Eradicating Poverty, Addressing Climate Change, Protecting The Terrestrial Ecosystem

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This paper presents a rationale behind the prioritisation of the Sustainable Development Goals in Bhutan. Bhutan, being a mountainous country, is highly vulnerable to the impact of climate change, according to a series of reports produced by the Inter-governmental Panel on Climate Change (IPCC). The prioritised Sustainable Development Goals (SDGs) (ending poverty, combating climate change, and managing the terrestrial ecosystem) addresses key emerging environment issues and immediate needs of the larger proportion of the population, that is the farming community.

Mountainous Farming Environment

Bhutan is an agrarian society with more than 58 percent of the population engaged in mixed farming systems. The settlements and food production are concentrated around the flood plains of the southern foothills and the ridges and valleys of the mid hills of the country. Rice is the preferred staple food and the largest rice growing area is found in the southern foothills. Dry land makes up about 70 percent of all arable land and is mostly dominated by the cultivation of wheat, maize, millet, buckwheat, barley, and horticultural crops. Use of chemicals such as mineral fertilisers to increase crop production in 2013 was reported around 15.2kg per hectare of arable land compared with the global average of 240kg[1]. The traditional practice of crop rotation, keeping land fallow, and application of farmyard manure to cultivated land is still prevalent, a good indicator of a natural farming system.

There are a few semi-commercial or commercial specialised farming efforts including coffee and hazelnut plantations, and mega livestock farms involving poultry and pigs, are now emerging slowly. However, such enterprises may demand high resource inputs, and may also pose a risk to the health of local ecosystem services if not managed well.

1 www.TheGlobalEconomy.com

Bhutan has a rich biodiversity, healthy ecosystem goods and services, and abundant water resources that can provide good economic opportunities if wisely used and managed. Of late the Bhutanese scientists have added 11 new species of birds, and 57 new species of fish in the last five years. In many rural areas, no chemical treatment is provided to the drinking and sanitation water primarily because the pristine upstream landscape filters, buffers, and provides clean potable water. A survey in North America indicated that for every 10 percent increase in forest cover in a water supply catchment (up to about 60 percent forest cover), water treatment cost decreased by approximately 20 percent. However, these subsistence farming practices and the healthy ecosystem goods and services (rich biodiversity, clean air and water) are changing with the growing population and infrastructure works such as construction of roads and buildings along the hill sides and valleys of the country.

The country has a good forest cover (close to 71 percent tree cover) and absorbs more green houses gases (GHG) than it emits from its economic activities. The GHG in Bhutan mainly comprises Carbon Dioxide, Methane and Nitros-Oxide. In the recent carbon sequestration assessment using the Inter-governmental Panel on Climate Change (IPCC) guidelines, the managed forest of the country sequestered around 6.3 million tonnes of Carbon Dioxide against the emission of 2.3 million tonnes from economic activities. The carbon sequestered and stored in cultivated soils, rangeland, virgin forest and timbers of traditional houses are not included in this assessment. However GHG emission from the industries, waste and energy sectors are increasing rapidly while the agriculture sector, one of the highest emitters, remained more or less constant. In 2009, the country declared the pledge to remain carbon neutral at the Conference of Party (COP 15) to UNFCCC and this statement was also mentioned in the Intended National Determined Contribution (INDC) to the Paris Agreement in 2015[2].

Erratic Weather and Climate Events

One can clearly see that the glaciers along the northern peaks and ridges of the country are retreating rapidly, and glacial lake formations are taking place in a short span of time. According to one of the findings of ICIMOD[3], the glacial lakes in Bhutan grew at 25-45 hectares per year between 1990 and 2009, and it is likely to grow faster because of the increase in temperature. One can attribute these changes to the rise in the global temperature since there are no human settlements or economic

