

## 1. Introduction

The best practices and lessons learned publications are an integral part of the work of the Least developed countries Expert Group (LEG) to support developing countries on adaptation. This publication will provide information on the general experience of formulating NAPs and identify initiatives, projects and programmes that could be identified as best practices for NAPs which can be shared and learnt from. This publication is not a comprehensive list of experiences on NAPs and on adaptation action from countries but rather has tried to include approaches that are widely promoted as solutions by major programmes and some critical components that need to be considered under different sectors (systems) for adaptation to climate change.

This volume will also fulfil the mandate of supporting the work of the CMA to recognize adaptation efforts of developing country Parties.

## 2. Overview of the process to formulate and implement NAPs

The COP, by decision 5/CP.17, adopted the initial guidelines for the formulation of NAPs by the LDC Parties. Subsequently the NAP technical guidelines were developed based on the initial guidelines as requested by the COP. Several LDCs and developing countries have explicitly mentioned in their submitted NAPs the use of the NAP technical guidelines or components of it in the formulation of their NAPs. There have been several initiatives taken by different agencies to support the NAP process. One of these initiatives includes the development of materials to supplement the technical guidelines for the NAP Process. The list of supplementary material is available [here](#).

The NAP Guidelines promote a development-first approach, crystallized by looking at Sustainable Development Goals (SDGs), supplemented by other national level goals/targets and those from other frameworks.

The NAP-SDG iFrame is aimed at helping to integrate different assessment approaches into NAPs and enabling the consideration of how to contribute to addressing relevant SDGs in conjunction with NAPs. The framework takes an integrated approach towards country-driven and country-specific descriptions of systems that should be managed to achieve adaptation and to contribute towards achieving SDG targets. The approach makes it easy to manage synergy between development and adaptation goals, including documenting outcomes to support monitoring and evaluation of SDGs and adaptation. It enables countries to harmonize addressing SDGs, national goals and targets (development, disasters, etc) with activities designed to address adaptation in a country-driven manner. It facilitates harmonized reporting on indicators for the SDGs and assessment of outcomes of the adaptation benefits. To do this well, it requires good collaboration between all relevant ministries and supporting agencies and organization – avoiding a silo approach, maximizing synergy and effectiveness.

## 3. Approach to the Best Practices and Lessons Learnt Series: Methodology

Based on an assessment of countries that have developed NAPs and other adaptation plans; there are ten key systems that are commonly featured in their NAPs and adaptation, which are:

1. Agriculture,
2. food security,
3. energy security,
4. water resources and management,
5. life and safety – health and human well-being,
6. coastal zones,
7. economic planning and activities,

8. human settlements/housing (living spaces),
9. general ecosystems, unique biodiversity, and
10. Infrastructure.

There are also common hazards that have recurrently surfaced in the vulnerability assessments and adaptation plans of countries. They include droughts, flood, landslide, sea level rise, pest and diseases.

The ten core systems listed above can be defined on each of the main sectors identified by countries. Each core system can be further defined on each of the main sectors and for each of these; the report will discuss experiences of countries and other stakeholders. Based on the experiences; candidates for best practices will be identified taking into account:

- The criteria recommended in table A below based on inputs from sources
- Approaches that are widely promoted as solutions by major programmes
- Advisory panel (NAP Technical Working Group)

The report will also draw out lessons learnt if any from these practices for future adjustments.

*Table A: Criteria to shortlist candidates for best practices*

<b><i>From LEG's publications</i></b>	<b><i>From UNCDF</i></b>	<b><i>Cross cutting issues</i></b>
Effectiveness. The extent to which an activity had achieved the intended objective.		Promotion of systemic approaches, through government systems or markets. Does the approach/case study establish coordination among different actors, particularly at the subnational and local levels?
Impacts. The extent to which an activity had positively changed the current state of vulnerability of the system. This can include positive effect on connected systems as well.	Does the approach/case study explain how and to what extent it helps to reduce vulnerability of the system and vulnerable population, particularly women, to climate hazards and impacts currently and in the future? How so?	Evidence of integration of gender and/or inclusion?
Measurability. The extent to which an activity has yielded positive quantifiable results including beneficiaries.	Does it respond to adaptation priorities identified out of a robust science-based climate risk assessment of the system?	Multipartner/ multilevel engagement?
Efficiency. The extent to which results have been achieved with the least costly resources possible.		

