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Sustainable Consumption and Production in Nepal

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Abbreviations

CBD	Convention on Biological Diversity
CBFM	Community-Based Forest Management
CF	Community Forestry
CFUG	Community Forest User Group
DFA	Development Finance Assessment
DMC	Domestic Material Consumption
EIA	Economic Impact Assessment
EIA	Environmental Impact Assessment
EPI	Environmental Performance Index
FDI	Foreign Direct Investment
FPCRN	Forum for Protection of Consumer Rights Nepal
FY	Fiscal Year
GDP	Gross Domestic Product
GHG	Greenhouse Gas
GNI (PPP)	Gross National Income (Purchasing Power Parity)
IEE	Initial Environmental Examination
LDC	Least-Developed Country
LTS	Long-term Strategy
LULUCF	Land Use, Land Use Change, and Forestry
mMt	Million Metric Tons
MEA	Multilateral Environmental Agreement
MOFE	Ministry of Forest and Environment
NBSAP	National Biodiversity Strategy and Action Plan
NDC	Nationally Determined Contribution
NEPAP	National Environment Policy and Action Plan
NIP	National Implementation Plan
NPR	Nepalese Rupee
NPS	National Planning Commission
P**A**	Protected Area
PEI	Poverty-Environment Initiative
POP	Persistent Organic Pollutants
PPP	Public–Private Partnership
REDD	Reducing Emissions from Deforestation and Forest Degradation
SAARC	South Asian Association for Regional Cooperation
SCP	Sustainable Consumption and Production
SDAN	Sustainable Development Agenda of Nepal
SDG	Sustainable Development Goal

SEA	Strategic Environmental Assessment
SMEs	Small and Medium Enterprises
UNFCCC	United Nations Framework Convention on Climate Change
VNR	Volunteer National Review

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1. Summary

We envision Nepal as an enterprise-friendly middle-income country by 2030, peopled by a vibrant and youthful middle-class living in a healthy environment, with absolute poverty in the low single digits. For this to be achieved, we need to make sure that the country's environment is protected, and that its natural resources are used sustainably.

(Nepal Sustainable Development Goals Status and Roadmap: 2016-2030)

Sustainable Consumption and Production and its significance for Sustainable Development

There are fundamental constitutional, socio-economic and environmental factors that make sustainable consumption and production (SCP) particularly important in Nepal. The Constitution of Nepal (2015) guarantees that every Nepali citizen has the right to live in a clean environment, while the State is responsible for using natural resources for people's welfare. International commitments made by Nepal, such as the Sustainable Development Goals (SDGs), Paris Agreement on climate change, and other multilateral environmental agreements (MEAs) including the Convention on Biological Diversity (CBD) are particularly important in this context. With a politically stable government, growing population, increasing urbanization and rising family income, Nepal is now ready for prioritizing sustainable consumption and production actions that will contribute substantially to poverty alleviation and the transition towards low-carbon and green economies.

The economic growth and improvement in human development have, however, generated significant environmental degradation as it has been coupled with a staggering rise in the use of resources such as energy, biomass, minerals, fossil fuels, metals, water and land. Thus, the use of resources in Nepal's development approach should not overlook the fundamental connections between economic growth and ecosystem integrity. With trends and future scenarios of rising consumption in Nepal, it is likely that progress will lead to unsustainable resource use, higher greenhouse gas (GHG) emissions and greater environmental impact. As in the rest of the world, and especially in the Asia–Pacific region, the Asian least-developed countries (LDCs) such as Bangladesh, Cambodia, Laos, Myanmar and Nepal have doubled their domestic material consumption (DMC) in the last two decades (Baniya & Ariyal, 2020)[1]. It is therefore necessary to make development and resource use complementary to each other and ensure resource efficiency by adopting the principles of sustainable consumption and production, and especially of circular economy.

Like other Asian developing countries, Nepal is in the process of modernization, which creates unprecedented pressure in balancing socio-economic growth with environmental conservation. To mitigate negative effects on Nepal's natural resources and environment, there is an immediate need to change the way that goods and services are currently produced. Sustainability cannot be attained within the present context of linear production and overconsumption. Nepal's use of resources is mostly unsustainable; it produces large amounts of waste and rapidly pollutes its environment. In particular, waste generation is increasing at an alarming rate and Nepal does not yet have modern disposal or recycling facilities. In this context, embracing SCP principles is urgently needed.

SCP in Nepal's national development policies and strategies

Constitution of Nepal 2015 (Nepali: नेपालको संविधान २०७२) is the current constitution governing the country. It aspires to create a prosperous, egalitarian and pluralistic society, and serves as the overarching guide to all development policies, plans and programmes. The country adopted the National Conservation Strategy for Nepal (1988)[2] as the basis for the development of the National Environment Policy and Action Plan (NEPAP)[3] implemented in 1993. Subsequently, the Environmental Protection Act 2019[4] and Environment Protection Rules were adopted as a follow-up to NEPAP, which are the key legal provisions and procedures to mitigate adverse environmental impacts and integrate environmental sustainability into development activities. Other key sustainable development plans and strategies such as the Sustainable Development Agenda of Nepal 2003–2017 (SDAN)[5] , confirms its commitment to implement Agenda 21 of the Rio Earth Summit, the National Strategic Framework for Sustainable Development (2015-2030)[6], and the Sustainable Development Goals, Status and Roadmap (2016-2030)[7], guides Nepal in operationalizing the SDGs at all levels--national, regional and local. It contains goal-wise indicators and their quantitative benchmarks, which contribute to sustainability issues linked with the area of sustainable consumption and production (SCP).

Nepal is a party to the 2015 Paris Agreement within the United Nations Framework Convention on Climate Change (UNFCCC). The country submitted its Nationally Determined Contributions (NDCs) in 2016 and submitted an enhanced NDC in 2020 to the UNFCCC by raising its ambition in adaptation and mitigation targets. Nepal has also prepared a Long-term Strategy (LTS) for Net Zero Emission (aimed at making Nepal a net zero emission country by 2045) and has approved its NDC implementation plan until 2030. Nepal supports initiatives to limit temperature rise to well below 2°C (leading to 1.5°C above pre-industrial levels) in order to reduce the risks and adverse effects of climate change on its people and their livelihoods.

Nepal committed to the SDGs early on, and this commitment has been reaffirmed in key policy documents, such as the current 15th Development Plan (2019-2023)[8] and the 25-Year Long-Term Vision 2043 that internalizes the Goals and prioritizes environmental conservation and resilience to natural hazards and climate change in its development efforts. The National Planning Commission (NPC) has prepared the Nepal SDG status and roadmap (2016-2030) report which provides milestones and indicators for SDG 12 or Responsible consumption and production.

Nepal has developed 11 targets set for 2019, 2022 and 2030 within SDG 12 and has committed to sustainable management of natural resources by reducing use of water and fossil fuels, increasing carbon sink, reducing land use for agricultural production, improving soil organic matter, using less wood; reducing food waste (post-harvest loss and food loss), reducing the use of plastic, recycling plastic and reusing of glass and metal products. The government has been promoting policies and programmes to encourage sustainable production and consumption. For example, sustainable agriculture policies promote focus on organic production and the efficient use of water. Efforts need be made towards enhancing regulatory and incentive mechanisms to reduce waste in production and consumption, and for waste management with due emphasis on 'reduce, recycle and reuse'. A fair and competitive market, responsible supplies and promotion of digital technologies could help to further promote sustainable production and consumption.

The Volunteer National Review (VNR) 2020[9] indicated a growing awareness among people over the years, but it showed limited progress especially towards SDG 12. This related primarily to inefficient resource use. For example, the per capita consumption of wood, which was 0.11 cubic meter per year in 2015, was at 0.65 cubic meter per year in 2018/19; this is proposed to be contained to within 0.05 cubic meter per year. Use of fossil fuel was 15.5 per cent in 2019, which was higher than the target. Land under cereal crops as per centage of cultivated land is currently 76.3 per cent, which is lower than the target.

The government has also integrated some guiding principles of SCP in other sectoral policies and strategies such as the forest sector strategy, water strategy, agriculture development strategy, climate change policy, Nationally Determined Contribution, National Biodiversity Strategy and Action Plan 2014-2020 (NBSAP) and Nature for Prosperity Strategic Plan (2020-2025), for making a greater contribution to species conservation, improving protected area (PA) and ecosystem management, promoting nature-based economy, addressing climate change issues, generating robust scientific knowledge and creating public awareness. In addition, the Nepal SDG status and roadmap (2016-2030) also highlighted that the government has already aligned the national monitoring framework with the global SDG indicators and has formed three high-level committees to help implement SDGs in Nepal[10].

Key actions for decision-makers and other stakeholders

The existing sectoral strategies focus on sectoral growth, but to achieve the goal of sustainable development requires a more integrated policy framework to sustain growth with balancing the consumption and production of goods and services. Sustainable consumption and production (SCP) is an integrated development approach that brings valuation of ecosystem services into development, and links to state and non-state members and to multiple sectors in managing development efforts.

SCP represents a decoupling of economic growth from resource consumption. It allows a broader view and an integrated approach of resource management and economic growth – that is, production activities on the supply side and consumption activities on the demand side. It acknowledges the importance of interrelationships between the resources used during the development of products and services, the energy consumed during their use, and the protection of ecosystems during the life cycle of a product or a service. It can, therefore, clearly identify areas having a big impact of resources and energy use, and consequently highlight key 'hot spots' for intervention to support attaining the SDGs.

SCP is considered an enabler of other goals of the 2030 Agenda for Sustainable Development. Hence, to achieve sustainable development targets set by the government, integration of the SCP approach in its national plans, sectoral strategies and their implementation is central. Holistic approaches are essential for sustainable development plans and programmes. Focussing on resource efficiency through life cycle and systems thinking, these approaches address production and consumption issues in essential sectors such as food and agriculture, energy, forestry, waste, urban settlements and infrastructure.

The required policy framework may seek to support a transition towards a more circular model that strengthens resource efficiency (target 12.2), improves waste management (targets 12.3, 12.4 and 12.5) and embeds environmental impacts in employment and economic growth policies[11]. Some of the specific policy interventions may include: engaging national and sub-national level decision-makers and ministries (such as, finance/ NPC/ other sectoral ministries) to identify intervention area and process, with clear roles and responsibilities in order to implement the SCP; integrating SCP principles into the core economic agenda in development planning at the national and sub-national levels, and creating an environment for resource efficient strategic investment; devising appropriate policy tools such as regulations, taxes, subsidies and sustainable public procurement to encourage green innovation, green investments, green financing and green consumption; integrating the SCP concept and its principles in education systems; and devising mechanisms for sustainable tourism.

In addition, there is also the need to document the initiatives and best practices related to SCP and identify the interlinkages (synergies and trade-offs) across SDGs; consider social inclusion and pro-poor climate and environment management through supporting local-level implementation; carry out multi-stakeholder dialogues to raise the awareness of responsible actors; and initiate and support programme decoupling and circular economy (reducing food losses, recycling waste); use recent technologies and innovations in SCP processes; and support eco-innovation initiatives (eco-products and eco-process innovations, such as, the use of new technologies, material product innovation, forest certification, organic certification, and reducing emissions from deforestation and forest degradation [REDD]).

Regional initiatives, such as those by the South Asian Association for Regional Cooperation (SAARC), need to be further strengthened to enable learning across member countries and to create a regional market for SCP-based products.

2. Introduction

The years 2019 to 2022 have been a period of continued improvement in Nepal, despite and sometimes because of significant obstacles. After the 2015 earthquakes and successful national-level elections, Nepal has steadily implemented federalism and achieved economic progress. The COVID-19 pandemic compelled the building of state capacity and governance, and the country may emerge from the pandemic better than it started[12]. Socio-economic exclusion remains a problem in Nepal. It remains one of the poorest countries in the world, with a per capita Gross National Income (GNI) of $4,280 in 2021[13].