2 Bhutan State Of Environment Report, National Environment Commission, the Royal Government of Bhutan, 2016.

3 ICIMOD Report…

activities possible above 4300 metres above the sea level in Bhutan. Climate change is expected to affect farming activities with pests and disease outbreaks (sudden changes in local air temperature and moisture regime is likely to create a conducive environment to explode the population of pest/disease), soil erosion by wind and rain, and water availability. There are a number of global and regional climate models, but these models may not provide good predictions for a mountainous country like Bhutan where orographic effects (change in atmospheric conditions caused by a change in elevation, primarily due to mountains) are strong. For example Dodena and Kawang *gewogs* receive more rainfall than Chang *gewog.*

Field observations and stories from the farming communities are important to validate these model predictions. Of late, the frequency of erratic localised weather patterns has increased, affecting the livelihoods of the farming communities. In 2007 farmers living above 1,800 metres above sea level lost more than half their maize harvest in an outbreak of northern corn blight disease. The crop harvest of about 320 households was also affected in 2008 by a severe windstorm[4]. A heavy hailstorm damaged more than 367 acres of paddy in five *gewogs* of Wangduephodrang in 2015. Many local farmers believe that these reoccurring events are a result of changing climate.

The farmers usually report that paddy transplantations are delayed because of the late arrival of monsoon rain in the foothills and flood plains. The erratic rainfall pattern, with high intensity of monsoon rain, has increased in the last few years. These conditions have led to frequent incidences of landslides and flooding, affecting livelihoods and infrastructure along the foothills. For example, flooding in 2016 affected more than 8.2 acres of paddy fields owned by 14 households in Umling *gewog*, Sarpang *Dzongkhag,* and damaged infrastructure such as road networks and bridges worth Nu 27.28 million. During the winter months, some of the local streams dry up and some of the communities do not even have adequate water for drinking. According to the 5th IPCC report, recent anthropogenic emissions of greenhouse gases are the highest in history and climate changes have had widespread impact on human and natural systems**.** Extreme changes in weather and climate events have been observed since the 1950s[5].

Impacts on Ecosystem Services

These erratic and extreme weather patterns, coupled with the land use changes including infrastructure development, pose the biggest risk to healthy ecosystem

4 A Country Paper-Building Climate resilience to Food Security and Rural Livelihood, Bhutan Climate Summit 2011.

5 IPCC 5th Assessment Report, 2014

services such as clean water and air that the country has been enjoying. The construction of farm roads increased from 502 kilometres (km) in March, 2007, to over 8937.30 km by 2016 and is still likely to increase. There is no doubt that farm roads provide opportunities for the farming communities to enhance farm productivity through access to market and external inputs including improved seeds and fertilizers. But is it possible to maintain and sustain these networks in the long run without harming the local environment?

Likewise, the conversion of forest land to other uses has also increased. According to the draft report (*Drivers of Deforestation and Forest Degradation in Bhutan*) about 5,770 hectares of forest land was allotted to road construction between 2008-2014, and 36,298 hectares of forest land converted into agriculture between 2000-2015[6]. Due to loss of vegetation cover and poor farm road drainage systems, most of the streams and rivers in and around the settlements and construction sites carry heavy sediment loads during the monsoon season. The rivers loaded with these sediments are likely to wear down the life span of hydropower turbines of hydropower plants in operation. Some field studies have also shown that, without proper land management practices in place, estimated soil loss is more than 24 tonnes per hectare per annum while it takes more than 100 years to form 1 centimetre of soil. In addition, during the windy winter months, the dust particles in the local air from these exposed land surfaces and construction sites are becoming more dangerous than the emissions from other economic activities in the cities and towns.

Sustainable Development Goals

In September, 2015, world leaders came together and adopted 17 SDGs of the 2030 agenda for Sustainable Development at the historic UN Summit. These goals, with 169 targets, call for action by all countries to promote prosperity while protecting the planet. Although it is not legally binding, countries are expected to take ownership, establish national frameworks with locally appropriate indicators, and carry out periodic review to track the progress of these goals in the next 15 years[7]. Given the arguments provided in the previous sections of the paper, the Royal Government has prioritised three SDGs namely – end poverty in all its forms everywhere (SDG1), take urgent action to combat climate change and its impact (SDG13), and protect, restore and promote sustainable use of terrestrial ecosystem, sustainably manage, combat desertification, and halt and reverse land degradation and halt biodiversity loss (SDG 15). These selected SDGs have direct or indirect affects on the well-being of the population, the farming communities in particular, and mountainous