Sustainability. The potential of an activity or practice to yield benefits beyond the intended lifetime of the activity. This also includes yielding positive outcomes leading to achievement of the sustainable development goals.	Is the approach/case study aligned with and contribute to achieving goals under National Development Strategies and Plans? If yes, how?  Is the approach/case study aligned with and contributes to achieving goals under NDC and/or NAP? If yes, how?	Evidence or replication and scalability?  Evidence of country ownership through e.g. co-financing and/or federation of efforts of various partners to sustain the approach?
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**4. General Experiences (of formulating NAPs):**

NAP formulation is most commonly led by government agencies focused on climate affairs, and finance or economic development agencies often hold a major role as well. In most countries, these organizations already existed, but some formed committees specifically for NAP creation.

While the UN NAP mandate in decision 5/CP.17 outlines objectives and guiding principles for National Adaptation Plans, countries also define their own goals within the NAP. All are oriented around reducing overall vulnerability to climate change, and through a review of the goals, visions, and guiding principles described in NAPs. Each NAP lays out the particular risks and hazards facing the country. Countries also generally aligned their NAPs with the 2030 Agenda on Sustainable Development and other broader goals, such as those related to encouraging sustainability in economic development initiatives. The NAPs also emphasized inclusion of women, indigenous groups, and/or youth as a goal or guiding principle. Countries varied in their approaches to proposing adaptation actions, as well as the number of actions proposed. In terms of costing; countries either used NAPs as an opportunity to estimate costs and set up a budget for adaptation or they mentioned plans to evaluate costs in the future. From the list of submitted NAPs most countries specify an implementation timeframe within their NAPs giving generally a 10-13 year implementation horizon (*Synthesis of available NAPs and inputs into paper for the GST, 2021*).

As of 31 August 2021, at least 126 of the 154 developing countries had undertaken activities related to the process to formulate and implement NAPs. It is also noted that 7 LDCs and 17 other developing countries had completed and submitted their NAPs on NAP Central and that several countries had developed and submitted sectoral and thematic strategies and other relevant outputs. It was also noted that 6 out of the 7 LDCs that had submitted their NAPs had also prepared and submitted a total of 14 proposals for accessing funding from GCF as of August 2021 for implementing priority actions identified in their NAPs (*LEG 40 report, 2021*). The 7 LDCs who have developed and submitted their NAPs are:

- Burkina Faso, 2015
- Sudan, 2016
- Togo, 2018
- Ethiopia, 2019
- Kiribati, 2020
- Timor-Leste, 2021
- Cambodia, 2021

The Green Climate Fund (GCF) provides USD 3 million per country for the formulation of the NAPs and other adaptation planning processes as part of their Readiness Programm. The LDCF also provide support to countries for formulating their NAPs<sup>1</sup>.

There have also been other initiatives that have worked towards strengthening information towards NAP formulation such as gender analysis for integration in the NAP process, engagement of varying levels of stakeholders, strategies for costing and implementation and sectoral NAPs etc.

*Table B: Other initiatives towards NAP Process*

<b>Other initiatives</b>	<b>Countries</b>	<b>Source</b>
Conducted targeted gender analyses to integrate gender considerations in their NAP processes. These analyses have informed next steps.	<ul style="list-style-type: none"> <li>- Benin,</li> <li>- Côte d’Ivoire,</li> <li>- Ethiopia,</li> <li>- Guinea-Conakry,</li> <li>- Madagascar</li> <li>- Togo</li> <li>- Kiribati</li> </ul> <p>Zambia, conducted gender assessment in the cashew sector in preparation of their NAP for the agriculture sector.</p>	<p><a href="#">NAP Global Network, 2019</a></p> <p><a href="#">Benin, 2019</a></p> <p><a href="#">Côte d’Ivoire, 2019</a></p> <p><a href="#">Ethiopia, 2019</a></p> <p><a href="#">Guinea-Conakry, 2019</a></p> <p><a href="#">Togo, 2019</a></p> <p><a href="#">Madagascar, 2019</a></p> <p><a href="#">NAP Global Network, 2021</a></p> <p><a href="#">Zambia, FAO 2020</a></p>
Fiji established a government-led NAP Steering Committee to support an inter-ministerial approach to developing the NAP to ensure institutional legitimacy.	Fiji	<a href="#">Republic of Fiji, 2018</a>
A series of workshop on the NAP process was held to engage decision makers, including parliamentarians and district chiefs to build political support and momentum for the NAP. With these workshops, national and district decision-makers gained an understanding of the NAP process, agreed on its importance, recognized the need for collaboration, and will embed this knowledge into key decisions on the allocation of resources—both human and financial—across key ministries.	Ghana	<a href="#">NAP Global Network, 2021</a>
Conducting detailed, participatory assessments of vulnerabilities in key sectors to inform adaptation planning	<ul style="list-style-type: none"> <li>- South Africa conducted assessment for their mining sector</li> <li>- Standardized approach to community vulnerability</li> </ul>	<p>South Africa’s experience described in <a href="#">NAP Global Network, 2021</a></p> <p><a href="#">Kiribati, 2020</a></p>