According to the 2022 Environmental Performance Index (EPI)[14], Nepal's score is 32.7 and it is ranked 145 out of 180 countries, above India (168), Bangladesh (162) and Afghanistan (178), but below Pakistan (142), indicating that environmental performance in the region is very poor. Nepal's major environmental problems are created both by natural processes and human induced activities, and in turn have an influence on both.

Adverse environmental and societal effects of economic growth

Economic growth has been achieved at a high environmental cost and has led to additional environmental degradation, especially because of increasing air pollution and persistent problems with water, sanitation and water resource management. Although air pollution continues to be a problem, though less so during the COVID-19 pandemic, and water and sanitation issues persist, incremental progress is starting to yield gains, with more anticipated in the near term. Nepal, more than some other countries in the region, has managed to protect its native flora and fauna as well as a variety of delicate ecosystems. This is driven, at least in part, by the government's reliance on revenue from eco-tourism.

Deteriorating air quality, drying up of water sources and depleting groundwater, pollution of surface and groundwater, overexploitation of natural resources, deforestation, unmanaged solid waste, increase in emission of toxic pollutants, loss of biodiversity, unscientific agricultural practices, and harmful land use changes have been some of the major causes of environmental degradation. Some of the root causes of rapid environmental degradation are weak monitoring and enforcement, weak institutional capacity, scarce resources in the responsible public institutions and inefficient interagency coordination.

Nepal has a unique young Himalayan geology, varied ecosystems with rich natural resources, abundant water, fertile land, and a diverse sociocultural milieu—giving the country a huge potential for socioeconomic transformation. However, sustainable management of these resources has remained the main challenge. The young mountain geology, fragile ecosystems, poverty, lack of capacity and resources, and weak governance have made the country extremely vulnerable to environmental degradation and impacts of climate change and disaster risks. The climate-change-driven events such as melting glaciers, degrading and eroding watersheds, drying water sources, and extreme precipitation pose a grave risk to Nepal's economy. These could cause losses equal to almost 2.2 per cent of the country's annual gross domestic product (GDP) by 2050, and may go up to 9.9 per cent by 2100[15].

The conventional development approach that emerged in the 1970s/80s did not adequately address important environmental and ecosystem issues, nor how to balance of consumption and production trends, which are critical for sustainable development. With increasing population and incomes[16], the development approach led to a high demand for food, water, energy, housing, transportation and other public services. These demands intensify the unsustainable use of natural resources and cause a loss of biodiversity and ecosystems, which are the basis for the life and livelihoods of humanity[17].

Nepal has witnessed challenges of ecosystem degradation due to unsustainable management of natural resources while undertaking development interventions. Although the government has developed policies and legal provisions as safeguards, they have not yet been translated into action. For example, there are challenges of fully understanding and applying the environmental impact assessment (EIA). The growing use of single-use plastic and absence of plastic waste management are another serious challenge. Nepal

uses about 1,250 million single-use plastic bags in a year[18], which may destroy fragile ecosystems and affect human health. Haphazard construction of rural roads leads to critical problems of soil erosion, massive landslides, deforestation and hydrological changes.

Unsustainable management of resources is also leads to the loss, degradation, and alteration of natural habitats, such as forests, grasslands, agricultural land and wetlands; overexploitation of natural resources; and pollution of water bodies. Widespread mining of gravel from streams and riverbeds has emerged as a major threat to aquatic biodiversity. Similarly, the use of persistent organic pollutant pesticides has become a serious concern. A majority of farmers are unaware of pesticide types, their levels of poisoning, safety precautions and their potential hazards. Chemical pollution has long-term effects on human life as well as on the environment[19]. Most of these threats continue to increase. The overuse as well as inefficient use of resources have a direct impact on the human and natural systems, leading to significant undesirable consequences on the ability of the systems to sustainably produce the required services.

All these consequences have a disproportionate impact on the poor, socially excluded and vulnerable communities. It has been recognized that women and the poor are the primary users and potential stewards of many natural resources that provide the means for basic survival. They use the natural resources to meet their basic livelihood needs (such as, fuel wood, drinking water, herbs and medicines) and support their economic stability (e.g., water for irrigation, raw material for cottage industry) and also provide for their future use. As a majority of the rural poor, including women, rely heavily on the goods and services that are provided by the natural ecosystems, they are disproportionately impacted by the loss of natural resources. In fact, the loss of natural resources not only undermines food, health, energy and water security (FAO, 2001[20]; UNDP, 2006[21]), it also increases the vulnerability and decreases their resilience to external forces such as climate shocks and market failure.

Nepal's greenhouse gas emissions and climate change

Nepal contributes only 0.027 per cent to the global greenhouse gas emissions but is most vulnerable to the impacts of climate change[22]. Nepal's diverse topography, fragile ecosystems, poverty, lack of capacity to plan effectively for climate change adaptation, and weak governance have made it extremely vulnerable to the impacts of climate change. The shrinking glaciers, a three- to four-week shift in the monsoons, and extreme climatic events (droughts, sudden cloudbursts followed by flash floods and landslides, extreme temperatures during winter and summer) are a manifestation of the impacts of climate change. Nepal ranked fourth out of 124 countries in the Climate Risk Index in 1998 and eleventh out of 181 countries in 2017, indicating that the country is one of the most climate-vulnerable in the world.

Climate change has a direct impact on sustaining the management of resources and therefore affects SCP-related interventions. The impact of climate change is increasing especially in developing countries. Special attention is, therefore, required to reduce GHG emissions at the country level, even though Nepal's contribution in this process is very small.

Based on Nepal's Long-term Strategy for Net-zero Emissions (2021)[23], it is committed to accelerating climate action whilst adhering to the principle of shared but differentiated responsibilities and respective capabilities towards the implementation of the Paris Agreement as per national circumstances. Nepal's goal is to achieve near zero emissions from 2020-2030, and after a period of very low emissions to full net zero by 2045. Nepal would also like to gain recognition for its mitigation contributions beyond its borders through clean energy trade. Nepal's Long-Term Strategy envisions bold policymaking, social transformation and technological advancements that will lead to a carbon-neutral, inclusive and climate resilient future. Nepal's total carbon dioxide (CO_2) emissions in 2019 were 23 $mMtCO_2$ (million metric tons of CO_2) in the reference scenario. This figure is expected to rise to 34 mMtCO2 in 2030 and 79 $mMtCO_2$ in 2050.

While non-energy-related emissions accounted for 46 per cent of the net CO_2 emissions in 2019, the energy sector accounted for 54 per cent. In the reference scenario, non-energy emissions would gradually decrease to 32 per cent of total emissions by 2050. Land Use, Land Use Change, and Forestry (LULUCF) CO_2 emissions were estimated to be 8 $mMtCO_2$ in 2019 and are expected to rise to 17 $mMtCO_2$ by 2050. In the "with existing measures" (WEM) scenario, the net CO_2 emissions will be reduced by 30 $mMtCO_2$ in 2030 and by 50 $mMtCO_2$ in 2050. In this scenario, the energy sector will be one of the most important

contributors to emission reductions. LULUCF will contribute significantly to carbon removal in the first 10 years. However, the sink potential of LULUCF will decrease over time as per the assumptions used in this scenario. As a result, after 2030, net carbon emissions will rise at an annual rate of 11 per cent. In the "with additional measures" (WAM) scenario, ambitious interventions in the energy sector combined with ongoing and additional carbon removal interventions indicate that Nepal's net CO_2 emissions will be lower than 'zero' in the period 2020 to 2030, then hovering around 'zero' throughout 2035 to 2045. Sequestration increases from 2045 onwards would reach -5.7 mMT in 2050.

Opportunities for SCP in Nepal to address environmental challenges

Without comprehensive reforms to address its long-standing challenges, Nepal will probably not become a lower-middle-income country before 2030 (World Bank, 2016)[24]. After a political transition and election of a stable government, Nepal is aiming for fast economic development and prosperity. The government aims to achieve this goal primarily by tapping the country's vast potential for hydropower, tourism and natural resources.

Nepal is endowed with natural resources, diverse ecology and rare species of flora and fauna. A large part of the rural population in the country depends on these resources for livelihood. These natural assets, however, are in a critical state of degradation from the impacts of natural calamities and human activities. With the long-awaited political stability and a federal system of governance in place, Nepal is at a historic point to bring about economic and social transformation. The country is striving to eliminate poverty and expedite the pace of economic growth.

With Nepal's economic growth ambition, resource extraction has been increasing. This indicates unsustainable use of resources, leading to a higher rate of GHG emissions and harmful environmental impacts. By adopting the life cycle and systems thinking approach, the fundamental objective of SCP is to decouple economic growth from environmental degradation[25]. The SCP approach allows a broader and integrated view than has been the case in the past. It integrates the two aspects: production activities on the supply side, and consumption activities on the demand side. Considering both aspects can give rise to a complete and integrated picture of the overall impact on the environment and economic development. The SCP approach specially acknowledges the importance of the interrelationships between the resources used during production and service, the energy consumed during their use, and the protection of ecosystems – during the life cycle of a product or a service. It can therefore clearly identify areas having a big impact on resources and energy use and consequently highlight key 'hot spots' for intervention.

Adopting the approach may be challenging in the beginning but it is possible to manage consumption and production processes while ensuring resource efficiency by taking a circular-economy-oriented approach with respect to mobility, housing, food systems, and other sectors of the economy. It is noted that a reduction in demand can leverage large savings at different stages of the supply chain[26].

SCP approach for social well-being and economic development

Human well-being is assumed to have multiple components, including the basics for a good life, such as secure and adequate livelihoods, enough food, shelter, clothing, and access to goods; good health and a healthy physical environment, such as clean air and access to clean water; security, including secure access to natural and other resources, and security from natural and human-made disasters. Given the specific focus and principles of SCP, it can significantly contribute to improving poor people's well-being through provisioning of these basic needs.

SCP policies and programmes focus on maintaining ecosystems and ecosystems services (e.g., food, fibre, fuel, freshwater and clean air) on which people rely for their basic needs, human well-being and economic prosperity. SCP can thus contribute to raising incomes, creating new jobs and new market opportunities, and promoting eco-based products such as organic agriculture, diverse genetic resources, Himalayan products (medicine and food), fair trade and eco-tourism. If managed properly, SCP helps to grow local markets, find a niche in national and international markets, and increase income of the people involved in the production of these products. In addition, SCP approaches contribute to improved participatory natural resources management, such as community managed forests, and help to enhance access to various

forest products and safe drinking water. Adoption of SCP leads to improved availability of raw materials for nature-based small-scale industry.

In Nepal, community forestry is part of the national strategy for livelihoods improvement and environmental protection. Nepal is well-known for its success in implementation of community-based forest management (CBFM) initiatives. Among other modalities, Community Forestry (CF) is a dominant form of CBFM in which forest is managed by, for and with local communities with the objective of improving forest conditions, enhancing livelihoods of the local people and empowering communities in management of the forest resources[27]. In countries like Nepal there is always a large difference in the levels of income and well-being between people. Households ranging from rich to very poor can be found even in a single community. It is obvious that poor people depend more on forests because they do not have other alternative sources of livelihood and that the richer people have the option to choose their livelihood strategies (Balooni et al., 2010)[28].

Community-forests-related data revealed that 24,61,549 households have benefited from community forests in terms of access to firewood, fodder, raw material for cottage industry, timber and herbs/medicine (Department of Forests, 2018). Bhattarai (2011)[29] reported that the annual direct monetary benefits per Community Forest User Group (CFUG) per year are Nepalese Rupees (NPR) 710,000.

The current climate variability and extreme events lead to major disasters and economic costs in Nepal, and the estimated direct cost of these events is equivalent to 1.5 to 2 per cent of the current GDP/year. A 2014 study on the economic impact assessment of climate change in key sectors of the economy revealed that climate-induced net agricultural losses in Nepal were equivalent to 0.8 per cent/year of the GDP[30]. The flood events in 2017 in the southern part of the country wiped out crops worth NPR 8.11 billion in the 14 districts known to be the breadbasket of the country[31]. COVID-19 added to these challenges.