6 Drivers of Deforestation and Forest Degradation, the Department of Forests and Parks Services, 2017 (draft).
7 www:un.org/sustainabledevelopment/development-agenda

landscape ecosystem services. This approach does not mean that the other SDGs are not important or not included in the work programmes of the sectors. For example SDG 6- Water and Sanitation is taken up as a flagship programmes in the 12th Plan period and beyond. Likewise, many of the remaining SDGs targets are embedded in the ongoing programs and projects of the sectors. Hence a good reporting format needs to be designed to track all progress towards SDGs.

National Action Plans

A good starting point to address these selected SDGs is to examine the national action plans prepared to implement the three sister Rio-Conventions (UNFCCC, UNCBD and UNCCD), and the other frameworks such as Bhutan For Life (management of protected areas), and Integrated River Basin Management (promotion of integrated water resource management principles). These action plans and frameworks were prepared with targets and indicators based on threats, gaps and opportunities through inclusive participatory processes engaging the stakeholders from all sections of society. For example the National Biodiversity Strategic Action Plan 2014 was designed to address biodiversity conservation and utilisation, and National Action Plan (NAP) 2014 to combat land degradations/desertification in Bhutan including soil erosions. Likewise, the Intended Nationally Determined Contribution (INDC) submitted to UNFCCC before the endorsement of the Paris Agreement has nine mitigation (human intervention to reduce the source or enhance the sinks of GHG – greenhouse gases) and ten adaptation (adjustments in natural or human system in response to actual expected climate stimuli or their effects) measures to combat impacts of climate change in Bhutan.

It is also important to highlight here that more than 127 countries have ratified the Paris Agreement (PA) as of February, 2017. Bhutan is still in the process of ratification as required by the law to advocate, educate, and take ownership of the treaty. The National Assembly unanimously cleared the PA for ratification in the winter session of 2016, and the National Council will engage in the ratification discourse at the upcoming summer session of 2017. The PA requires countries to prepare, communicate and maintain successive Nationally Determined Contributions (after the ratification of PA, INDC becomes Nationally Determined Contributions) every five years[8].

8 Intended Nationally Determined Contribution (INDC), National Environment Commission, The Royal Government of Bhutan, 2015.

Exploring Synergy and Co-benefits

Bhutan, as a least developed country, has to make judicious use of its limited resources, be it internal revenue or external support. One of the ways is to explore synergies and co-benefits among as well as between prioritised SDGs. For example, good land management practice (SDG 15) like growing hedgerows of grass or fodder trees along the contours of cultivated sloping land minimises surface erosions, increases soil organic matter, improves crop yield (SDG 1) and enhances carbon sequestration through the established hedges (mitigation measures under SDG 13). It is proposed all action plans and adaptation projects implemented by the sectors such as the Ministry of Agriculture and Forest and Ministry of Health are cross checked to avoid overlap and duplication. The participation of the farming community is critical in identifying climate change adaptation and mitigation measures, biodiversity assessment, land degradation technology verifications and formulation of integrated water resource management plan. It is important to understand the local landscape, and know local farming practices and beliefs before imposing or introducing improved farming technologies. Once good partnerships and trust are established among the players, it is possible to foresee signs of ownership, and sustainability of introduced technologies.

One possible approach is to design implementation packages of SDGs by positioning the farming community in the centre with support from all relevant players. This approach is likely to bring all key players - the sectors, donors, civil societies and communities together to work in a most cost effective and harmonised environment. For example, the current approach of stakeholder engagement is program specific that demands a lot of resources, operates in silos, and is particularly time demanding when there is farm labour shortage everywhere. The implementation of these prioritised SDGs provides a platform for all sectors to come together as a team to deliver on the agreed goals, targets and indicators. Perhaps this approach may allow us to pursue the dream of living prosperously, in harmony with nature.