<sup>1</sup> [https://www4.unfccc.int/sites/NAPC/Pages/accessing\\_funding\\_for\\_NAPs.aspx](https://www4.unfccc.int/sites/NAPC/Pages/accessing_funding_for_NAPs.aspx)

	<p>assessment for developing NAPs used by:</p> <ul style="list-style-type: none"> <li>- Kiribati</li> <li>- Solomon Islands</li> <li>- Tuvalu</li> <li>- NAP private sector engagement strategies developed by</li> <li>- Ghana,</li> <li>- Vietnam and</li> <li>- Saint Lucia</li> </ul> <p>Lessons from a Climate Risk Assessment of Water Resources in the Ruhezamyenda catchment were developed to inform Uganda’s NAP process.</p>	<p><a href="#">Tuvalu, 2020</a></p> <p><a href="#">Ghana, 2020</a></p> <p><a href="#">Vietnam, 2020</a></p> <p><a href="#">Saint Lucia, 2020</a></p> <p><a href="#">NGN, Uganda 2019</a></p>
<p>Developing sectoral strategies and action plans accompanied by project concept notes with costs.</p>	<p>Saint Lucia developed Sectoral Adaptation Strategy and Action Plan (SASAPs) and attendant concept notes for the priority Agriculture, Fisheries, Resilient Ecosystems, and Water sectors. The Agriculture SASAP was used to inform the development of a successful USD 10 million proposal to the Adaptation Fund.</p> <p>Under Colombia’s NAP process likewise involved cost for adaptation measures in a health and water sectors.</p> <p>NAP Agriculture Program in</p> <ul style="list-style-type: none"> <li>- Colombia</li> <li>- Guatemala</li> <li>- Gambia</li> <li>- Kenya</li> <li>- Nepal</li> <li>- The Philippines</li> <li>- Thailand</li> <li>- Vietnam</li> <li>- Uruguay</li> <li>- Uganda</li> <li>- Zambia</li> </ul>	<p>Saint Lucia SASAPs and project concept notes include:</p> <p><a href="#">Resilient Ecosystems Adaptation Strategy and Action Plan (REASAP) 2020–2028 &amp; Portfolio of Project Concept Notes for Resilient Ecosystems 2020–2028</a></p> <p><a href="#">SASAP for the Agriculture Sector 2018-2028 &amp; Portfolio of Project Concept Notes for the Agriculture Sector 2018-2028</a></p> <p><a href="#">SASAP for the Fisheries Sector 2018-2028 &amp; Portfolio of Project Concept Notes for the Fisheries Sector 2018-2028</a></p> <p><a href="#">SASAP for the Water Sector 2018-2028 &amp; Portfolio of Project Concept Notes for the Water Sector 2018-2028</a></p> <p><a href="#">FAO, UNDP 2016</a></p>

<p>Building strategic alignment between NAPs and adaptation in Nationally Determined Contributions (NDCs) to build links between NDCs and NAPs for a well-coordinated approach.</p>	<p>Many countries have referenced the NAPs in their NDCs. Some of them are:</p> <ul style="list-style-type: none"> <li>- Chile,</li> <li>- Fiji,</li> <li>- Grenada,</li> <li>- Moldova,</li> <li>- Republic of Marshall Islands</li> <li>- Saint Lucia,</li> <li>- Suriname,</li> <li>- Vietnam etc</li> </ul>	<p><a href="#">Grenada, 2019</a> <a href="#">NAP Global Network, 2021</a></p>
<p>Developing health components of National Adaptation Plans (HNAPs)</p>	<p>The project on <b>Building Resilience of Health Systems in Asian LDCs to Climate Change</b> is being implemented in six Asian least-developed countries (LDCs): Bangladesh, Cambodia, Lao PDR, Myanmar, Nepal and Timor-Leste from 2019-2023. One of the main objectives of the project is to improved regional cooperation and knowledge exchange and the integration of a Health National Adaptation Plan (HNAP) into the national adaptation planning process.</p>	<p><a href="#">WHO 2021</a></p>

## 5. Experiences, LL & BP by essential systems

System thinking is a holistic approach that focuses on how a system’s constituent parts interact and interrelate with the other constituents of the system. Open systems interact with its environment via inputs, throughputs, and outputs. The different constituents of a system work collectively towards a common outcome. Systems thinking leads to exploring the inter-relationships (context and connections), perspectives (each stakeholder has their own perceptions) and boundaries (agreeing on scope, scale etc.). The application of a systems thinking in developing adaptation plans/NAPs will allow holistic thinking of different systems which over time with also interact with each other and take on board views of multi stakeholders resulting in an informed and holistic adaptation plan.