SCP-related policies and measures contribute to enhancing ecosystems integrity (provision of environmental goods and services), which is important to support adaptation to climate change and control climate change induced disaster shocks such as floods and droughts that threaten livelihoods and undermine food security. Improved resource efficiency and management in forests, agricultural land and watersheds will result in increased community resilience and limit the potential exposure of poor and other communities to environmental risks.

Enabling policy frameworks and legal provisions for SCP

There are no specific policies and strategies for SCP in Nepal, but there are some policy frameworks and legal provisions that enable and support adoption of SCP approach and practices. The Ministry of Environment (MOE) was established in 1995 with the responsibility for environmental conservation, pollution control, conservation of national heritage, and preparation of national legislation on environmental protection. The Ministry went through several reorganizations and is now named as the Ministry of Forest and Environment (MOFE). With such frequent changes in institutional arrangements, the ministry faced difficulties in proper institutionalization, monitoring, and enforcement of safeguards and compliance activities.

The current governance structure gave space for establishing focal sections on environment in most of the government ministries and departments at the federal and provincial levels. Local bodies also have an environment section, although mostly defunct due to the lack of staff and resources. The environment sections in federal ministries are either formal or informal, and they look after sector-related safeguard issues. Most of these sections are constrained by limited staff, resources, and capacity to address environmental and climate change risks. The authority to approve initial environmental examinations (IEEs) lies with the concerned federal ministries, whereas MOFE has the authority to approve the environmental impact assessments (EIAs). They ensure that environmental and social issues are addressed in all development projects.

In addition, the implementation of environmental policies and strategies has been very weak due to a sectoral approach, insufficient harmonization of policies and priorities, inadequate coordination, and collaboration among the actors within government ministries and with non-state actors, and a weak understanding and application of the valuation of ecosystems and ecosystems services in the development process.

Since 1985, notwithstanding the constraints, major environmental mainstreaming initiatives have been undertaken, environment-friendly policies introduced, and environment management strategies integrated into sector plans in Nepal. The country adopted the National Conservation Strategy for Nepal (1988)[32], and prepared the National Environment Policy and Action Plan 1993. Subsequently, the Environment Protection Act, 2076 (2019)[33] came into force, which provides for the protection of the environment with the proper use and management of natural resources, so as to protect the fundamental right of each citizen to live in a clean and healthy environment, provide the victim with compensation by the polluter for any damage resulting from environmental pollution or degradation, maintain a proper balance between environment and development, mitigate adverse environmental impacts on environment and biodiversity, and face the challenges posed by climate change.

Some sector policies have environmental and natural resources priorities, which include: (i) forest conservation and management through community participation, (ii) wildlife and biodiversity conservation through the establishment of protected areas, (iii) reducing vulnerability to the impacts of climate change, (iv) disaster relief and risk management, (v) environmental sustainability of development projects), (vi) improving air quality and waste management in urban areas, (vii) use of renewable energy and energy-efficient technology in rural areas, (viii) watershed management–ecological restoration in the fragile Siwalik range, (ix) improved drinking water and sanitation services, (x) adopting a climate-resilient agriculture system, (xi) conservation of natural resources including water; and (xii) achieving the sustainable development goals. However, weak government capacity for effective implementation and monitoring of environmental management plans, inadequate resources, a lack of awareness about the importance of environmental safeguards and risks of climate change, and political instability have been the key challenges in achieving sustainable development[34].

In 2015, the National Planning Commission (NPC)[35] developed polices and mechanisms to implement SDGs, which are presented in Sustainable Development Goals Status and Roadmap: 2016 – 2030. Built upon a pioneering SDG-related study prepared by NPC, it highlights major issues and challenges that the country needs to reckon with in pursuit of the SDGs. The major initiative includes the publication of the SDG-Roadmap which takes stock of Nepal's present development status and provides a roadmap to 2030, with intermediate milestones for 2019, 2022, 2025 and 2030. This has been extremely useful in identifying the progress of the SDGs. The roadmap envisions building a just and prosperous Nepal by 2030. The year 2030 coincides with the end date of the Sustainable Development Goals. The roadmap sets 11 targets and 27 indicators for SDG 12 (SCP).

Although all the 17 SDGs and 169 targets are legitimate development objectives seen through a global lens, a resource-strapped country like Nepal needs to prioritize, localize and motivate a bottom-up path towards greater progress. The monitoring framework in this roadmap aligns and updates national indicators with global ones. The Government has started mainstreaming the SDGs into national planning and budgeting systems. The National Steering Committee presided over by the Prime Minister, the Coordination Committee chaired by the Vice Chairperson of the National Planning Commission, and thematic committees under the convenorship of NPC members are in place to guide SDGs through plans and programmes. The private sector, cooperative sector, civil society organizations and development partners are collaborating with the government on implementing the SDGs. The ongoing plans and programme budgeting has already started to orient policy and budget priorities. Other key documents are SDGs Needs Assessment, Costing and Financing Strategy, and additional SDGs Localization Guidelines. Finally, Nepal has conducted a Development Finance Assessment (DFA) to provide an overview of development finance flows, and institutions and policies that can align finance with national development priorities. In 2020, NPC issued the National Review of Sustainable Development Goals, which tracks the progress of the SDGs[36].

SDG 12 in Nepal: Sustainable consumption and production is an issue of great importance for Nepal, especially the use of natural resources in a sustainable manner with inter-generational equity in mind. According to the review report, despite limited progress, there is growing awareness among the public, particularly among the younger generation, about sustainability. Sustainable agriculture policies are being promoted, with a focus on organic production and the efficient use of water. Efforts need to be made towards enhancing regulatory and incentive mechanisms to reduce waste in production and consumption, and for waste management with due emphasis on 'reduce, reuse and recycle'. The emphasis of the Forum for Protection of Consumer Rights Nepal (FPCRN) is on a fair and competitive market, responsible supplies and promotion of digital content market to promote sustainable production and consumption. There is still

a strong need to raise awareness as well as to promote sustainable consumption and production in the coming years with more targeted programmes in collaboration with all the stakeholders, in particular the private sector and the general public.

Table 1. SDG12: Ensuring sustainable consumption and production patterns

Targets and indicators		Baseline 2015*	Target 2019*	Progress 2019**	Target 2030*
Target 12.2 By 2030, achieve the sustainable management and efficient use of natural resources					
12.2.2	Domestic material consumption, domestic material consumption per capita, and domestic material consumption per GDP				
1	Use of fossil fuel energy consumption (% of total)	12.5	13.2	15.5	15
3	Land use for agricultural production (cereal as per cent of cultivated land)	80	78.7	76.3	75
4	Soil organic matter (%)	1	1.8	1.92	4
5	Consumption of wood per capita cubic meter	0.11	0.09	0.65	0.05
Target 12.4 By 2030, achieve environmentally sound management					
1	Use of plastics (per capita per gram)	2.7	2	2	0
Target 12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse					
12.5.1	National recycling rate, tons of material recycled				
12.5.a	Re-cycling of plastics in manufacturing industries (% of industries)	24.5	42	25	90
12.5.b	Re-use of glass and metal products in manufacturing industries (% of industries)	7.2	29.3	7.2	90

Source: National Review of Sustainable Development Goals (2020)

The SDG Status and Roadmap: 2016-2030 has provided a brief account on this goal and has focused on agriculture, the primary backbone of economic activities (sustainable use of water resources, doubling land productivity and land use, reducing post-harvest losses in agriculture), forestry (consumption of biomass), energy (reducing the use of fossil fuels) and waste (liquid and solid industrial waste and plastic). The report has identified baseline indicators for 2015 and has proposed indicators for 2019, 2022, 2025 and 2030 (for details see Annex 1).

3. Environment and development issues in relation to SCP and the environment

Nepal is among the countries most vulnerable to climate change and is at high risk due to the country's fragile topography, climate-sensitive and subsistence livelihoods of the people, and their low adaptive capacity. Nepal's gross domestic product is highly dependent on climate-sensitive sectors such as agriculture, water, energy and tourism. With the ongoing climate change impacts, the national GDP is likely to suffer in the future. The economy of Nepal is experiencing uneven GDP growth, hovering between 1 and 8 per cent per year. Currently, the agriculture sector contributes significantly to the national GDP (27 per cent of total contribution). With a 7.3 per cent GDP growth rate from 2017 to 2019, Nepal made significant progress. However, due to the COVID-19 pandemic, which had a widespread impact on the national economy, GDP growth slowed dramatically in 2020 and 2021.

There has been a growing interest in foreign direct investment (FDI) in the last few years. According to the Central Bank of Nepal, foreign investors from 39 countries had invested NPR137.7 billion in 252 firms in Nepal as of mid-July 2016. This amount is 6.1 per cent of the GDP. The outstanding FDI was highest in the service sector (70.2 per cent). In March 2019, Nepal organized an investment summit where the world's business community committed investments in various projects by signing more than a dozen deals, mainly in the hydropower and service sectors. This suggests no immediate threat for the environment from highly polluting industries. However, compliance with environmental safeguards could get side-lined in a rush to increase the pace of development for rapid prosperity of the country. Overlooking environmental sustainability could later cause serious harm with high economic losses (ADB, 2020)[37]

Agriculture dominates Nepal's economy and has been the backbone of the country. Land, forests, minerals and water remain the key natural resources in Nepal for human survival, being the livelihood base of almost 80 per cent of the population and comprise almost one-third of the GDP. Rural populations, especially the poor, landless, indigenous people and women, rely heavily on forests and land resources for their livelihoods. More than 80 per cent of the total energy for cooking and 40 per cent of the fodder comes from forests.

Nepal, more than some other countries in the region, has managed to protect its native flora and fauna, as well as a variety of delicate ecosystems. This is, at least in part, driven by the government's reliance on revenue from eco-tourism. Two-thirds of the total gainfully employed population is engaged in the primary sector including agriculture, forestry, and fishery. Although considerable progress has been made in poverty reduction, the unsustainable use of natural resources has resulted in widespread environmental degradation which is now threatening the overall sustainable development process, especially the livelihoods and health of the poor.

Some of the important sectors and their trends are presented as below.

Population in Nepal

The population of Nepal has been steadily rising in recent decades. According to current projections, it is expected to surpass 30 million people in 2022 and will reach its peak of 35.32 million by 2049. After 2050, the population is expected to shrink, going down to 24.04 million by the end of the century[38]. Economic activities and economic growth tend to directly affect employment opportunities as well as the urban and rural population ratio. The number of urban households is expected to reach 5.7 million in 2040 from 2.7 million in 2015; on the other hand, rural households will grow to 3.9 million in 2040 from 3.3 million in 2015[39].

There is a wide variation in poverty between urban and rural areas and across geographical regions. Approximately 75 per cent of the total population is rural, with agriculture as their main source of living, and poverty in Nepal is mainly a rural phenomenon. The poor and the vulnerable live in more inaccessible

and unsafe areas with higher disaster risks, and they have minimal capacity to build resilience from natural hazards and disasters. A draft policy prepared by the Ministry of Land Management, Cooperative and Poverty Alleviation aims to bring down the poor population to 5 per cent by 2030 (submitted for cabinet approval).

Demographic distributions for the Business as Usual (BAU) Scenario are given in Annex 2.

According to the UNDP Human Development Report (2022)[40], the country is in the Medium human development category. The analysis shows that Nepal continues to incur substantial loss in human development due to persisting inequalities across gender, caste, geographic regions and other categories. As inequality in a country increases, so does its loss in human development, In 2019 and 2020, Nepal's performance was comparatively low in the areas of maternal mortality, share of parliamentary seats held by women, and women's participation in the labour force. Socioeconomic inequalities in Nepal on the basis of gender, caste, ethnicity, language, region and sexual orientation remain structurally ingrained and pervasive, although gender dynamics have changed dramatically over the last decade. These long-standing social hierarchies continue to restrict access to political influence and economic opportunities of the many marginalized groups. For instance, despite gender equality improvements, Nepal ranked 113 out of 153 countries in the Global Gender Gap (2022), and 143th of 189 countries in the Human Development Index in 2022.

