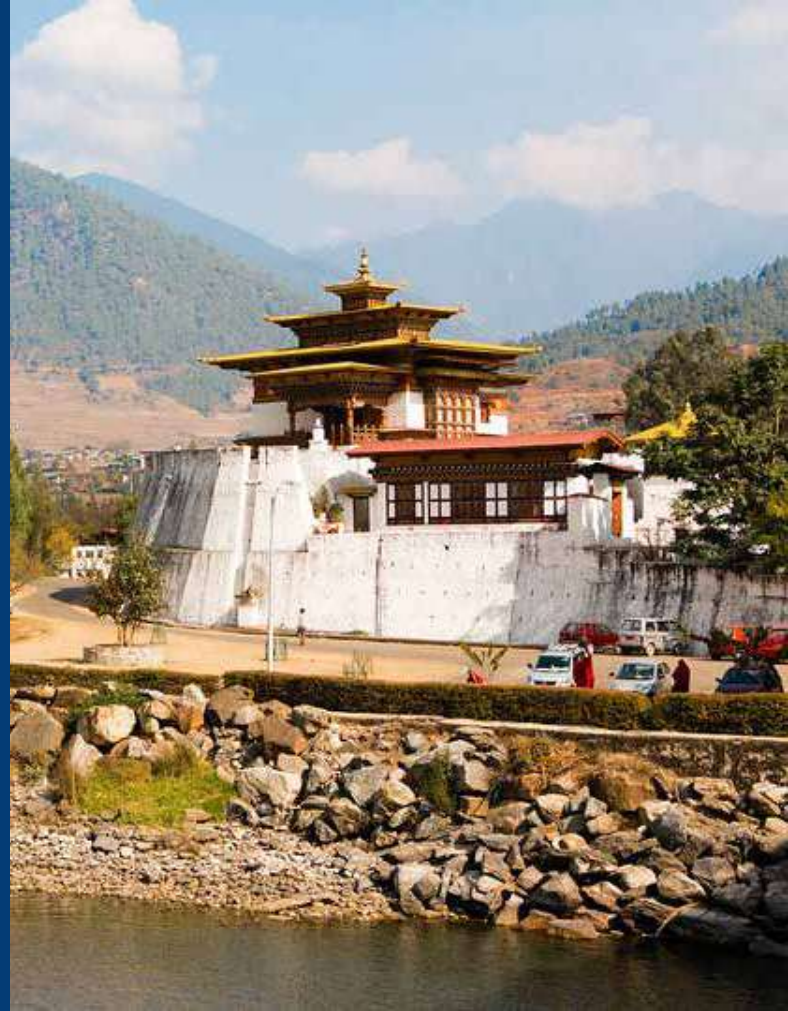




Urban
Pathways

STEPS to ACTIONS

BHUTAN



Wuppertal
Institut

UN HABITAT
FOR A BETTER URBAN FUTURE

UN
environment



Urban
Pathways

STEPS to ACTIONS

BHUTAN

Author

Shritu Shrestha

Organisation

Wuppertal Institute

Editor:

Oliver Lah

Project Leader

Graphic design

Barbara Lah

CAIF.org



Urban Pathways

www.urban-pathways.org

Berlin, 2018

Supported by:



Federal Ministry
for the Environment, Nature Conservation
and Nuclear Safety

based on a decision of the German Bundestag

URBAN PATHWAYS

PROJECT CONCEPT

The Urban Pathways project helps delivering on the Paris Agreement and the NDCs in the context of the New Urban Agenda and the Sustainable Development Goals. It has established a facility in close cooperation with other organisations and networks active in this area to support national and local governments to develop action plans and concrete implementation measures to boost low-carbon urban development. This builds on UN-Habitat's role as "a focal point on sustainable urbanisation and human settlements including in the implementation and follow-up and review of the New Urban Agenda". The project develops national action plans and local implementation concepts in key emerging economies with a high mitigation potential. The local implementation concepts are being developed into bankable projects, focusing on the access to urban basic services to create a direct link between climate change mitigation and sustainable development goals.