The ten core systems (Agriculture, food security, energy security, water resources and management, life and safety – health and human well-being, coastal zones, economic planning and activities, human settlements/housing (living spaces), general ecosystems, unique biodiversity, and Infrastructure) will be analyzed by breaking them down into components and listing down cases of country experiences which will then be assessed for potential best practices candidates.

### 5.1 Agriculture/Food Security

The analysis of food systems is well advanced and at the national level food security is best described along the following four components: Food availability, Food access, Food stability and Food utilization.

- *Food availability:*
  - Production (crops, fisheries, livestock, land, seed, etc.)
  - Distribution (preservation, storage, market place, etc.)
- *Food access:*
  - Food price (subsidies, tax, import and export, etc.)
  - Purchasing capacity (income, credit schemes, etc.)
- *Food stability:*
  - Sustainable supply of food (insurance, transportation, etc.)
- *Food utilization:*
  - Nutrition

For the least developed countries (LDCs), agriculture can be broken down into subsistence production or economic activity. Subsistence production is for survival and usually on small plots (in a few hectares at best), mostly rain fed and with low inputs. Agriculture business, for many, is still a small scale activity (few to 10 hectares) or a small to medium enterprise. Although, larger estates of 100ha or more exists, with investments in machinery and irrigation systems that produce food for sale at the national level and/or for export.

Collaborating with over 100 partner organizations, Climate Change Agriculture and Food Security (CCAFS) launched a new manifesto for transforming food systems under climate change in 2020. The report on “Actions to Transform Food Systems under Climate Change” indicates that there is a requirement for a systemic transformation in the food system if we are to achieve the four major components of food security while considering the loop of climate change impacts on the food system and vice versa.

The 11 transformative actions across four action areas proposed by CCAFS are:

- Rerouting farming and rural livelihoods to new trajectories to ensure zero agricultural land expansion on high carbon landscapes, incentivizing climate resilient and low emission practices and supporting prosperity through mobility and rural reinvigoration.
- De-risking livelihoods, farms and value chains through early warning systems and helping farmers make better choices.
- Reducing emissions from diets and value chains by shifting to healthy and sustainable climate friendly diets and reducing food loss and waste.
- Realigning policies, finance, support to social movements, and innovation through implementation policy and institutional changes that enable transformation, providing sustainable finance, driving social change for more sustainable decisions, and transforming innovation systems to deliver impacts at scale.
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Similarly, the Sectoral Guide on Agriculture and Food Security by the Green Climate Fund (GCF, 2021) has identified three paradigm shifting pathways in the agriculture and food security sector for transformation towards climate resilient and low emission agriculture:

1. Promoting resilient agroecology,
2. Facilitating climate informed advisory and risk management services and
3. Reconfiguring food systems.

The table in the following page will provide information on various country experiences on adaptation in the agriculture system from various sources and they will be assessed for potential best practices.

Table 5.1: Experiences and Best Practices from the Agriculture and Food Security System

Selected systems	Country Experiences with Adaptation Actions	Source	Candidates for best practices
Climate smart technology: <ul style="list-style-type: none"> <li>- Information,</li> <li>- Water harvesting</li> <li>- Reservoirs</li> <li>- Drought tolerant varieties</li> </ul>	The project Improving the <b>Resilience of the Agriculture Sector in Lao PDR to Climate Change Impacts</b> has noted the following outputs between 2011-2015: <ul style="list-style-type: none"> <li>- Climate change information generated, collected and uploaded into the website for public access.</li> <li>- Developed planning tools for forecasting and development of climate change scenarios on district and watershed level</li> <li>- Integrated climate change criteria into formal village land use planning.</li> <li>- 637 household (10%) of the project target farmers received direct technical support service from government extension officers during piloting of 29 adaptive agricultural practices such as frog raising, duck raising, native chicken raising, pig raising, onion growing etc.</li> <li>- Supported communities in drought prone areas in rain water harvesting and small scale reservoirs</li> <li>- Flood/drought tolerant rice varieties piloted in an area of about 110 hectares in 4 target districts. The average yield reached 3.6 tons per hectare (about one ton higher than local seed used before the project)</li> </ul>	<a href="#">UNDP/LDCF-LaoPDR</a>	✓ The project includes interventions on: <ul style="list-style-type: none"> <li>- Climate information</li> <li>- Forecasting and scenarios</li> <li>- Tools and technologies</li> <li>- Alternative livelihoods</li> <li>- Integration of climate change into planning.</li> </ul>
Climate smart technology:	<b>AQUAADAPT-Myanmar</b> project developed a free mobile app called Green Way to provide farmers with practical real time information about local weather, farm productivity and income. It has resulted in more than 120,000 registered users of the application in 327 of	<a href="#">IDRC 2018</a>	