Macro-economy

Nepal is considered one of the least developed countries (LCD) in the world, The Gross Domestic Product per capita in Nepal was last recorded at 1049.68 US dollars in 2021, whereas it was was only 498 US dollars in 2009. The government is pursuing an accelerated growth path for Nepal to become a lower middle-income country by 2030. The country continues to face regional, rural-urban, and social disparities. The incidence of poverty in rural areas was about twice as high as in urban area. Poverty among socially disadvantaged groups such as Dalits, Madhesis, Muslims, and indigenous Janajatis is significantly higher than the national average. The economy is characterized by low productivity resulting in low economic growth and inadequate number of good jobs. Insufficient and basic standard of infrastructure, uncompetitive business environment, and weak governance and institutional capacity underpin low productivity and competitiveness of the economy.

According to the Nepal Development Update report released by the World Bank in October 2022, Nepal's economy is expected to grow by 5.1 per cent in 2022-23 and 4.9 in 2024[41]. The growth of GDP is forecast to be moderate, largely reflecting the tight monetary policy for FY2023 necessary to stem the rise in imports, a marked decline in foreign exchange reserves and inflationary pressures. The update highlights that agricultural growth will likely be boosted owing to a normal monsoon, but the ongoing fertilizer shortages may adversely affect paddy production. Industry is expected to grow owing to increased generation of hydroelectricity and capacity utilization of industries. The report also notes that growth in services is likely to be moderate because of a slowdown in real estate, and wholesale and retail trade activities induced by credit control measures and a hike in interest rates.

Despite these constraints, Nepal has the potential to deliver higher and more inclusive growth by properly utilizing the huge potential of hydropower, irrigation, medicinal herbs and tourism. Agriculture too has a high potential if year-round irrigation could be provided in arable land, and if productivity is increased and transformed into commercial high-value products. The Government, through its periodic plans, has prioritized the infrastructure, tourism and agriculture sectors for socio-economic development and to achieve a higher economic growth rate. Energy is one of the pre-requisite sectors to support the Government's plan of achieving enhanced economic growth.

Annex 3 provides the growth rates of various economic sectors and their shares for the base year 2015.

Water resources

Nepal has a total drainage area of 194,471 square kilometres comprising more than 6,000 rivers. The rivers flow from mountains in the north to hills and plains in the south, and finally discharge into the Ganges (Ganga) in India—contributing 47 per cent of its monsoon flow. Nepal lacks an integrated river basin planning and management system, scientific water pricing and cost recovery mechanism. The country also lacks a sufficient hydrometeorological network, resources for management of the existing network, flood forecasting and warning systems, and a geo-seismic database. Lack of environmental databases and mapping, weak integration of environmental considerations in the planning of water resource development, poor implementation, lack of enforcement of environmental impact assessment, and lack of strategic environmental assessment for national plans and policies have constrained informed decision-making by policymakers. Weak enforcement of regulations regarding surface and groundwater pollution, watershed degradation and unsustainable water use, aggravated by the risks of climate change, have been the major reasons for declining freshwater resources in the country[42].

Despite an abundance of water, irrigation facilities are limited only to some arable lands. The majority of arable lands are reliant on rainwater. Lack of irrigation is the major hindrance to agricultural production and productivity. Nepal has low water security, with many people unable to access sufficient water to meet their domestic, agricultural and industrial needs. Many factors contribute to this situation. They are divided into specific challenges in different water use sectors and overall management, and drivers that are likely to challenge overall water security in the future.

Although the Water Resources Strategy (1992) and the National Water Plan (2005) call for developing an integrated approach to managing water, land and other resources in a coordinated manner for sustainable economic development, integrated watershed management is yet to be actually operationalized in the spirit of the strategy and plan. Some achievements in water conservation and management include expanding irrigation facilities to 1,311,000 ha; increasing national sanitation coverage from 30 per cent to 62 per cent between 2000 and 2011; increasing basic water supply coverage to approximately 85 per cent of the population; construction of small, medium and large irrigation structures using rainwater harvesting; and applying public–private partnership (PPP) models for hydroelectricity development[43].

The SDG Roadmap mentioned that Nepal has abundant water resources but only about 10 per cent of such resources have been used to generate commercial hydropower.

There are some emerging issues related to water resources management. With climate change, increasing rate of disasters, increasing demand and rising urbanization, access to clean water, water for irrigation, and water resources used for developing hydropower are limited. There have been some cases of enforced migration due to water scarcity in the hilly areas of Nepal. Box 1 presents brief findings of a case study on depleting water resources (NPC, 2013)[44].

Box 1: Depleting water sources: An emerging crisis in Nepal

The Kathmandu Valley is home to about 4 million of Nepal's 30 million inhabitants. The dream of making a decent living in the capital draws many more from rural areas. The resulting urbanization has seen Kathmandu's population grow by about 7 per cent a year, putting pressure on the city's already overwhelmed water system.

Water demand reached 377 million litres (100 million gallons) per day in 2017, but the daily supply is only 120 million litres (32 million gallons) per day in the wet season, and 73 million litres (19 million gallons) in the dry season. The net result has been a draining of the aquifers that has caused the water table to fall on an average 80 centimetres (31 inches) a year, exposing the groundwater to contamination by concentrated nitrates and arsenic. This feeds a vicious cycle that sees Kathmandu's inhabitants drilling even deeper for fresh water.

Water shortage is affecting food security and social development, and the number of environmental migrants is increasing every year. After failing to adapt to water stress, permanent or temporary migration is seen as the last option by people affected by drought

Source: Kathmandu Upatyeka Khanepani Limited (KUKL)

In addition to depletion of water, water bodies are being polluted because of unplanned sewage systems, overuse of pesticides and chemical fertilizer in agriculture, overuse of plastics and heavy metals, which further reduces the availability of usable water. As a result, economic sectors such as agriculture, tourism and industry are becoming less productive.

Agriculture

Evidence from around the world suggests that the poorest people are disproportionally affected by disasters. The poorest of the poor, who largely rely on agriculture, typically live on steep slopes under the constant shadow of landslides, or in low-lying flood-prone areas, and have virtually no resources with which to bounce back after a disaster.

According to the The Economic Activities Report 2020/21, published by the Nepal Rastra Bank (NRB)[45] The majority of Nepalese population lives in rural areas, and depends on agriculture for their livelihood. Agriculture has been prioritized as an important sector of development in policies and plans since Nepal's third periodic plan. However, the expected development of this sector has not been attained mainly because it never received priority in terms of investment. Given that a quarter of the contribution to the national GDP comes from agriculture, the sector receives only 10 per cent of its required budget from the state. Besides, as a result of improper mobilization of the allocated resources within the stipulated timeframe, the lack of timely capacity development of the responsible channels for agricultural development and deficiency of good governance, the expected rate of agricultural development has not been achieved. This has affected the food security of the country; from being an exporter of food, Nepal has now become a net importer. The lack of capacity of the state to manage natural disasters such as landslides, and its unstable land polices have obstructed the investment of the private sector in the agricultural sector. To mitigate the problems arising from natural disasters and other related dangers, there are no insurance schemes but several management complications[46]. In the absence of a favourable policy environment, it has also been difficult to attract international investments to agri-business and its industrialization.

Agriculture is key to Nepal's economic development as well as to sustaining the livelihoods of about two-thirds of its population. Agricultural production is largely at a subsistence level, and its contribution to the GDP has been decreasing over the years. In the fiscal year 2020/21, agriculture contributed 25.8 per cent to the country's GDP**,** whereas 61.1 per cent of came from its service sector. The production, productivity and the area under cereal crops have been increasing over the years. The production of cereals reached 10,953,655 tonnes in 2020, but the total land under agriculture declined from 42,590 thousand sq. km in 2001 to 42,210 thousand sq. km in 2020[47].

Nepal's Agriculture Development Strategy 2015-2035[48] provides guidance for both production (crops, livestock, fisheries, forestry) and processing and trade (storage, transport and logistics, finance, marketing). The vision of "a self-reliant, sustainable, competitive, and inclusive agricultural sector that drives economic growth and contributes to improved livelihoods and food and nutrition security", requires the acceleration of agricultural sector growth through four strategic components related to governance, productivity, profitable commercialisation and competitiveness, while promoting inclusiveness, sustainability, development of the private sector and connectivity to market infrastructure.

Despite being an agrarian country, Nepal suffers from food insecurity. Multiple factors such as low production and lack of access to knowhow, infrastructure, and knowledge of food management make the country vulnerable to food insecurity. The high hills and mountainous regions are particularly susceptible to hunger. According to the World Food Program (WFP), 41 per cent of children under five years are stunted. The prevalence of stunting in the hills and mountains of the mid and far western regions is extreme, with rates above 60 per cent (World Food Program, 2015)[49].

The import of agricultural products has been steadily increasing. In 2021/22 Nepal's import expenses on agricultural products were Rs 378.60 billion, or Rs 55 billion (17%) more than in the previous year. Overall, the share of expenses on agricultural goods was 19.71 per cent of the total imports of Rs 1.920 trillion in 2021/22. On the other hand, the country exported agro- products worth Rs 125.51 billion, which constituted 63 per cent of its export earnings during the review period[50].

Based on the SDG Roadmap, Nepal's agriculture production per unit area is low, but there is room for doubling land productivity rather than expanding cultivated land. Currently, 80 per cent of the cultivated land is being used for cereal production, and cultivable land is shrinking due to urbanization and other alternative uses. Thus, the target for land to be available for cereal production is set at 75 per cent of all cultivated land.

Agriculture is dependent on various ecosystem services as mentioned by Millennium Ecosystem Assessment (MA, 2005). According to this study, ecosystems provide supporting services such as nutrient recycling, primary production and soil formation, provisioning services such as genetic resources (for crop improvement), water, bio-fertilizers, minerals, medicinal resources, energy; regulating services such as pollination, pest and disease control, all of which are important for improving agriculture sector performance (MA, 2005)[51].

Forestry

In 2015, forest area covered 40.36 per cent (5.96 million ha) of total land area in Nepal, of which 3.56 million hectares have been marked as potential area for community forests (Master Plan for Forestry Sector, 1989)[52]. The forest cover is rapidly declining[53]. Nepal lost 2.72 million hectares (ha.) of forest with more than 10 per cent crown cover between 1965 and 2013, with an average annual forest clearance of 56,710 ha. Of the total area, 1.76 million ha. was degraded to shrub land. Altogether, 0.96 million ha. of forest and shrub land was estimated to have been lost to farming, urban expansion and infrastructure development, or left barren. About 94,659 ha. of forest area was encroached by 121,234 households. The alarming rate of loss has affected natural habitats, biodiversity, and ecosystems[54].

Forests provide various kinds of ecosystem and livelihood benefits. They not only support the rich ecosystems within the forest areas but are also an important vehicle for improving livelihoods and economic conditions of the millions of poor communities across the country. A total of 118 ecosystems have been identified in the country, of which 112 are forest ecosystems. In 2018, agriculture and forestry contributed 27.1 per cent to the GDP with direct products, and 27.5 per cent with environmental services. In 2017/18, forests supplied 78.14 per cent of rural energy needs in the form of fuelwood[55].

Understanding the tremendous value of forest ecosystems, Nepal has committed to maintain a sustainable forest cover, a commitment also highlighted in its Constitution. Similarly, the Forest Policy 2015 has in place a strategy to maintain 40 per cent of land cover as forest for sustainable forest management and to enhance the production of forest goods and services, which will be ultimately beneficial for biodiversity that depends on the forest and other ecosystems[56].

The Forest Policy 2015 is the key policy guideline for conservation programmes for forests, plant resources, wildlife, biodiversity, medicinal plants, and soil and watershed. The policy calls for sustainable and climate-resilient management of forest ecosystems and watersheds; and that these should be sustainably managed through a decentralized, competitive and well-governed forest sector that provides inclusive and equitable income, employment and development opportunities. Forest encroachment due to rural-urban migration has become a major cause of loss of forest area. Learning lessons from the past, the government has declared working directives for offsetting forest clearance by development projects and enforcing them to plant ten trees for each felled tree, and guarding them for five years.