The project follows a structured approach to boost Low Carbon Plans for urban mobility, energy and waste management services that deliver on the Paris Agreement and the New Urban Agenda. The project works on concrete steps towards a maximum impact with regards to the contribution of urban basic services (mobility, energy and waste management) in cities to global climate change mitigation efforts and sustainable and inclusive urban development. This project makes an active contribution to achieve global climate change targets to a 1.5°C stabilisation pathway by unlocking the global emission reduction potential of urban energy, transport and resource sectors. The project will contribute to a direct emission reduction in the pilot and outreach countries, which will trigger a longer term emission reduction with the aim to replicate this regionally and globally to make a substantial contribution to the overall emission reduction potential.



Where We Work

PROJECT AIMS

This project implements integrated urban services solutions as proposed in the New Urban Agenda providing access to jobs and public services in urban areas, contributing to equality and social coherence and deliver on the Paris Agreement and the Sustainable Development Goals. This is the first dedicated implementation action oriented project, led by UN-Habitat to deliver on inclusive, low-carbon urban services. Securing sustainability and multiplier effect, the project aims to leverage domestic and international funding for the implementation projects that will follow from this initiative.

Pathways Paper: Steps to Actions

Summarizing key on-going initiatives and identify opportunities for further action with a focus on cross-sectoral synergies and policy interactions between the local and national level.

Bhutan is a landlocked developing country, located in South Asia. A population of about 779,666 lives in a total area of 38,394 km², which makes Bhutan's population density of 20.3 person per km² (National Statistics Bureau, 2017). Of the total population, urban population comprises of 39% with annual growth rate of 3.2% recorded in 2016 (World bank, 2018). Thimphu is the capital of Bhutan which is located within an area space of 1,794.87 km². A population of 116,012 lives in Thimphu Dzongkhag in 2015 with an estimated population density of 64.6 per km² (National Statistics Bureau, 2017a) and future projection foresee the city to grow. Other larger cities with above 20,000 people are Phuntsholing, Samdrup Jongkhar and Punakha. Bhutan's economy is based on hydropower, agriculture, and forestry. The country's GDP per Capita is US\$ 2,879.07 and has a GDP growth rate of 7.99% (2016) (National Statistics Bureau, 2017). Gross National Happiness (GNH) is the guiding philosophy of Bhutan's socio-economic development for the prosperity and happiness of the people in Bhutan, whose main four pillars are: 1. good governance; 2. sustainable socio-economic development; 3. cultural preservation, and 4. environmental conservation.



As per the second national greenhouse gas (GHG) inventory, Bhutan is a net sink of greenhouse gases (GHG). This is due to the huge forest cover the country has, currently 70.46%, and a constitutional mandate to maintain the forest cover above 60%. Thimphu's land covered by the forest is 64.3% (in 2016) (National Statistics Bureau, 2017a), which contributes in net carbon sink. The sequestration by forest in Bhutan is estimated at 6.3 million tons of CO₂ and emissions in 2013 amounted to an estimated 2.2 million tons of CO₂ equivalent. The emissions from Bhutan's agriculture sector have more or less remained constant, but emissions from sectors such as industrial processes and transport are increasing. During the period 2000 - 2013, emissions from the energy sector, industrial processes and waste management increased by 191.6%, 154.3% and 247.54% respectively.

Summary of the planned actions: Integrated Solid Waste management in Thimphu and other cities

Waste management is an important issue in Bhutan, mainly in urban areas (from household, commercial and industry) due to increasing quantity of waste and its related emissions. The main challenges in waste management in urban areas in Bhutan (including Thimphu) are illegal dumping of waste (although waste collection services are available) and lack of cooperation in segregation and disposal of waste. Bhutan intends to minimise GHG emission on waste through application of zero waste concept and sustainable waste management practices. It includes enhancing 3R principles of waste management including conversion of waste into resources, and improving the current system and infrastructure for waste management (Royal Government of Bhutan, 2015).