<ul style="list-style-type: none"> <li>- Information</li> <li>- irrigation system</li> <li>- Tools</li> <li>- Water access and distribution systems</li> </ul>	<p>Myanmar’s 355 townships, 20% of whom are women. The green Way application further added a component of aquaculture which provided information tailored to address environmental issues affecting Myanmar’s aquaculture with special reference to climate change. Since the launch of the aquaculture section in June 2018, more than 2,420 registered fish farmers have used the application to access fish farming information. The app is also being used to report fish diseases to qualified staff at the Department of Fisheries, universities, the private sector, and World Fish so that they are quickly diagnosed. So far, 30,000 people, fish farmers and other users have viewed the aquaculture and nutrition material this year.</p>		
	<p><b>The Feed the Future innovation Lab for Small-Scale Irrigation (ILSSI)</b> project is using irrigation to increase food production in Ethiopia, Ghana and Tanzania. The goal of the innovation lab is to define the most effective irrigation systems and practices; from water lifting, distribution and monitoring methods that will enhance the lives of small holder farmers:</p> <p>Some of the outcomes of the project include:</p> <ul style="list-style-type: none"> <li>- Development of models by national university partners, such as the IDSS (Integrated Decision Support System) to measure the impact of an intervention on the lives of the individuals.</li> <li>- Support towards various methods of water lifting and delivery systems.</li> <li>- Providing Small Scale Innovations (SSI) such as the “wetting front detector”, “Berken plough tool”, etc. that can be made and maintained locally.</li> <li>- Increased yields and efficiency, gender considerations and household surveys targeting impact of interventions</li> </ul>	<p><a href="#">ILRI 2018</a></p> <p><a href="#">ILSSI</a></p> <p><a href="#">AGRI-LINKS 2018</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Climate information</li> <li>- Forecasting and scenarios</li> <li>- Innovative tools and technologies</li> <li>- Alternative livelihoods</li> <li>- Integration of climate change into planning</li> <li>- Gender considerations</li> </ul>
	<p><b>Irrigation Restoration and Development</b> Project supported the rehabilitation of irrigation systems, serving some 300,000 hectares of targeted areas in Afghanistan before it closed in 2020. Over 425,000 households benefited from IRDP services, which aimed to improve access to irrigation in the targeted areas and strengthen</p>	<p><a href="#">World Bank 2021</a></p> <p><a href="#">World Bank 2017</a></p>	

	<p>capacity for water resources management. To list a few out of the 180 irrigation schemes:</p> <ul style="list-style-type: none"> <li>- The Balkhi irrigation canal in Bamyan province is still operational a decade after it was rehabilitated and has benefited the agriculture, economic activities and living conditions</li> <li>- The rehabilitation of Sharqi canal in Balkh Province has revived many areas of wasteland and turned them into productive farmland, irrigating over 13,000 hectares.</li> </ul>		
Climate smart technology	<p>CTCN brings together stakeholders to provide technical assistance for mitigation adaptation in the agriculture sector, through a combination of well-established and innovative technologies.</p>	<a href="#">CTCN</a>	
Conservation agriculture (CA)	<p><b>Conservation Agriculture</b> is a farming system that promotes minimum soil disturbance (i.e no tillage), maintenance of a permanent soil cover, and diversification of plant species. It enhances biodiversity and natural biological processes above and below the ground surface, which contribute to increased water and nutrient use efficiency and to improved and sustained crop production.</p> <p>The case study by the programme on <b>Integrating Agriculture in National Adaptation Plans (NAP-AG)</b> led by UNDP and FAO has provided a cost benefit analysis of conservation agriculture for climate change adaptation in Zambia. The study uses a cost-benefit analysis to analyze the financial and economic worthiness of conservation agriculture (CA) practices using primary data from a survey of a sample of 18,183 households (HH) targeted by the Conservation Agriculture Scaling-up (CASU) Project in Zambia. The findings are as follows:</p> <ul style="list-style-type: none"> <li>- If a farmer switches from conventional farming to CA, annual net income from agricultural production would increase from USD 217 to 351, a 62 percent increase.</li> <li>- In the first three years of switching from conventional to CA implementation, there are negative incremental net benefits. This is due to the transition period needed for CA benefits on crop yields to become effective. While farmers</li> </ul>	<p><a href="#">FAO</a></p> <p><a href="#">FAO &amp; UNDP 2020</a></p>	

