggles to maintain its forest density and utilize its hydropower potential. Bhutan's forests are critically important to their success, earning them the distinction of being the world's first carbon negative country (Harvard International Review, 2022). Increasing the GNH index while decreasing greenhouse gas

emissions and increasing GDP are sometimes conflicting goals, and therefore difficult to balance. As Bhutan's economy has grown, "consumerism has crept into Bhutanese society and is a real test of GNH" (Yangka, 2018). Yet, by seeking a balance of GNH, GDP, and GHG, Bhutan's approach to development "may indeed be a better way to approach the future" (Yangka, 2018).

India acts as a regional economic and environmental influence on Nepal. India has a GDP per capita of 2,480.79 USD, slightly less than double Nepal's; its GDP per capita has been rapidly increasing "during the last two decades … [accelerating] the demand for energy and natural resources related to water, land and forests" (Banerjee, 2012). This surge in resource demand has heightened stress on transboundary water systems with Nepal. India's extraction from rivers like the Ganga, Gandak, Kosi, Mahakali, as well as shared aquifers, is reducing downstream flows into Nepal (Dixit et al., 2023), and further complicating already sensitive water-sharing treaties. Meanwhile, Nepal's rapid expansion of hydropower is raising serious ecological concerns; by damming Nepalese rivers, they risk damaging aquatic biodiversity and disrupting ecosystems in exchange for electricity revenues. These risks are amplified by climate-driven shifts in water availability in the Himalayas. The International Centre for Integrated Mountain Development found that there is a projected peak glacial melt "in mid-century, driven by accelerated glacial melt, after which it is projected to decline" (Bhushal, 2023). Transboundary water issues create an additional challenge for realizing Nepal's potential for green development, restricting their ability to pursue equitable, sustainable, and cooperative development in the face of climate pressures.

Ethiopia, a peer in development and green ambitions with Nepal, struggles with similar environmental issues. Akin to Nepal, Ethiopia is a land-locked developing country. Its citizens

have a high dependency on agriculture, its geography is mountainous, and it is rich in water resources. “With the exception of climate change, the major environmental issues affecting Ethiopia are soil erosion and land degradation, deforestation and forest degradation, water scarcity, biodiversity loss, and various types of pollution” (Daley, 2015). The Climate Resilient Green Economy (CRGE) Strategy, released in 2011, is Ethiopia’s guiding strategy toward green development. The overarching goal detailed in the CRGE is to achieve middle-income country (MIC) status by 2025 through an annual economic growth rate of more than 10%. The Ethiopian government intends for this growth to occur while also reducing greenhouse gas emissions and improving their climate resilience. An integral part of the CRGE is the Climate Resilience Strategy (CRS), which focuses on climate change adaptation and initially emphasized the agricultural sector due to its high vulnerability. Some of Ethiopia’s plans include integrating energy-efficient technologies, improving the practices around crop and livestock production, protecting forests, and increasing forest density. To reduce emissions, it also encourages the adoption of modern technologies in the transportation sector, as well as rural cooking. While this is important progress, Ethiopia’s CRGE lacks necessary social equity considerations. For example, the plan lacks focus on poverty reduction, which is a vital consideration when trying to develop a country’s economy in a sustainable and equitable way. To address this gap, the CRGE should integrate more green development projects focused in rural areas and poverty in urban areas.

Challenges and Opportunities

Waste Management/Pollution

From the review of literature on each province, the three prominent sectors for green development in Nepal are waste management, hydropower/clean energy, and tourism.

For air pollution, Nepal ranked 7th in the world for the most polluted country (CNN), with a PM2.5 concentration of 48.2 $\mu g/m^3$. From the Environmental Protection Agency Victoria,

> "PM2.5 particles are very small particles found in air. They have a diameter of 2.5 micrometres (0.0025 mm) or less. PM2.5 particles are a common air pollutant that can impact human health and the environment. … PM2.5 particles are small enough for you to breathe them deeply into your lungs. Sometimes particles can enter your bloodstream."