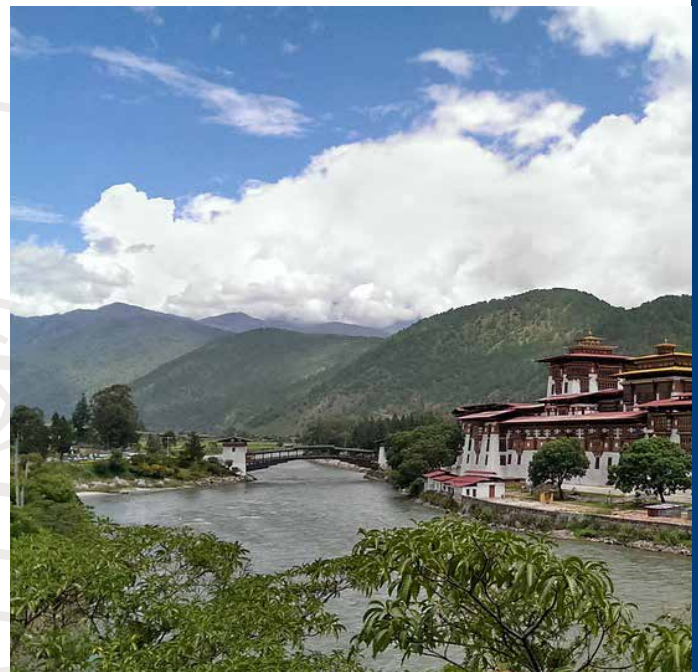


City of Thimphu



Waste management in Bhutan

The capital city, Thimphu, has piloted evening waste collection services and CCTV surveillance to monitor illegal dumping (Ghalley, 2017). The availability of not enough waste compost plants and landfill sites are also an issue in Thimphu. To tackle this, the city is planning to explore technology either to make composting faster or to establish a bio-gas plant (which requires waste segregation at the source) (Bhutan Times, 2017). Greener Way and Clean City are private companies (outsourced by Thimphu municipality) to manage waste in Thimphu. In order to improve Bhutan's solid waste management system, a holistic approach of Integrated Solid waste management in the cities is required and is proposed in this paper.



Integrated Municipal Solid Waste Management (ISWM) system typically involves timely collection of waste; its temporary stocking if required, and transportation; its treatment, and reduce volume; and ultimately safe disposal. An effective ISWM system is based on the specific local conditions and is developed with due considerations to protection of public health, environment and aesthetics. The key infrastructure components are: containers for primary collection, a treatment facility and a sanitary landfill site with all necessary safeguards.



Planned actions

In addition, a robust ISWM system requires a municipality to take proactive initiatives towards community participation through sustained awareness generation, behavioral change, cooperation and compliance. Continuation of solid waste treatment and disposal sites in particular is affected by the ‘NIMBY Syndrome’ (Not in My Back Yard) and to that effect the municipality needs to have effective communication and build partnerships as well as offer some incentives to the affected community. Finally, it is to be recognized that effective municipal solid waste management is about managing material, manpower and technology & machinery and it involves significant expenses. Therefore, the implementing institution needs to have all the necessary systems and process in place for measurement, human resources management, and maintenance of equipment.

In order to make improvements in the solid waste management system in Bhutan, a holistic approach is to be adopted to improve all service components of existing waste management system in all the participating towns. This includes improvement of door to door waste collection services with introduction of waste segregation at source, secondary collection & transportation system and development of waste treatment & disposal facility.