	<p>begin to see benefits in the fourth year, they will incur investment costs in the beginning. This causes a low proportion of farmers to adopt CA.</p> <ul style="list-style-type: none"> <li>- Negative income recorded in the first years of CA implementation, low asset (including land and income) levels, limited family size, and opportunity cost of labour are adoption barriers to the adoption of CA technology.</li> </ul>		
<p>Food production:</p> <ul style="list-style-type: none"> <li>- Land management</li> <li>- Gene banks</li> <li>- Seed</li> </ul>	<p>The global project <b>Soil Conservation and Soil Rehabilitation for Food Security</b> supports Benin, Burkina Faso, Ethiopia, India, Kenya, Madagascar and Tunisia in adopting cultivation practices that improve the soil and have direct benefits for climate protection. Thus, more regular and bountiful harvests can be expected, even if extreme weather events happen. Advisory and training services have already reached over 167,500 smallholders. Close to 261,500 hectares of soil have been rehabilitated and yields have increased by up to 36 per cent per hectare.</p>	<p><a href="#">GIZ 2020</a></p>	
	<p>The <b>Svalbard Global Seed Vault</b> was established with the “<i>objective to provide a safety net for the international conservation system of plant genetic resources, and to contribute to the securing of the maximum amount of plant genetic diversity of importance to humanity for the long term in accordance with the latest scientific knowledge and most appropriate techniques</i>”. The Seed Vault is managed in partnership by the Government of Norway, the Nordic Genetic Resource Center (NordGen) and the Global Crop Diversity Trust (the Trust).</p> <p>According to Westengen et al; the Seed Vault is on the one hand, a high-profile environment and development project and, on the other, a low-tech practical solution increasingly serving a basic global need for the safety duplication of seeds held in conventional genebanks. There are important synergies between these two aspects, and the Seed Vault plays an important symbolic role for enhanced integration and cooperation in the global <i>ex-situ</i> conservation efforts.</p>	<p><a href="#">Westengen et al 2013</a></p> <p><a href="#">Crop trust</a></p>	

	<p><b>BOLD (Biodiversity for opportunities, Livelihood and Development)</b> is a 10 year project under the Crop Trust to strengthen food and nutrition security worldwide by supporting the conservation and use of crop diversity. It was launched in 2021 and builds on the work and achievements of the Crop Wild Relatives Project (2011-2021).</p>		
	<p><b>Community seed bank</b> has more than 20 years of history in Nepal. The main objectives of establishing a community seed bank are to halt the rapid erosion of local varieties and their on-farm management, improving local livelihoods and resilience through providing easy access to quality seeds of diverse crops and varieties at the local level and realizing farmers' rights on seed.</p> <p>Recently; Nepal has also legally registered national Community Seed Banks Association of Nepal (CSBAN), probably the first such association anywhere in the world. In 2015, the National Gene bank in Nepal started an Evolutionary Plant Breeding (EB) program for the local rice variety, Jumli Marshi with the objective of enhancing genetic conservation through creating a dynamic gene pool. Evolutionary populations have the potential to produce higher yields and perform better than their local or improved counterparts in adverse, or stress conditions.</p>	<p><a href="#">Li-BIRD 2017</a></p> <p><a href="#">CSBAN 2020</a></p> <p><a href="#">EPB, Nepal 2020</a></p>	
<p>Climate smart interventions:</p> <ul style="list-style-type: none"> <li>- Alternate livelihood</li> <li>- Irrigation system</li> <li>- Sustainable land management</li> </ul>	<p><b>Preserving the agro-forestry system (Kihamba) on Mount Kilimanjaro</b>, Tanzania for 660 households has led to:</p> <ul style="list-style-type: none"> <li>- Rethinking sources of cash income. Three interventions were agreed on: a) conversion to certified organic coffee farming; b) introduction of vanilla as a high value additional cash crop; and c) introduction of trout aquaculture along the canals of the irrigation system.</li> <li>- Rehabilitation of the irrigation system to reduce water loss and expansion of the capacity of storage ponds to cope with longer dry seasons due to climate change.</li> <li>- Training in sustainable land management.</li> </ul>	<p><a href="#">FAO Success Stories</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Climate information</li> <li>- Tools and technologies</li> <li>- Alternative livelihoods</li> <li>- Capacity building for long term</li> </ul>