From the World Health Organization, long-term exposure to air pollution is the second leading cause of non-communicable diseases worldwide, impacting quality of life and leading to about 6.7 million deaths annually (2019). In Nepal, air pollution is the top health risk factor (World Bank, n.d.). According to the National Library of Medicine, in Kathmandu, "vehicles alone contribute about 38% of PM10 out of total particulate emission. About 63% of total PM10 comes from vehicles and road dust, whereas resuspended dust contributes 25% of PM10 emission in Kathmandu valley" (NIH, 2020). A significant amount of air pollution in Nepal is a byproduct of vehicles; the prominence of air pollution underscores the urgent need for policy changes and development investments in road management.

Water pollution is also a major issue, as "10.8 million people in Nepal do not have access to improved sanitation, and 3.5 million do not have access to basic water services" (UNICEF, n.d.). Water pollution tends to occur because of three main factors: industrial activity, agricultural runoff, and improper waste disposal. Lack of access to safe drinking water means ingesting contaminated water, which can lead to gastrointestinal issues, respiratory problems, and skin

infections. Exposure to contaminated water is “linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid and polio” (WHO, 2023). Furthermore, many studies (Garcia, 2024; Morris, 1995; Velema, 1987) have identified a positive correlation between long-term exposure to common water contaminants and cancer. This disproportionately affects rural and poor communities worldwide, and Nepal is no exception.

Land pollution significantly contributes to water pollution, particularly in urban areas where waste often clogs drainage systems, leading to frequent flooding and waterlogging. This issue is not just environmental but deeply socioeconomic, as “city residents face economic and health impacts from flooding and waterlogging, which are aggravated by solid waste infiltrating and blocking drains” (Nepal) Addressing these challenges requires robust waste management systems, and research indicates that such systems are most effective when supported by stable revenue sources. Green development strategies that implement “polluter pays” principles - such as taxes or service charges - have proven successful in strengthening waste infrastructure and reducing the cascading impacts of unmanaged waste.

Clean Energy

Clean energy-focused green development includes both small-scale endeavors, such as cooking to transportation, and large-scale, such as hydro, solar, and wind power. Due to Nepal’s ample water resources, hydropower is at the forefront of clean energy discussions. While hydropower projects are costly ventures, the payoffs are considerable. Nepal currently relies heavily on fossil fuels, and the environmental benefits of prioritizing clean energy would massively help reach their Net Zero Nepal goal. Furthermore, if Nepal could become an exporter of energy, like Bhutan, clean energy would bolster Nepal’s economy. While the majority of Nepal’s clean energy endeavors focus on hydropower, it is important that solar is incorporated as well. Joseph

Silvanus, from Dolma Himalayan Energy, stresses the need for "a judicious mix of hydro and solar. With the kinetic force needed in hydropower, storage is difficult … With solar power you can potentially have a battery back-up, storing energy for when it is needed the most. This helps in further reducing the dependence on India's coal-fired energy import" (FMO, n.d.).

Third, tourism presents both a challenge and a significant opportunity for Nepal. The country's rich natural and cultural heritage makes it an ideal destination for ecotourism, but successful implementation requires a thoughtful and sustainable approach. Changes need to be made to frame Nepal as an ecotourism destination, such as improving air quality and reducing land pollution. Furthermore, ecotourism in Nepal must prioritize sustainability, local involvement, and equitable economic benefits. This includes limiting tourist numbers to reduce environmental strain, promoting the use of local businesses and resources, and ensuring that revenue stays within the community.

Recommendations: Creating an Enabling Environment for Green Investment

Quality of Government

Quality governance is a precondition for effective investment in green development (UN General Assembly, 2012). According to the Berggruen Governance Index (BGI), Quality of Government is the capacity of the state to achieve its primary objectives, such as generating revenue, organizing collective action, and delivering on its policies. This construct in the BGI is made up of Fiscal Capacity, Coordination Capacity, and Delivery Capacity (Anheier, 2023). Although the BGI ranks 145 countries, it excludes some, including Nepal, due to data availability. The lack of data to assess Nepal's performance in Quality of Government is itself a reflection of governance challenges.