Community forestry

Community forestry (CF) has been recognized as the most successful participatory approach and a new development initiative of Nepal's forestry sector in rehabilitation of forests and improving regeneration.

This mode of forest conservation is effective as economic benefits to sustain rural livelihoods have been linked with the community forestry programme. Forest User Groups, or local beneficiaries, manage the forest and utilize forest resources in a sustainable manner, based on an annual plan approved by the district forest office. Studies on community forestry's impact revealed a reduction in fuelwood extraction among community forest user groups[57]. Hence, it is also directly linked to sustainable consumption and production. This forest-management regimes demonstrates how ecosystems can contribute to human well-being if they are managed properly.

According to the Department of Forests and Soil Conservation, the main impacts of community forests are increased supply of forest products; empowerment of women, poor and the disadvantaged groups; promotion of income generation and community development activities; and improved livelihoods of forests users. The intervention has also significantly improved forest coverage and protected ecosystem services. An example of sustainable forest management practice in Nepal is demonstrated through the SWITCH-Asia project, which promoted Lokta handmade paper (see Box 2).

Box 2: Lokta handmade paper

Handmade paper is a traditional craft in Nepal. It is currently produced by SMEs in the rural mountain regions, using a local plant called lokta. The major part of the population has very limited resources and employment possibilities. The sector has a significant economic and poverty reduction potential given that 90% of the handmade paper and products produced in Nepal are exported. The inefficient resource extraction and production processes, however, do not allow farmers and entrepreneurs to exploit the full economic potential considering sustainable forest management.

SWITCH-Asia's project sought to improve the extracting method of the lokta plant, to increase the efficiency of and reduce the pollution from paper making, to strengthen the capacity of Nepal Handmade Paper Association and to further develop the European market.

Activities:

- Social and environmental challenges associated with the paper production adressed;
- Lokta cutting and forest management training conducted – 1,195 lokta cutters benefitted from the training;
- Paper making training organized – 727 paper makers benefitted;
- Training on waste water management conducted – 30 entrepreneurs were trained to use waste water to clean up a polluted environment.

In addition, Bhattarai (2011)[58] reported that the annual direct monetary benefit per Community Forest User Group per year is NRs. 710,000. This indicates that the benefits are about 7 times greater than the costs incurred by them, even without considering the indirect benefits. Of the total, about 80 per cent benefits come from forest products, 11 per cent from time saving and 7 per cent from employment generation due to better management of community forestry.

Biodiversity

Nepal is relatively rich in biodiversity due to its great geographical and climatic diversity. Nepal occupies 0.1 per cent area on the global map, whereas it is home to 3.2 per cent of the world's flora and 1.1 per cent of the fauna[59]. Of its total forest area, 23.39 per cent has been declared as protected area. Various legal instruments guide ecosystem and biodiversity conservation, and protection of endangered flora and fauna. Nepal is a party to more than 22 international conventions, including the Convention on Biological Diversity, and is a member of the Nagoya Protocol on access and benefit sharing. Nepal is also a member of the intergovernmental panel on biodiversity and ecosystem services.

Deforestation and collection of riverbed aggregates in the fragile Chure hills (1.9 million ha.) have caused massive erosion and subsequent sedimentation of rivers in the Terai region, causing floods resulting in loss of agricultural land and wildlife habitats. Uncontrolled livestock grazing and forest fires are also adversely affecting the forests. The Terai region with 73.6 per cent forest cover had an annual deforestation rate of 0.18 per cent in 1999–2010. Destructive fishing, ad hoc location and construction of dams across rivers, and wildlife poaching, too, have threatened biodiversity conservation.

Biodiversity provides the basis for provisioning of ecosystems, as mentioned in the MA (2005) report. It plays an important role in managing ecosystems, releasing ecosystems services and supporting people's

livelihoods, and makes a direct contribution to SCP. Since the damage to biodiversity has been mostly due to human activities and infrastructure development and not due to serious industrial pollution, it is still possible to reverse the degradation of ecosystems and biodiversity in Nepal through sustainable development measures. These measures include promoting SCP by raising awareness about sustainable consumption and production practices, mobilizing public and private investment in nature-based solutions and sustainable agriculture, improving environmental governance and the participatory approach, and promoting resource efficiency and circular economy in both agriculture and forestry sectors.

Energy

Energy sources in Nepal are categorized as traditional, commercial and alternative. Alternative energy is synonymous with new, renewable and non-conventional forms of energy. Traditional sources of energy include biomass fuels – particularly fuelwood, agricultural residues and animal dung used in the rural areas – and account for 70.47 per cent of energy consumption. Energy from petroleum products accounts for 12.53 per cent and hydropower for only 3.39 per cent of the total energy consumption.

Nepal relies heavily on traditional energy resources, as it does not have any significant deposits of fossil fuel. In addition, electricity demand in the country has far outgrown its supply capacity, leading to load curtailments and increased dependence on imports from India. This has become a major challenge to attaining energy security for the country, but on the other hand, great opportunities exist for renewable energy (RE) and energy efficiency (EE) solutions.

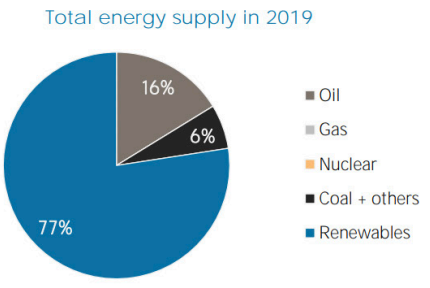
According to the International Renewable Energy Agency's country profile 2019[60], although 90 per cent of Nepal's population has access to electricity for lighting, the supply has been unreliable and inadequate. Nepal has long recognized that the development of its large hydropower potential is an important cornerstone for its poverty reduction and economic growth efforts. The power sector lacks adequate investment, partly due to poor regulatory and investment environment for private sector participation. Around 77 per cent of Nepal's energy comes from renewable sources, predominantly bioenergy (95 per cent). (See Figure 1).

TOTAL ENERGY SUPPLY (TES)

Total Energy Supply (TES)	2014	2019
Non-renewable (TJ)	86 748	135 023
Renewable (TJ)	456 155	463 117
Total (TJ)	542 902	598 140
Renewable share (%)	84	77

Growth in TES	2014-19	2018-19
Non-renewable (%)	+55.6	-12.4
Renewable (%)	+1.5	+1.3
Total (%)	+10.2	-2.2

Primary energy trade	2014	2019
Imports (TJ)	97 443	144 542
Exports (TJ)	12	385
Net trade (TJ)	- 97 431	- 144 157
Imports (% of supply)	18	24
Exports (% of production)	0	0
Energy self-sufficiency (%)	83	77



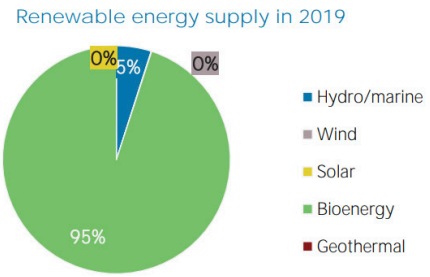
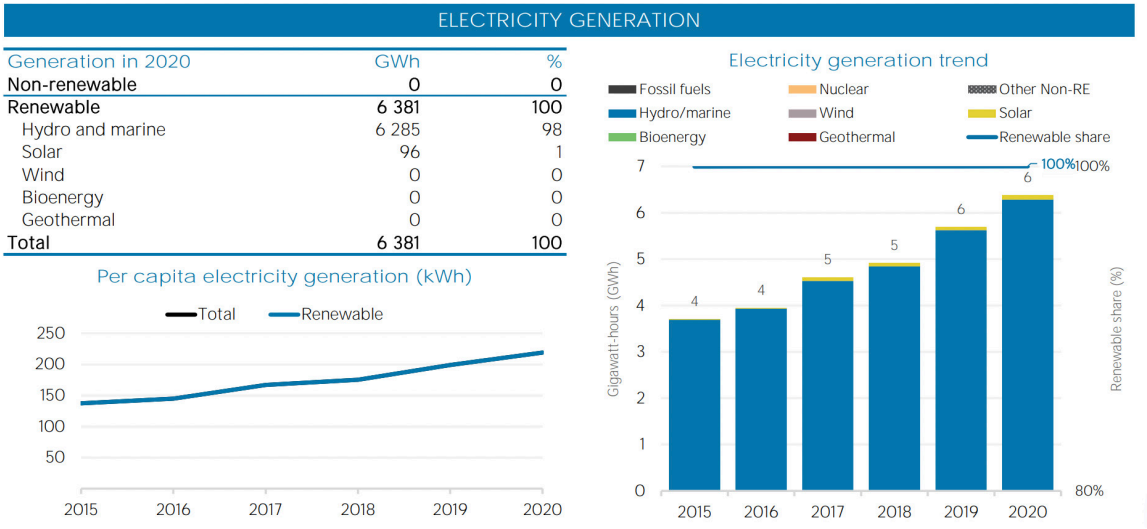


Figure 1: Nepal's energy supply status



Source: IRENA (2022)

Figure 2: Electricity generation in Nepal

The electricity generation is predominantly from renewable sources, hydro power accounting for most of the electricity in Nepal (Figure 2). Both solar and hydro energy are renewable resources with a huge potential to expand.

Given Nepal's economic growth and development ambition, the demand for energy will increase sharply. Fuelwood (bioenergy) is the largest energy resource and currently provides 70 per cent of the total energy demand.. In aggregate, the share of traditional fuels (fuelwood, agricultural residues and dung) is 77.63 per cent, commercial fuels (coal, petroleum and electricity) is 19.88 per cent, and renewables (solar, biogas, micro-hydro and wind) is 2.49 per cent.

Renewable energy helps to reduce greenhouse gases, air and land pollution, supplies energy for local production activities and makes them more efficient. Hence, renewable energy technologies play an important role in promoting SCP.

Despite a huge potential for renewable energy such as hydropower, solar power and wind energy, these resources have not been sustainably captured due to geographical, technical, political and economic reasons. Regardless of the reasons, Nepal has continued to prioritize the generation and utilization of clean energy, particularly through hydroelectricity. For the last two decades, micro-hydro, solar, biogas and improved cook stoves have been promoted in rural Nepal in line with its National Rural and Renewable Energy Programme.

According to Nepal's NDC (2016), its plans for generating clean energy are as follows:

- 4,000 MW of hydroelectricity by 2020 and 12,000 MW by 2030
- 2,100 MW of solar energy by 2030 with arrangements to distribute it through the grid
- Additional 220 MW of electricity from bio-energy by 2030
- Additional 50 MW of electricity from small and micro hydropower plants
- Increase the share of biogas up to 10 per cent as energy for cooking in rural areas, and
- Equip every rural household with smokeless (improved) cooking stoves (ICS) by 2030.

Eight renewable energy projects were registered under the United Nations Framework Convention on Climate Change as carbon reduction projects earning NPR 1,000 million under carbon trading[61].

Nepal aims to generate 15,000 MW energy by 2030. However, the hydropower policy lacks strategic environmental assessment (SEA) for ensuring environment friendly development of the energy sector.

Land management

Land is an important natural resource. It provides space for crop cultivation, forests, protected areas, human settlements, public infrastructure and industry. The use of land and soil is very important in sustaining human life. More than 90 per cent of Nepal's population depends on land for their basic needs.

Land is used for maintaining biodiversity and generating ecosystems services. Proper management and use of land is critical for promoting SCP.

Soil erosion is the main cause of land degradation. Various studies indicate that the annual soil loss in Nepal ranges up to 105 tonnes per hectare, with 34 per cent caused by water-induced erosion, 60 per cent mass wasting (geological erosion), and 3 per cent wind erosion[62].