<p>Climate smart interventions:</p> <ul style="list-style-type: none"> <li>- Irrigation</li> <li>- climate resilient crops</li> <li>- water-related infrastructure</li> <li>- alternative livelihood options</li> <li>- climate responsive planning</li> <li>- water and soil management</li> <li>- Grain reserves</li> <li>- Agro-met information</li> <li>- Crop diversification</li> </ul>	<p>To date, 24 adaptation measures in nine communes received financing through <b>Performance Based Climate Resilient Grants (PBCRG)</b> under the LoCAL program in Benin. Overall, 71,000 people are reported to have directly benefited (or will benefit); 55 per cent of these are women.</p> <p>These measures mainly focus on the following:</p> <ul style="list-style-type: none"> <li>- Rehabilitation/improvement of community ponds in an effort to revitalize the local aquaculture sector as an alternative livelihood option for local communities as well as water retention infrastructure for supporting agropastoralism.</li> <li>- Construction/rehabilitation of wells and irrigation facilities to ensure water availability for irrigated fields throughout the year and maintenance of market garden yields, as a key income-generating activity especially for women</li> <li>- Capacity-building activities on climate-resilient crop varieties, i.e. climate-resilient rice varieties and cost-efficient agricultural practices in two communes.</li> <li>- Water-related infrastructure (e.g. boreholes) to ensure a supply of potable water in rural villages affected by water scarcity.</li> </ul>	<p><a href="#">Benin, UNCDF</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Climate information</li> <li>- Capacity building</li> <li>- Tools and technologies</li> <li>- Alternative livelihoods</li> <li>- Integration of climate change into planning.</li> </ul>
	<p><b>Strengthening the resilience of rural livelihood options for Afghan communities</b> in Panjshir, Balk, Uruzgan and Herat province to manage climate change induced disaster risks. The objective of the project is:</p> <ul style="list-style-type: none"> <li>- Climate responsive local development planning</li> <li>- Enhance rural livelihoods through income generating opportunities, restore critical rangelands and watershed, and building critical infrastructure such as storage reservoirs, check dams and canals.</li> </ul>	<p><a href="#">GEF, UNDP 2013</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Climate information</li> <li>- Tools and technologies</li> <li>- Alternative livelihoods</li> <li>- Integration of climate change into planning.</li> <li>- Focus on vulnerable communities &amp; women</li> </ul>
	<p>The project <b>Strengthening the resilience of women producer groups and vulnerable communities in Mali</b> will focus enhancing</p>	<p><a href="#">UNDP/LDCF -Mali</a></p>	

	women and producer group's adaptive capacities to secure livelihoods production from climate impacts and increase socio-economic resilience in Malian vulnerable communes (Kayes, Koulikoro and Sikasso). The project will result in: <ul style="list-style-type: none"> <li>- Sustainable climate resilient water management systems provided to vulnerable communities, including women farmers, which in turn ought to support the development of subsistence activities</li> <li>- Innovative approach and sustainable climate resilient technologies provided to women farmers and producers in vulnerable communes to enhance and secure the production of local livelihood systems from climate impacts</li> </ul>		
Climate smart interventions: <ul style="list-style-type: none"> <li>- water management</li> <li>- land management</li> <li>- irrigation systems</li> <li>- crop diversification</li> <li>- Post harvest activities</li> <li>- Integration of climate resilience in planning</li> </ul>	The project, <b>Adaptation to the Effects of Drought and Climate Change in Zambia</b> , will support climate-resilient water management and agricultural practices. Pilot projects will test water harvesting and irrigation systems, improved land and water management practices, and crop diversification options in relation to financial sustainability and ability to reduce vulnerability to climate change.	<a href="#">UNDP/LDCF-Zambia</a>	
	The <b>Strategic Program for Climate Resilience (SPCR)</b> in Cambodia is an investment plan approved by the government and funded by the Climate Investment Funds' Pilot Program for Climate Resilience. It includes 7 investment projects aimed to strengthen the country's rural and urban infrastructure and agriculture development, including irrigation, seeding, and post-harvest activities. It also included an \$11 million technical assistance program, which concluded in June 2021 and showcased approaches the government can adopt to integrate climate resilience into development planning.	<a href="#">ADE, Cambodia</a>	✓ The project includes interventions on: <ul style="list-style-type: none"> <li>- Climate information</li> <li>- Seeding and post harvest activities</li> <li>- Tools and technologies</li> <li>- Alternative livelihoods</li> <li>- Integration of climate change into planning.</li> </ul>
Food risk transfer through index-based agricultural insurance	LDCs in the Pacific and the Caribbean are participating in the <b>Pacific Catastrophe Risk Assessment and Financing and the Caribbean Catastrophe Risk Insurance Facility</b> .	<a href="#">UNESCAP</a>	
	The <b>Global Facility for Disaster Reduction and Recovery (GFDRR)</b> is a grand funding mechanism of global partnership that	<a href="#">GFDRR</a>	