Following interventions & measures on solid waste management are required:

Technological measures

- Technical assistance
- Collection and transportation of MSW from source to treatment facilities
- Treatment of MSW
- Testing and labeling of compost
- Testing and labeling of biogas

Financial measures

Policy & regulatory measures

- User charge
- Standards setting for by-products

Capacity building and awareness raising

The planned actions aim to implement waste management practices in seven municipalities and towns of Bhutan: Thimphu, Phuentsholing, Gelephu, Samdrupjongkhar, Paro, Punakha and Bajo. These sites have been chosen for different reasons. Thimphu is the capital city and the most populated city of the country, while Phuentsholing, Gelephu and Samdrupjongkhar are at the border to India and have access to recyclable markets there. Paro, Punakha and Bajo, all border to Thimphu, are fast-growing towns. These municipalities and towns altogether cover about 25% of the country’s population, which is around 195,000. The project is planned to work in collaboration with relevant private sectors such as Greener Way, Clean City, Royal Society for Protection of Nature, Clean Bhutan and Green Road.

The project will help to streamline the waste management practices, create awareness for better waste management, create jobs in green sectors and demonstrate feasibility and viability of waste to energy (such as biogas) through pilot plan established in Thimphu.

Local and national frameworks to implement Integrated Solid Waste management in Thimphu and other cities

Bhutan has following Rules, Regulations, Policies, Acts pertaining to waste management issues in the country:

- 12th Five Year Plan Guidelines (2019-2023)
- 11th Five Year Plan (2013-2018)
- Economic Development Policy, 2016 (Draft)
- National Strategy and Action Plan for Low Carbon Development, 2012
- Waste Prevention and Management Act, 2009
- Waste Prevention and Management Regulation, 2012
- Waste Prevention and Management (Amendment) Regulation, 2016
- National Strategy + Action Plan – Integrated Solid Waste Management, 2006
- National Integrated Solid Waste Management Strategy, 2014
- Alternative Renewable Energy Policy, 2013
- Local Government Act of Bhutan, 2009 & Local Government (Amendment) Act of Bhutan, 2014



Regulation

Bhutan's comprehensive regulation for the waste minimisation and management is its policy on Waste Prevention and Management Regulation 2012 (Ghalley, 2017). The key stakeholder in waste management comprises of Gross National Happiness Commission under Royal Government of Bhutan, the Ministry for Works and Human Settlements, National Environment Commission (NEC), Clean Bhutan (a civil society organisation with the Civil Society Organisation Authority, Royal Government of Bhutan), Green Road (a public-private partnership that use plastic waste in road making), and private companies (e.g. Greener Way and Clean City in Thimphu) for waste collection and segregation.





The proposed planned project for ‘Integrated Solid Waste management in Thimphu and other cities’ is applied to ‘Nationally Appropriate Mitigation Action (NAMA) facility’ with the title ‘Nationally Appropriate Mitigation Action in Municipal Solid Waste Sector (Organic) in Bhutan’. It is planned to be implemented by Gross National Happiness Commission and NEC under Royal Government of Bhutan.

This NAMA for the solid waste sector aim to solve the problem of waste management (starting from waste segregation at source to its final treatment) and bring about a transformational change in the field. The potential for this change is closely linked to the specific context of the NAMA, the sector and the broader strategies (mitigation, green growth, sustainable development) of the country. The NAMA has elements of promoting innovation in the waste sector, private sector involvement, generate impacts beyond the scope of the project, and ability to replicate and scale up beyond the seven municipalities/towns covered under the project. NAMA contributes to the agenda of propagating organic farming by provisioning of organic compost produced through the project implementation. The NAMA envisages the private sector playing the key role in mobilizing finance, upgrading waste management technology through research and development, enhancing manufacturing capacity, providing jobs – including a 50% target for women - and implementation on the ground.

The waste management projects under this NAMA is planned to be implemented in the initial two years including all other supporting infrastructure and policy/ regulations. However, MRV for NAMA will continue to 2030 to assess the impact of the NAMA in the long term. The GHG emission reductions from the NAMA are estimated at about 34,103 tCO₂e in ten years (2019-2030¹). The impacts would keep accruing for many years thereafter.