Other causes of land degradation in Nepal are land clearance, unplanned urban sprawl due to rural-urban migration, and depletion of soil nutrients due to poor farming practices. The maximum estimated soil erosion in the country occurs in the Mahabharat Hill (6300-4200 tonnes/ square kilometre/year).

Land management has been a priority of the government. Some of the major work on land management includes preparing land-use maps; initiating systematic record keeping of all types of land in the country; documenting data maps of protected areas and forests; and promulgation of the National Land Use Policy (2069 BS), among others. The government, however, has faced many challenges in effective land management in Nepal. These include lack of integrated land-use planning, management of human settlements and urbanization; creating and applying special zones for industries and business estates; use of agricultural land for non-agricultural uses; keeping agricultural land fallow; and encroachment of government and public land in the name of resettlement. Other challenges include failing to ensure industrial land management and systematic settlement planning; and loss of soil and soil fertility due to unsustainable land use such as construction of rural roads (see Box 3).

Box 3: Rural roads – their impact on environment and people's livelihoods

A study was carried out by PEI /NPC revealed that the use of heavy equipment for road construction, such as bulldozers and excavators, started to increase in Nepal in the last two decades. This resulted in an increase in unsustainable road construction because of (i) no drainage arrangements; (ii) steep gradient; (iii) no protection structures in critical places; (iv) no protection for biodiversity; (v) no operation and maintenance arrangements or fund.

As a result of climate change, rainfall is expected to become increasingly intense in Nepal and, hence, unsustainable and unstable roads are likely to cause increasingly greater environmental damage and affect livelihoods of people living nearby. However, guidelines have now been prepared to construct ecologically sound and inclusive rural roads, that ensure that no individual, community or social group is left behind or prevented from benefiting from improved infrastructure. Environmental Impact Assessment is conducted before extraction of sand, gravel and stones, and before building rural roads.

Source: http://www.unpei.org/sites/default/files/e_library_documents/Rural%20Roads%20Report%20Summary.pdf

Industry

The industrial sector began to emerge in Nepal only in the 1980s, consisting of mainly cottage and medium-scale industry, which did not cause significant levels of pollution. Several industrial estates were set up to promote industrial development, which succeeded to some extent.

In developing countries like Nepal, the industrial sector is becoming an important backbone of the economy. It has a key role in income generation, creation of employment opportunities and poverty alleviation.

Attracting investment, sustainability in the use of technology, and increasing the contribution of industry to the GDP are challenges faced by the Nepalese industrial sector. The contribution of industrial production to GDP is estimated to have remained at 5 per cent in the recent years, whereas two decades ago it was around 10 per cent. The Government of Nepal has been using different strategies to attract foreign investment through its FDI policy.

Industries in Nepal include the service industry (tourism, hotels and restaurants); carpets and textile weaving, and leather production; rice, jute, sugar and oilseed processing; manufacture of instant noodles and beverages; cigarette making; and cement, paint, brick and steel, iron and allied industries. In the face of lax government monitoring, most of the industries dispose of their waste in the open, polluting air, water and soil. Suspended particulate matter is discharged mainly by brick kilns (70%) and the cement industry (27%)[63]. Nevertheless, the industrial units are mostly small to medium sized, and the pollution generated by them is still reversible.

Most of the local industries in Nepal are dependent on nature-based raw material such as fibre, medicinal herbs, water and minerals. At the same time, they also use energy and release pollutants which affect air, land and water bodies. Managing industries in a resource efficient way by using innovative approaches and technologies, therefore, is very important in order to promote SCP approaches. The industrial sector in Nepal is still small but growing steadily. Although adequate and stable power supply is now available, the production and productivity of industrial goods is not competitive.

Tourism

Tourism is an important industry in Nepal and is the largest source of foreign exchange and revenue. It is a productive business activity supported by Nepal's abundance of natural beauty, ecosystems and landscapes. Biodiversity contributes significantly to the attractiveness and quality of tourist destinations. Although tourism could have a significant adverse impact on natural resources and the environment, it also contributes to conservation through raising awareness about their importance, investment in natural resources and income generation.

The foremost tourist attractions in Nepal are concentrated in key biodiversity sites and protected areas. In addition, mountains, rivers, wildlife, forests and associated cultural diversity are major attractions. National parks and wildlife reserves are the most visited places for nature-based tourism. Nature-based tourism and eco-tourism therefore have the potential to generate greater employment and increase the country's GDP.

In 2017, this sector directly contributed 3 per cent to the GDP, and earned more than 15 per cent of the total foreign exchange. Nepal received 940,000 international tourists in 2017, an increase of 24.8 per cent from the previous year. More than 427,000 people in Nepal were directly employed in the tourism industry in 2016, which was 2.9 per cent of the total employment. The total number both directly and indirectly employed by the industry in 2016 was about 945,000.

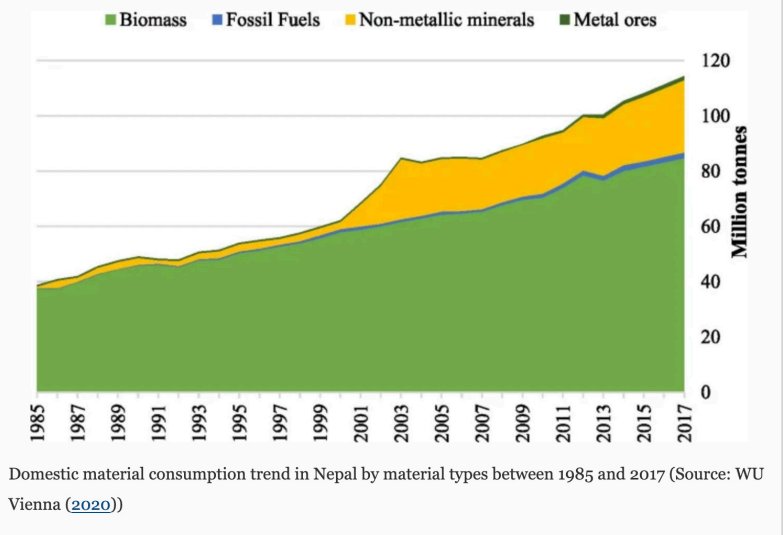
Although the tourism sector makes a fair contribution to economic growth, it also faces challenges. Overuse of resources and pollution are major issues which might inhibit the process of SCP in Nepal. The tourism industry could be a fundamental building block of development in Nepal, but it has to be more eco-friendly and adopt sustainable tourism approaches. Mountain tourism encouraged local people to open lodges and restaurants, which use firewood for cooking and heating, causing forest degradation. Waste is left behind by the mountaineers despite regulations to bring back the waste they generate. Although the introduction of eco-tourism and homestay facilities has increased public awareness about the need to conserve natural resources while attracting tourists, a significant shift in the conservation approach is yet to happen.

Material consumption

As in the rest of the world and the Asia-Pacific region, the Asian least developed countries (LDCs) such as Bangladesh, Cambodia, Laos, Myanmar and Nepal have doubled their domestic material consumption (DMC) in the last two decades. Most LDCs aim to reduce their material consumption (e.g., biomass and

fossil fuels) via delivering commitments to the two important multilateral agreements—the Paris Climate Agreement and the environment-related sustainable development goals 7, 12 and 13. SDG 7 relates to improving access to affordable and clean energy, SDG 12 pertains to the responsible consumption and production of resources, and SDG 13 emphasizes enhanced climate actions. These commitments, together with Nepal's aspiration to seek promotion from the LDC status of the United Nations (UNDP 2021), has put the country in a unique position of delivering the multilateral agreements' goals while increasing its economic output. SDG 12 and LDC graduation can co-exist and complement each other, that is, LDCs can follow the environmentally sustainable growth pathway. However, environmental sustainability objectives should be integrated into economic growth strategies, which will also help achieve SDG 13 (Murshed et al. 2021). This is relevant for South Asian nations with two LDCs, Nepal and Bangladesh.

Material footprint refers to the amount of primary materials required to fulfil the annual demand of a person, and is considered as an indicator of the level of use of resources and the standard of living. For Nepal's DMC by material types between 1985 and 2017, see Figure 3.



Domestic material consumption trend in Nepal by material types between 1985 and 2017 (Source: WU Vienna (2020))

Figure 3: Domestic material consumption trend in Nepal by material types (1985-2017)

Resources, such as energy, biomass, minerals, fossil fuels, metals, water and land are fundamental for the well-being of people and the planet. The rapid growth of resource use in Nepal in recent time has made possible the improved economic growth but it also has implications for the sustainability of resource use and making our environment unhealthy.

The material footprint per capita in Nepal has been increasing trend. In 2014, the material footprint in Nepal amounted to 2.4 tons per capita[64]. At the global level, the consumption level in 2010 was about 9 tons per capita (UNEP, 2011). Although the per capita consumption in Nepal is low compared to global statistics, it is steadily increasing. It is also noteworthy that the nature of resource use has shifted from mainly biomass to mainly mineral materials and petroleum products. In addition, there has been a sharp increase in per capita consumption of energy and water. These trends indicate a transition from a traditional, agricultural and land-based economy to an increasingly industrial and urban economy, which has a direct impact on SCP.

According to Baniya and Aryal (2022)[65], considering the looming LDC graduation in 2026, the recent economic downturn from the COVID-19 pandemic and the poverty implications of the Paris Climate Agreement for the LDCs, the policymakers in Nepal and other LDCs face a dilemma. They ponder whether to focus on economic growth or sustainable development objectives, including SDGs 7, 12, and 13. The LDC graduation scenario presents itself as a suitable DMC pathway in the future for its potential to resolve poverty and resource accessibility issues prevalent in many LDCs, including Nepal. However, it is material-intensive and unsustainable on Nepal's part in delivering the Paris Climate Agreement and the SDGs. Thus, the understanding of sustainable growth as a growth pathway that helps LDCs achieve LDC graduation by 2030 (SDSN, 2014) appears to be confusing. Nonetheless, reflecting on the viewpoint of some researchers

about wealthy nations potentially giving up some of their material consumption for LDCs' future growth (Duro et al., 2018; O'Neill et al., 2018; Schandl et al., 2018; Giljum et al. 2014), it is natural to give more weightage to economic growth and social outcomes in the LDCs, including Nepal. However, the important question is: Can equitable allocation of material use help LDCs achieve their social outcomes?

Use of plastics

The arrival of tourists in Nepal, which started in the early 1970s, introduced new and non-biodegradable materials such as plastic, cans and fast-food packaging—transforming the very nature of solid waste in the country. The rapidly changing consumption behaviour has increased the rate of waste production—both in volume and type—particularly in urban areas.

A study conducted by ADB in 2013 in 58 municipalities found that the average municipal solid waste collection efficiency in Nepal was 62.2 per cent and the disposal rate was merely 37 per cent (ADB, 2013). The figures are bound to be dismal after 293 municipalities having been established, many of them with rural characteristics. In the absence of sanitary landfill sites, the collected waste is generally disposed of in rivers, natural drainages or forest areas. The proportion of household waste composition was 66 per cent organic waste, 12 per cent plastic and 9 per cent paper. Establishing the 3R (reduce, reuse and recycle) mechanism could help significantly. Composting organic waste, minimizing waste generation, and recycling would largely reduce the woes of waste management. Management of medical waste is also a challenge, with most hospitals and nursing homes disposing of hazardous medical waste mixed with common solid waste. Only a few hospitals have functional incinerators to safely burn their medical waste.

The Solid Waste Act 2011 and the Solid Waste Management Rules 2013 are the two key legal provisions for solid waste management. Both have made the municipalities responsible for the construction, operation and management of infrastructure for collection, treatment and final disposal of solid waste by following the 3R principle. A study carried out by the South Asian Network for Development and Environmental Economics (SANDEE) revealed that a plastic-bag ban across Nepal could prevent 1,250 million single-use plastic bags from entering the country's environment every year. Given the harmful impact that plastic bags have on the environment, a complete ban should become a key part of the government's environmental policy[66]. Nepal government had made an effort to ban plastic in 2015 but it has not been successful. Working on managing plastic waste has been an important area to protect our environment and support SCP approaches. Public awareness is vital for effective waste management. A stringent enforcement of the "polluters pays" mechanism may discourage and minimize unnecessary waste generation.