These elements of Quality of Government describe critical functions, including the ability to organize and coordinate collective action and to execute policies on the ground; these capacities require elite consensus, as well as limited corruption, predictable enforcement, and effective resource allocation (Anheier, 2023) For green development efforts to make long-term meaningful change in Nepal, significant adjustments need to be made to improve inter and intra governmental coordination. Coordination appears to be a common challenge in each province. This poor coordination is further exacerbated by the pervasive government corruption in Nepal (Tribhuvan University Journal, 2019).

Approaches for improving vertical (national to local) and horizontal (interagency) coordination to increase government efficacy may be drawn from the performance management literature.

> "Dialogue forms a basis of social cooperation, and people feel committed to the agreements reached in such a context. Interactive dialogue therefore acts as a social

> process that helps to create shared mental models, has a unifying effect, and helps to develop credible commitment for the execution phase" (Moynihan).

Dialogue routines and learning forums, where leaders and project managers meet routinely together across government agencies regarding goals, provide a simple yet key mechanism for improvement; this is ideally augmented with data concerning the topic (Moynihan, 2008).

Nepal is a nascent government in many respects, having only begun conducting local elections in 2017. As a result, the provinces are at varying levels of governance capacity. Power remains largely centralized, with significant influence retained by the federal government. This uneven development has contributed to governance challenges, including a limited understanding of green development at the provincial level. In many cases, it is narrowly interpreted as "villages should benefit," rather than being approached as a complex, multi-dimensional process.

In 2024, the Nepali government released the Nepal Green Finance Taxonomy, marking a significant step toward aligning national development with sustainable finance principles. This move sends a clear signal to international developers about Nepal's strong commitment to green growth. By taking this initiative, the government provides reassurance to investors and developers alike, demonstrating its seriousness in fostering an environmentally responsible economic future.

Waste Management/Pollution

Green investment such as ecotourism requires creating an environment that is healthy and visually appealing to visitors. As such, effective waste management becomes a precondition for some forms of green development. Unfortunately, air pollution, water pollution, and land pollution are currently poorly managed in Nepal (World Bank, n.d.). To mobilize international

green finance, stronger environmental policies and regulatory structures, as well as predictable enforcement is critical; this provides a 'level playing field' (FMO, n.d.) for international and national investment and ensures appropriate environmental standards are made.

In Nepali cities, air pollution is a significant issue. As stated in "Challenges and Opportunities", 63% of PM10 emissions, which is inhalable fine particulate matter that damages lungs, comes from vehicles and road dust in Kathmandu (National Library of Medicine, n.d.). Nepal does not currently have the technical capacity to integrate fully electric cars in a meaningful way. However, the government has control over the regulation of vehicles and industry, which allows a degree of control over air pollution. Potential approaches to reducing vehicle-induced air pollution include improving public transportation and government action on motorcycles.

Public transportation in Nepal is both publicly and privately owned. Improving current public transportation - making it safer, more reliable, etc. - would lead to less personal vehicles on the road. Many women avoid using public transportation, as sexual harassment is prevalent; "Public transport offers males both proximity and anonymity, which, in turn, results in high levels of abuse with very little risk of social or legal consequences" (Neupane, 2013). A potential way to combat this aversion is to offer women-only buses. Initiatives like Sustainable Electric Transport for Nepal from the German Development Bank aim to introduce electric minibuses to Nepal, while developing an app to increase ease of transportation. This, and similar initiatives like the Green Climate Fund's E-Mobility Program, work toward reducing air pollution while improving efficiency for consumers. Another air pollution challenge is that motorcycles are far more prevalent than cars; in Kathmandu Valley, they account for 73.2% of registered vehicles (Udas, 2012). Based on numbers alone, motorcycles produce substantially more pollution, but they also lack emissions testing (Kumar, 2020). Research into motorcycle-dependent cities, such as Solo,