¹ Followed the methodology approach as provided in IPCC 2006, Volume 5: Waste, Chapter 2 & 3 to estimate baseline GHG emissions

Total cost of NAMA implementation is estimated at around USD 26.4 million of which 17.5 million of is to be covered by Government of Bhutan through provisioning of land to private players for developing facilities besides the ongoing support in terms of tax concession and tax holidays.

The initial financial need would be for the investment in installation of plant & machinery and setting up of needed infrastructure. It is proposed that the recurring operation & maintenance cost will be borne through the annual revenue generated through the project operations. It is estimated that the operating revenues will also be able to cover for the debt repayment and interest accruing on it.

The implementation of projects under NAMA will be supported through technical assistance by national and/ or international experts who will support in developing detailed project reports, model bid documents, management & award of bids and management of contracts for each municipality and town. The interventions will be executed under a long-term agreement between the private players and the appropriate governing authority of the NAMA (e.g. the Implementing Entity or the Financial Trustee). It is proposed that the private party of the Public-Private-Partnerships is chosen through an appropriate selection process (e.g. through a transparent bid process). The finance will support actual implementation of infrastructure for collection & transportation, treatment plants and labeling & certification facility at site and at the national level in Thimphu.

NAMA envisages a number of revenue streams to support a financially sustainable project operation, for providing enough for servicing debt and adequate return on the investment made by the private sector. Primary sources of revenue are:

- user charges for the waste collection from households and commercial establishments,
- the sale of compost and
- sale of recyclables such as plastics, glass & paper.

Learnings from the project development so far

The proposed project will help to ensure that the NAMA focuses not just on GHG emissions reduction but also on sustainable development, national development goals and transformative change.

Bhutan committed to remain carbon neutral in 2009. Following this, a National Strategy and Action Plan for Low Carbon development was developed in 2012. Then the commitment was reaffirmed in NDC that was submitted in 2015. To minimize GHG emissions through application of zero waste concept and sustainable waste management practices is one of the mitigation measures proposed under the NDC.



Managing municipal solid waste also has strong connection with Sustainable Development Goals (SDGs) in particular, Goal 3 – Good health and well-being, Goal 5 – Gender equality, Goal 6 – Clean water and sanitation, Goal 11 – Sustainable cities and communities, and Goal 13 – Climate action.

The transformative change of the NAMA can be seen well through the application of a theory of change approach (as defined by the Center for Theory of Change). The theory of change approach “defines all building blocks required to bring about a given long-term goal. This set of connected building blocks—interchangeably referred to as outcomes, results, accomplishments, or preconditions—is depicted on a map known as a pathway of change/change framework, which is a graphic representation of the change process” (Rhett, 2010).

The overall hierarchy of activities, outputs, outcomes, impacts and the overall paradigm shift for the NAMA can be seen in table below

ACTIVITY	OUTPUT	OUTCOME	IMPACT (STRATEGIC LEVEL)	TRANSFORMATIONAL CHANGE
<ul style="list-style-type: none"> • Physical implementation of interventions • Financial/ fiscal incentives • Policy/ regulatory measures • Capacity-building • Create awareness 	<ul style="list-style-type: none"> • Reduced interest rate on loan for MSW management projects • Increased debt: equity ratio for MSW management projects • Application of user charge on MSW generators • MSW management in municipalities/towns 	<ul style="list-style-type: none"> • Prevent MSW from going to unmanaged dump sites • GHG emissions reduction 	<ul style="list-style-type: none"> • Promotes waste management practice in municipalities & towns • Promote organic farming • Healthier living conditions due to improved air quality and thereby improved quality of life • Create jobs & business opportunities • Gender disaggregated development 	<ul style="list-style-type: none"> • Shift towards low-emission sustainable development pathways

Other planned project concepts in Bhutan: Energy efficient buildings and Electric Vehicles