Use of pesticides

Unwise use and overuse of pesticides has been a serious issue for Nepal's environment and human health. Pesticide use in the country started in the early 1950s in agriculture. Since then, its use has been increasing mainly to control insects and pests, and also to reduce damage to agricultural products during storage. Overuse of pesticides not only has a harmful effect on the environment, biodiversity and human health, it also results in pesticide-induced pest resurgence. GC and Ghimire (2018)[67] reported that farmers were applying chemical pesticides at high dose and frequency because of a lack of awareness regarding the harmful effects such as cancer, improper foetal development, Parkinson's disease, birth defects, altered growth, and acute and chronic toxicity. Pesticides also cause severe harm to soil and aquatic biodiversity. Cases have been reported of fish and other aquatic animals having died in many rivers and ponds due to overuse of pesticides.

The Stockholm Convention on Persistent Organic Pollutants (POPs) entered into force in May 2004, and Nepal became Party to it in 2007. Nepal had prepared a baseline inventory of POPs during 2004-2005, after which the initial National Implementation Plan (NIP) was prepared in 2007 to implement the convention. Nepal also managed the identified stocks of obsolete pesticides including POP pesticides (74.51 MT) and Polychlorinated Biphenyls (PCBs – 54 MT of PCBs in oil and 155 MTs of PCB-contaminated equipment) in an environmentally sound manner[68]. However, the legal and institutional systems to regulate the import, production and use of hazardous and toxic chemicals have not been as effective as desired, and regular and systematic monitoring of POPs, except pesticide monitoring in food items, is lacking. All these issues

have to be addressed to make the environment and ecosystems safe so that they produce safe and adequate environmental services that help in SCP approaches.

Connecting the dots

Activities of the sectors discussed are based on their respective sectoral strategies. Many of the sectoral strategies and programmes have some activities that can be linked with SCP, but because of the lack of overarching policy and legal provisions, they remain uncoordinated and unreported. Some sectors have had a few good programmes and learning; for example, the work done by the Ministry of Forests on the protection of ecosystem services, promotion of nature-based income generating activities and promotion of the EIA process, and the work of the Ministry of Agriculture on promotion of organic agriculture and on sustainable food system transformation. Nor have some good practices, outputs and learnings been adequately shared. It is now important to connect these good learnings and see them from the point of view of sustainable consumption and production. These connections and interlinkages are useful to maximize collaboration, set priorities for action, generate evidence, contribute to dialogue and learning, leverage knowledge production, and finally, to develop robust and coherent strategies to promote and implement SCP.

4. Programmes carried out to support SCP and resource efficiency in Nepal

In addition to government efforts in managing sustainable resources management, there have been programmes that have more specifically contributed SCP principles and approaches.

SWITCH-Asia Programme

The EU SWITCH-Asia Programme has supported Nepal to move towards adopting SCP principles through various grant projects. The programme aimed to promote behavioural and technological changes in order to produce goods and services more sustainably. In general, the projects focused on how small- and medium-sized enterprises (SMEs) do business, which affects the consumers and, in turn, supports SCP principles and practices. Some of the projects included (also see Annex 4):

- Up-scaling the production and consumption of bio-energy to reduce carbon emissions and enhance local employment
- Green Homes: Promoting sustainable housing in Nepal
- Sustainable production of commercially viable products from municipal waste through Public–Private Partnerships in Green SMEs, Green City, Green Agro Products, and Green Employment Generation (PPP for 4Gs)
- Enhancing sustainability and profitability of the carpet and pashmina industries in the Kathmandu Valley
- Sustainable and efficient industrial development in Nepal and Bhutan/SEID (a multi-country project)
- Vertical shaft brick kilns (VSBK) and other sustainable construction practices (SCPs)
- Proposal for enhancement of sustainable production of lokta handmade paper production in Nepal.

Poverty-Environment Initiative

The Poverty-Environment Initiative (PEI) in Nepal supported the country's efforts to achieve a greener and more inclusive development path. The main focus of the programme was to help in poverty reduction and inclusive development by integrating climate and environmental concerns and opportunities for the poor into national and local development planning, budgeting and economic decision-making processes. The initiative provided support for capacity building of the National Planning Commission to integrate pro-poor environmental and climate measures into national planning, budgeting and monitoring processes and incorporating poverty-environment indicators in the national Poverty Monitoring System. It also assisted in reviewing national development budgetary processes and financing mechanisms to address pro-poor natural resource management priorities and climate change concerns; and developing measures to improve access to financial resources for investing in sustainable natural resource management and climate resilience.

Nature Conservation National Strategic Framework for Sustainable Development

The National Planning Commission developed the Nature Conservation National Strategic Framework for Sustainable Development (NCNSFSD) in 2015. Considering the role of ecosystem services and natural capital in sustainable development, the framework mainly encourages sectoral ministries to integrate conservation and environmental concerns in the sectoral and national development plans.

Nepal SDG Status and Roadmap

The NPC has been implementing remarkable work on the SDGs implementation processes at the national level. Nepal is committed to working its best towards achieving the SDGs by or before 2030. For this, Nepal has undertaken various measures including creating an enabling environment to facilitate the process. This includes the SDG Roadmap which takes stock of Nepal's present development status and provides milestones for 2019, 2022, 2025 and 2030.

5. SDG interlinkages

The ambition of Nepal to achieve net-zero emissions by 2045 has clear links to the achievement of the Sustainable Development Goals by 2030 and beyond. Nepal has charted its economic, social and environmental development course by endorsing the use of 169 targets and 479 indicators to achieve its SDGs by 2030.

The 14th Plan (2016/17–2018/19), which began in July 2016, was the first national plan to mainstream and internalize the agenda of the SDGs by being aligned with the SDGs. It had five major pillars: (i) infrastructure (SDGs 6, 7, 9 and 11), (ii) social (SDGs 3 and 4), (iii) economic (SDGs 1, 2, 8, 9, 10 and 12), (iv) governance (SDGs 16 and 17), and (v) cross-cutting (SDGs 5, 13 and 15). The 15th Plan (2019/20 to 2023/24) is currently in progress, and will be crucial in the efforts towards achieving the SDGs.

The 15th Plan has incorporated graduation from the LDC status and attainment of the SDGs as its intermediate milestones. It has continued to internalize and mainstream the agenda of the SDGs in national goals, strategies and targets.

The plan includes, for the first time, a long-term perspective with a 25-year vision. It follows the motto 'Prosperous Nepal, Happy Nepali', to achieve which it has set10 national goals: high and equitable national income; development and full utilization of human capital potentials; accessible modern infrastructure and intensive connectivity; high and sustainable production and productivity as prosperity; well-being and decent life; safe, civilized and just society; healthy and balanced environment; good governance; comprehensive democracy; and national unity, security and dignity as happiness.

The strategic interventions identified in the areas of economic growth, employment, infrastructure, industrialization, and sustainability in consumption and production would help achieve the targets of SDGs 8, 9, 11 and 12.

Climate action and SCP are the central cross-cutting policy goals in achieving many of the goals outlined in Nepal's SDG roadmap. The SDGs include both direct and indirect targets and indicators aimed at achieving low-carbon, climate resilient development in Nepal. Climate action has been fully integrated into the SDGs as a key means of achieving the Roadmap's sectoral goals of sustainable development.

A systematic analysis of the interlinkages can provide more coherent and effective decision-making, and facilitate better follow-up and monitoring of progress. No systematic analysis has been carried out in the Nepalese context so far. But a simple analysis could identify possibilities of synergies and trade-offs and provide a starting point for policymakers and others stakeholders to set policy priorities and devise implementation strategies that enhance stronger connections among the SDGs. These, in effect, will help in achieving long-lasting sustainable development outcomes. All SDGs interact with one another by design. They are an integrated set of global priorities and objectives that are fundamentally interdependent.

SCP is one of the important goals of a cross-cutting nature, and some of its integral attributes link to sustainability. The goal embraces the concept of life cycle assessment and systems thinking (Box 4), which, if used properly and adequately, cuts across most of the SDGs and many targets. The following text provides some links of SDG 12 with other goals and targets

Box 4: SCP is based on life cycle and systems thinking

In order to assess and enhance sustainability, it is essential to understand systems thinking, and life cycle perspective of a product or service. This would help to comprehend all impacts associated with a product from production to disposal including consumption of natural resources, energy use as well as emission of pollutants during these processes. A life cycle perspective therefore often reveals surprising facts about environmental impacts associated with products. It can reveal what stage of a product's life cycle is causing the largest environmental burden and thereby help in guiding improvement efforts. For example, most of the environmental impacts of automobiles are caused during the use phase (emissions of carbon dioxide and other pollutants) for which that has to be the primary focus of intervention. For many food products the highest environmental impacts are caused through food and material losses, highlighting the importance of considering consumption behaviour when identifying the environmental hotspots of the food sector. These resource efficiency and sustainable consumption and production issues are as useful in development management as including SDGs.

A shift towards circular and resource efficient production and consumption pathways can reduce pollution on land and in water (SDGs 14 and 15), promote management and efficient use of natural resources, such as water (SDG 6), lead to innovation in industry and energy infrastructure, and reduce greenhouse gas emissions (SDGs 7, 9 and 13), and provide decent jobs to reduce poverty and inequality (SDGs 1, 5, 8, 10 and 11).

Sustainable management of natural resources (target 12.2), including resource use efficiency of water–energy material flows (targets 6.4, 7.2 and 11.b) would improve water quality (target 6.3), promote the use of renewable energy (target 7.3), and encourage waste minimization through 3Rs (target 12.5), and sustainable use of ecosystems (target 15.1).

The introduction of a circular economy (target 12.5) would stimulate an increase in resource productivity (target 8.4) and an accelerated shift away from fossil fuel to renewables. It can create new jobs (target 8.5) and business opportunities, thus reducing poverty and inequalities (target 10.3). This would help achieve sustainable urbanization, sustainable transportation (targets 11.2 and 11.3) and sustainable and resilient infrastructure (target 9.4), which would contribute to sustainable use of terrestrial ecosystems (SDG 15). Economic growth enables population to have advanced technology (target 8.2) and to have greater access to better education (target 4.7). Quality education (SDG 4) is crucial for changing people's mindsets on the relationship between nature and economic growth, and will lead to behavioural change amongst both producers and consumers to promote more sustainable, resource efficient and less wasteful industrial production (target 9.2).

Waste reduction and prevention of plastic and hazardous chemicals waste (target 12.5) will reduce contamination of marine and terrestrial ecosystems and animal habitats (targets 14.1, 15.1 and 15.5), which currently affects fish stocks and the productivity of soils (target 2.4), with impacts on human health as well (target 3.9).

6. Conclusion and the way forward

Conclusion

Nepal is in a stage of transition towards becoming a politically stable country. Like other developing Asian countries, Nepal is modernizing and has set itself a target of more than 7 per cent annual GDP growth. The main challenge for Nepal now is to achieve the dual objectives of economic development, and ensuring protection of environment and ecosystems integrity. The review of various policy frameworks and economic sectors in this report shows that although some policy frameworks and legal provisions support SCP principles, there are some challenges in their design and implementation. The review of the sectors also shows an unsustainable increase in the use of natural resources for sectoral growth. Some ecosystem services too have reached the thresholds of their limits. In order to make the economy and its various sectors healthy and self-reliant, and ensure sustainable consumption and production, there is an immediate need to change our development thinking. Innovative opportunities need to be explored and strategies focusing on resource productivity and resource efficiency adopted.