Indonesia, have found that there is a market for electric motorcycles, if competitive with standard motorcycles (Guerra, 2019). This introduces a dilemma, because e-motorcycles cannot currently price match standard motorcycles. One way to mitigate the impact of existing standard motorcycles would be to subsidize electric motorcycle conversion kits in combination, while instating a higher tax on standard motorcycle sales . This incentivizes citizens to convert their motorcycles, thus leading to less air pollution. Motorcycle conversion kits would reduce pollution, increase quality of life, and create an environment more hospitable to other green development.

Recommendations: Green Development

Clean Energy

As previous sections stated, hydropower investment is a primary focus for external and internal investment in Nepal. However, many developers have monetary tunnel vision, pushing aside environmental considerations; "not all energy projects in Nepal are done with enough care for the environment. The smaller developers in particular tend to look too much at the economic side of the project" (FMO, n.d.). It is vital that, when developing the hydropower sector, developers take precautions to protect the biodiversity and preserve the natural landscape of Nepal. Without protecting its natural resources, investments in one domain may short-sightedly inhibit other opportunities. The German Development Bank has invested in the initiative *Promoting Renewable Energy and Energy Efficiency Programme-Green Recovery and Empowerment with Energy in Nepal*, which aims to enhance the regulatory, institutional, and private-sector conditions in order to better implement clean energy efforts.

While hydropower is the dominant push for clean energy in Nepal, experts in clean energy have urged for diversifying clean energy efforts. Nepal is plentiful in water resources, but "the Himalayan region is also known for high solar radiation, providing a huge capacity for potential solar power development" (FMO, n.d.). By investing in more solar energy projects, the country "can potentially have a battery back-up, storing energy for when it is needed the most" (Silvanus, Dolma Himalayan Energy). This will help Nepal build and retain energy freedom in years to come.

Ecotourism

Ecotourism has developed many countries' economies while protecting natural resources and communal systems - but only when it is performed consciously. Due to its geographic conditions, Nepal has ample opportunities for ecotourism ventures.

Establishing capacity thresholds will be a vital condition for any tourism-related green development; "there is significant groundwork that is required for something like ecotourism to flourish … ecotourism has a very serious capacity threshold for particular destinations" (Ecotourism Professional, 2025). In 2024, Nepal instated capacity thresholds for climbing Mount Everest after many years of littering and mismanagement earning it the title of the "World's Highest Garbage Dump" (National Geographic, n.d.) (Kathmandu Post, 2024). While this is a step in the right direction, it is important to make these capacity thresholds flexible to account for conditions and deterioration of the sites. These changes should be applied to all natural sites, not simply Mount Everest.

Tourism is fundamentally driven by money; the market dictates how much of a priority environmental focus is. One of the primary benefits of ecotourism is the cash flow it brings to rural areas.

To successfully develop a country in a sustainable and inclusive way, education and upward mobility are vital. If you seek to educate rural areas on how to take care of the natural environment they have, it will set them up for ecotourism.

Final Thoughts

While an initial aspirational goal of this report was to provide tailored green investment opportunities and barriers by province, this approach was constrained by limited accessible data and information. Data capacity, particularly in the provinces, is low. As noted in the *Creating an Enabling Environment for Green Investment* section, government capacity itself may be an important investment area to facilitate green investment, particularly in the Nepali provinces. With that in mind, given Nepal's rich biodiverse landscape, opportunities abound. By diversifying from narrow development approaches focused on extraction and agriculture and turning to renewables and ecotourism, Nepal can attract external green investment. By facilitating an investment environment and prioritizing hydro and solar power and socially-responsible ecotourism, Nepal can build a more inclusive, sustainable future.

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