Hydropower dominates Bhutan's electricity generation and the country has immense hydropower potential, with an estimated theoretical potential of up to 26,760 MW while present installed potential of 1,500MW (ADB, 2014). The country's electricity generation is expected to grow as more hydropower projects are completed and start operating. A significant share of electricity generation is exported to India. While the country has tremendous hydropower potential and generation capacity, there is shortage of electricity in the winter months. This is considered as a serious energy security concern for the country (Jamtsho, 2015). As Bhutan has no fossil fuel (liquid fuel or gas) reserves except some coal reserves - extracted for domestic use, most of the fossil fuel is imported from India. The imported oil to the country are used for automobile and other essential purposes (Alam, et al., 2017). The import of fossil fuel has an impact on net energy trade and also poses a challenge to the carbon neutrality of the country (Jamtsho, 2015). Bhutan's energy demand is increasing and it is expected to grow faster. In order to remain carbon-neutral and maintain a net sink of GHG emissions, Bhutan is exploring options to increase renewable energy (RE) sources, such as solar and wind. Other concern is to focus on energy efficiency (e.g. Energy Efficient buildings or Green Buildings) and minimise use fossil fuel on automobile (e.g. Electric vehicles).

Energy situation in Bhutan



Planned project concept 2

Energy efficient buildings

Most of the building energy consumption in Bhutan are for heating, lighting, cooling, and appliances loads. The energy usage depends on the climatic zones, such as southern Bhutan with hot and humid climate has cooling load during summer while northern and central Bhutan with temperate climate has substantial heating loads in winter. The higher demand of heating and cooling needs through the usage of appliances have increased energy load in Bhutan, as buildings are not well insulated and energy efficient measures are not well implemented. Residential houses normally have a consumption level of above 121 kWh/m²/year (Jamtsho, 2015).

Ministry of Works and Human Settlement in Bhutan has published 'Bhutan Green Building Design Guidelines' in 2013 as a first formal step to guide all the stakeholders related to buildings and apply sustainable approaches in the built environment in the country (MoWHS, 2013). In order to transform built environment in Bhutan, the country requires good policy package, including regulatory guidance and capacity buildings for engineers and architects. For this, a project concept to design a suitable policy framework for energy efficient buildings with technical consideration, and capacity building activities is planned within Urban Pathways project together with Ministry of Works and Human Settlement, Government of Bhutan.

Planned project concept 3

With increases in economic growth in Bhutan, the vehicular growth is also significantly increasing. Currently, Bhutan has no railways and mode share are buses, taxis and private cars. The rate of motorisation in Bhutan grew about 12% per year during 2008–2012 with an average of about 6,300 newly registered vehicles each year (Zhu, Patella, Steinmetz, & Peamsilpakulchorn, 2016). Vehicle density is high in urban areas of Bhutan, including Thimphu. The city public transport services (buses) are inadequate so that use of taxis and private modes of transport (private cars and two wheelers) are increasing.

In order to improve air quality or reduce CO₂ emissions, electric vehicles (EV) have been introduced within Bhutan's market (mainly in Thimphu) in 2014, with support from policymakers. Bhutan also plans to make Thimphu - a clean Green Electric city (Tshering, 2014). A detailed study has been carried out by the Zhu et al. (2016) on the Bhutan Electric Vehicle Initiative, which shows the technical potential and barriers to implement EVs in Bhutan. Bhutan's government also have plans to convert some of public sector vehicle-fleet and public transport to EVs (Tshering, 2014) (yet to be implemented). As a further step, Urban Pathways plans to develop a project concept to improve public transport along with the implementation of EVs.

Electric Vehicles



References

ADB. (2014). Green Power for Bhutan: Clean Energy crosses borders to reach poor households. Asian Development Bank.

Alam, F., Alam, Q., Reza, S., Khursid-ul-Alam, S., Saleque, K., & Chowdhury, H. (2017). Sourcing green power in Bhutan: A review. *Energy Procedia* (110), 586-591.