In this context, SCP and circular economy approaches are viable development strategies for cleaner production and greater eco-efficiency in production leading to inclusive economic prosperity. These approaches would result in resource efficiency, reducing the use of natural resources in production, thereby reducing related waste and emissions, and would therefore be beneficial for environmental conservation and would also save production costs. This makes it an attractive strategy for businesses, particularly in the material, energy and emission intensive industries. Besides, improved eco-efficiency offers a window of opportunity to grasp new and emerging markets; for example, creating new (green) jobs, enabling efficient resource management systems, promoting local or community-based sustainably produced products, and local tourism. In the energy sector, increase in renewable energy uptake and energy efficiency can contribute to development and environmental conservation. SCP in the transportation sector could involve promoting modes of transport with low energy emissions such as electric vehicles, energy-efficient infrastructure, and railways and waterways. Most importantly, raising public awareness on environment friendly practices and sustainable consumption patterns in priority areas such as integrated solid waste management, consumption of food, transportation, eco-tourism, nature conservation, and water and energy are crucial.

It is particularly important to attend to under-consumption by certain population groups, but it also requires careful attention to the rise in consumption among other groups. It is essential to learn from the mistakes that the developed countries made in the past and focus on the circular model and resource efficiency to reduce the ecological footprint. This, in fact, has become the responsibility of humanity so that we can come out from harmful effects of the conventional development approach to sustain both nature and humanity.

The way forward

Nepal has already taken some constructive steps towards SCP implementation, which should be further strengthened. To achieve these objectives, following improvements are expected.

Devising appropriate policy frameworks and legal provisions to integrate SCP principles:

- Engage national and sub-national level decisionmakers/ministries (such as finance/ NPC/other sectoral ministries) to identify the roles and responsibilities in order to implement SCP;
- Integrate SCP principles, namely, integrated circular economic approach and resource efficiency in the core economic agenda at national- and sub-national-level development planning and create an environment for resource efficient strategic investment (such as in cities);
- Devise appropriate policy tools, such as regulations, taxes and subsidies, and prioritize sustainable public procurement to encourage green innovation investments/green financing and green consumption;

- Integrate the SCP concept and principles in education systems; and
- Devise mechanisms for sustainable tourism.
- Other specific interventions may include:
- Document the initiatives and best practices related to SCP, and identify the interlinkages (synergies and trade-offs) across SDGs;
- Consider social inclusion and pro-poor climate and environment management through supporting local-level implementation;
- Carry out multi-stakeholder dialogues to raise awareness among responsible actors, and initiate/ support programmes for decoupling and circular economy (reducing food losses, recycling waste);
- Use recent technologies and innovations in SCP processes; and
- Support eco-innovation initiatives (eco-products and eco-process innovations, such as use of new technologies, material product innovation, forest certification, organic certification, REDD).

Given the strong role of the EU in promotion of SCP at the global level, there is a need to support the government of Nepal and other actors working in this area through policy and network facility. Regional initiatives, such as at the SAARC level, need to be further strengthen to enable learning across countries and to enlarge regional markets for SCP-based products.

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Annexes

Annex 1: SDG 12: Main targets and indicators

Targets and indicators	Targets				
	2015	2019	2022	2025	2030
Target 12.2 By 2030, achieve sustainable management and efficient use of natural resources					
Proportion of total water resource used (%)	10	12.7	14.7	16.7	20
Consumption of fossil fuel energy (% of total energy)	12.5	13.2	13.7	14.2	15
Total carbon sink (tonnes) in forest area	2276	2522	2707	2892	3200
Land use for agricultural production (cereals as % of cultivated land)	80	78.7	77.7	76.7	75
Soil organic matter (%)	1	1.8	2.4	3	4
Consumption of wood per capita (cubic metres)	0.11	0.09	0.08	0.07	0.05
Target 12.3 By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses					
Food waste rate at consumer level (waste per capita)					
Post-harvest loss (%)	15	11	8	5	1
Food loss index (% of supply, Cereal)	10	7.9	6.3	4.7	2
Target 12.4 By 2020, achieve environmentally sound management of chemicals and all wastes throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment					
Use of plastics (per capita in grams per day)	2.7	2	1.5	0.9	0
Disposal of liquid Industrial waste					
Disposal of solid Industrial waste					
Target 12.5 By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse					
Recycling of plastics in manufacturing industries (% of industries)	24.5	42	55.1	68.2	90
Reuse of glass and metal products in manufacturing industries (% of industries)	7.2	29.3	45.8	62.4	90

Annex 2: Demographic distribution for the Business-as-Usual (BAU) scenario

Item	Unit	2015	2020	2025	2030	2035	2040
Population	Million	28.06	30.08	32.245	34.567	37.055	39.722
Population growth rate	% per annum	NA	1.4	1.4	1.4	1.4	1.4
Urban population	%	38.26	42.08	45.9	49.72	53.54	57.36
Urban population / household	number of persons	3.976	4	4	4	4	4
Urban households	Million	2.7	3.164	3.7	4.297	4.96	5.696
Rural Population	%	61.74	57.92	54.1	50.28	46.46	42.64
Rural Population per household	number of persons	5.298	5.113	4.927	4.742	4.556	4.371
Rural Households	Million	3.27	3.408	3.54	3.665	3.778	3.875

Source: Electricity Demand Forecast Report, (2015-2040)

Annex 3: GDP structure (economic growth scenarios) of different economic sectors

Sector	4.5 %					7.2 %					9.2 %				
	15-20	20-25	25-30	30-35	35-40	15-20	20-25	25-30	30-35	35-40	15-20	20-25	25-30	30-35	35-40
Agriculture	2.9	2.8	2.6	2.4	2.2	5.6	5.4	5.3	5.1	4.8	7.5	7.4	7.2	7.0	6.8
Construction	4.8	4.8	4.8	4.8	4.8	7.5	7.5	7.5	7.5	7.5	9.6	9.5	9.5	9.5	9.5
Mining	10.3	9.0	8.2	7.7	7.2	13.2	11.9	11.0	10.4	10.0	15.3	13.9	13.1	12.5	12.1
Manufacturing	10.3	9.0	8.2	7.7	7.2	13.1	11.8	11.0	10.4	10.0	15.2	13.9	13.1	12.5	12.1
Service	4.4	4.4	4.4	4.4	4.4	7.1	7.1	7.1	7.1	7.1	9.1	9.1	9.1	9.1	9.1
Energy	9.3	8.4	7.8	7.3	7.0	12.1	11.2	10.6	10.1	9.8	14.2	13.3	12.6	12.2	11.8

Source: Electricity Demand Forecast Report (2015-2040)

Annex 4: Projects supported by SWITCH-Asia in Nepal and their objectives (2008-2022)

https://www.switch-asia.eu/project/?country=nepal

Project	Objectives
Up-scaling the production and consumption of bio- energy to reduce carbon emissions and enhance local employment	Contribute to the national goal of poverty reduction through up-scaling the production and industrial consumption of bioenergy, thereby increasing employment and reducing carbon emissions
Green Homes: Promoting sustainable housing in Nepal	Create an enabling policy environment to promote sustainable housing, strengthening supply chains for sustainable housing, and building capacity of SMEs to deliver household-level green technologies and services
Sustainable production of commercially viable products from municipal waste through Public– Private Partnerships in Green SMEs, Green city, Green agro products, and Green employment generation (PPP for 4Gs)	Enable a sustainable waste management system, construction and management of compost plant through Public–Private Partnership approach, promotion of compost use for organic tea and vegetable farming, and mobilization of financial institutions to increase access to credit for the enhancement of organic farming
Enhancing sustainability and profitability of the carpet and pashmina industries in the Kathmandu valley	Increase resource efficiency, profitability and sustainable growth by mobilizing private sector and relevant public sector authorities to reduce fuel and water use and water pollution in the Nepali carpet and pashmina industries
Sustainable and efficient industrial development in Nepal and Bhutan/ SEID (multi-country project)	Contributes towards sustainable development of the economies of Nepal and Bhutan with a clear focus on industrial sectors that impact environment, employment generation and poverty alleviation
Vertical shaft brick kilns (VSBK) and other sustainable construction practices (SCPs)	Promotion of SCP in the construction industry by raising awareness of private sector stakeholders about green building materials and solutions, and by providing consumer information on the benefits of clean energy and energy-saving building material
Proposal for enhancement of sustainable production of lokta handmade paper production in Nepal	Improve the extracting method of the lokta plant, to increase the efficiency of and reduce the pollution from paper making, to strengthen the capacity of Nepal Handmade Paper Association and to further develop the European market.

Project	Objectives
Sustainable Tourism and Green Growth for Heritage Settlements of Kathmandu Valley	Promote SCP for heritage tourism sector stakeholders through demonstration in the Bungamati and policy advice, dialogue and advocacy at Kathmandu Valley level. It also aims to develop and implement in Bungamati and Pilachhen, tools for green growth with a focus on sustainable rebuilding, entrepreneurship among women and youth, SME engagement and investment, product innovation and sector campaigns.
Lead paint elimination (multi-country)	Reduce childhood lead poisoning by working to eliminate lead decorative paints in the seven participating countries. This will lead to improved school performance, which in turn will help to battle poverty. In addition, this project helped reduce trade barriers for small and medium-sized paint manufacturers.
Resource efficient supply chain for metal products in buildings sector in South Asia	Implementing sustainable production processes and practices in 400 SMEs and creating conducive environment for further adoption of sustainable production processes in the metal products supply chain for building and construction sector.
Building Energy Efficiency in Nepal (BEEN)	The project promotes climate-responsive building designs and retrofitting, as well as use of energy efficient space heating and cooling technologies, resource-efficient building materials and integration of renewable energy sources

Annex 5: Basic concepts: Sustainable Consumption and Production and Resource Efficiency

Basic concepts:

Sustainable consumption and production is defined as "…the use of services and related products which respond to basic needs and bring a better quality of life while minimising the use of natural resources and toxic materials as well as the emissions of waste and pollutants over the life cycle of the service or product so as not to jeopardise the needs of future generations" (Norwegian Ministry of Environment, 1994).

"SCP is a holistic approach to minimising the negative environmental impacts from consumption and production systems while promoting quality of life for all" (UNEP, 2011).

Key principles of SCP:

1. Improving the quality of life without increasing environmental degradation and without compromising the resource needs of future generations.
2. Decoupling economic growth from environmental degradation by:
    a. Reducing material/energy intensity of current economic activities and reducing emissions and waste from extraction, production, consumption and disposal.
    b. Promoting a shift of consumption patterns towards groups of goods and services with lower energy and material intensity without compromising quality of life.
3. Applying life-cycle thinking which considers the impacts from all life-cycle stages of the production and consumption process.
4. Guarding against the rebound effect, where efficiency gains are cancelled out by resulting increases in consumption

Sustainable consumption targets more efficient use of resources, thereby effectively expanding the resource base to meet human needs. Examples include increasing access to energy through renewable or clean energy technologies and the use of forests for energy, food and construction in such a way that the forests are not irreversibly damaged and can regenerate themselves.

Sustainable production aims at improving products and/or production processes in order to reduce consumption of resources, use of hazardous materials and production of waste and pollutants in the provision of products. These improvements are made with due consideration of the full life cycle of products or processes rather than confining analysis to narrow geographical or supply chain boundaries. Examples are seeking alternative raw materials for production processes, recycling waste and wastewater streams, and reducing energy use per unit of product.

Sustainable consumption and production (SCP) thus involve achieving economic growth while respecting environmental limits, finding ways to minimize damage to the natural environment and making use of the Earth's resources in a sustainable way. SCP also has the potential to contribute to reducing environmental risks by protecting ecosystem services.

Resource efficiency (RE) refers to the way in which resources are used to deliver value to society. RE recognizes the need to consume fewer resources and produce less waste while delivering the same, or even more or improved, end services or products.

SCP and RE can contribute to decoupling or breaking the link between economic growth and environmental degradation so that growth can continue without exceeding environmental limits. Furthermore, SCP and RE represent an opportunity for developing countries to "leapfrog"—bypassing inefficient, polluting and ultimately costly phases of development by jumping straight onto a sustainable development path. Leapfrogging could, for example, mean using solar energy in rural areas to replace existing unreliable or limited sources of energy.

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