Bhutan Times. (2017). Thimphu grapples with mounting waste. Retrieved May 09, 2018 from <https://bhutantimes.com/article/thimphu-grapples-with-mounting-waste>

Ghalley, B. (2017, September 24). Waste management arising is issue. Retrieved May 08, 2018 from *Bhutan Times*: <https://www.pressreader.com/bhutan/bhutan-times/20170924/281492161505289>

Jamtsho, S. (2015). Sustainable Energy in Bhutan: Opportunities for Energy Efficiency. *The International Journal on Green Growth and Development* , 1 (2), 75-102.

MoWHS. (2013). Bhutan Green Building Design Guidelines. The Engineering Adaptation and Risk Reduction Division. Ministry of Works and Human Settlement, Bhutan.

National Statistics Bureau. (2017). Bhutan at a Glance. Retrieved May 11, 2018 from <http://www.nsb.gov.bt/publication/files/pub9wt9959wh.pdf>

National Statistics Bureau. (2017a). Thimphu Dzongkhag at a Glance. Retrieved May 11, 2018 from <http://www.nsb.gov.bt/publication/files/pub8yf4556uu.pdf>

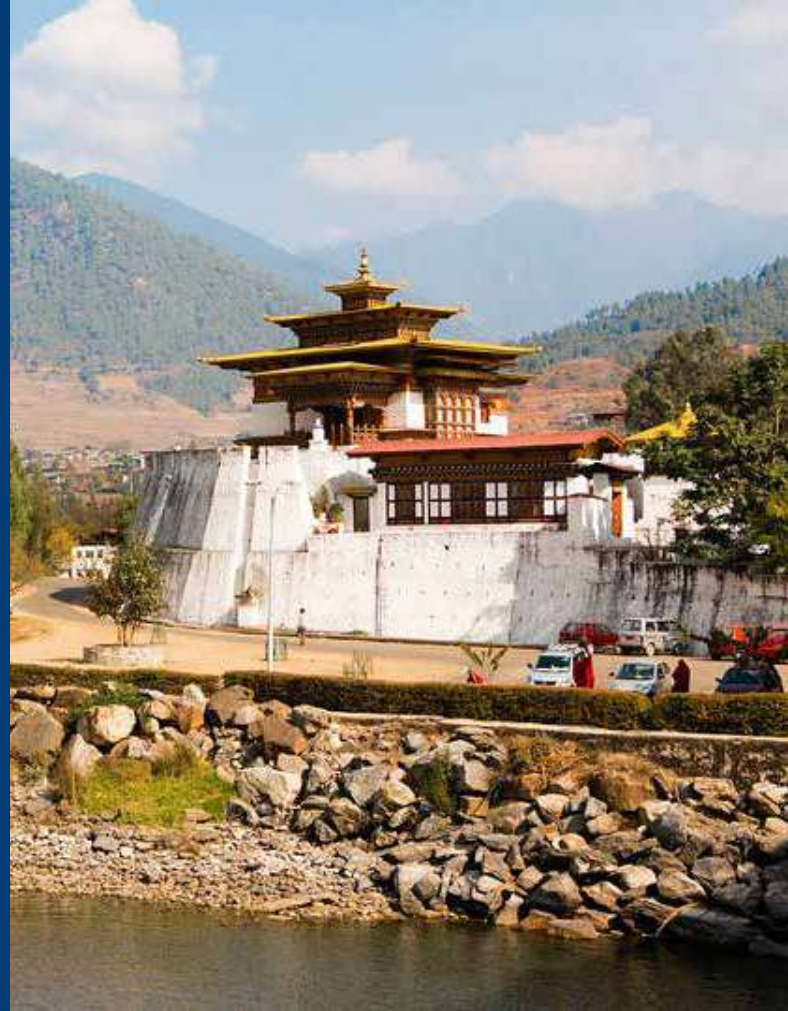
Rhett, I. (2010, September 29). What's Your Theory of Change. Retrieved May 21, 2018 from *Civic Actions*.

Royal Government of Bhutan. (2015). Intended Nationally Determined Contribution. National Environment Commission.





Urban Pathways



**Wuppertal
Institut**

UN HABITAT
FOR A BETTER URBAN FUTURE

UN
environment