	<p>helps developing countries better understand and reduce their natural hazards and climate change.</p> <p>The <b>African Risk Capacity (ARC)</b> was established by the African Union (AU) in 2012 as an African owned, index-based weather risk insurance pool and early response mechanism that combines the concepts of early warning, disaster risk management, and risk finance. ARC's mission is to develop a pan-African natural disaster response system that enables African governments to meet the needs of people at risk to natural disasters</p> <p>Three countries in Sahel- Mauritania, Niger and Senegal received a USD 26.3 million payout from African Risk Capacity (ARC Ltd.) The governments paid a combined premium of USD 8 million for drought insurance coverage and the payout benefited an estimated 1.3 million people and over half a million livestock.</p>	<a href="#">ARC</a>	
Regulations and management Plans	<p>The project <b>Enhancing National Food Security in the context of Global Climate Change</b> was designed with the objective to build the adaptive capacity of vulnerable Kiribati communities to ensure food security under conditions of climate change. The project will assist Kiribati to address urgent institutional capacity building needs primarily on the national level and implement and demonstrate community-based adaptation measures.</p> <p>By the end of the project, it aims to have operational models showing that food security, ecosystem integrity and climate change resilience can be enhanced through improved management approaches.</p>	<a href="#">UNDP, Kiribati MTR 2020</a>	
Climate Smart Villages (CSV)	<p>The CSV project launched in 2011 with 15 climate-smart villages in West Africa, East Africa and South Asia. Additional villages are now being chosen in Latin America and Southeast Asia.</p> <p><u>East Africa:</u> Kenya, Uganda, Tanzania and Ethiopia  <u>West Africa:</u> Burkina Faso, Ghana, Mali, Niger, Senegal  <u>Latin America:</u> Colombia, Guatemala, Honduras  <u>South Asia:</u> Bangladesh, Nepal, India  <u>Southeast Asia:</u> Vietnam, Lao PDR), Cambodia, Philippines</p> <p>After potential sites are selected, a steering group of community representatives and researchers together identify appropriate</p>	<a href="#">CCAFS</a>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Climate smart options are identified by communities and researchers.</li> <li>- Climate information</li> <li>- Index-based insurance</li> <li>- Tools and technologies</li> <li>- Alternative livelihoods</li> </ul>

	<p>climate-smart options for that village. These might include climate-smart technologies, climate information services, local development and adaptation plans and supportive institutions and policies, all tailored to that community's needs. The community chooses its preferred options in a process that aims to be as participatory and inclusive as possible, encouraging women and more vulnerable groups to participate.</p> <p>The CSV concept integrates a) climate smart technologies, b) Index-based insurance, c) climate information services and local adaptation plans. Some of the features of CSV include:</p> <ul style="list-style-type: none"> <li>- Training of trainers is an essential element in their farmer learning networks. This has been demonstrated in a national programme dedicated to empowering women in Bihar, India whereby CCAFS and partners trained a core group of elected women who then took the message to more than 1500 additional women across the state.</li> <li>- The approach of CSV is tailored, rather than one-size-fits-all, and there is scope for learning from what works in one site and adapting it for others, an approach the project calls "knowledge smart". For example, farmers from Lawra-Jirapa, a climate-smart village in Ghana, visited Yatenga, a climate-smart village in Burkina Faso, because the CCAFS Climate Analogues tool indicated that Yatenga farmers were experiencing today conditions that the Ghanaian farmers could expect in the future. The Ghanaians were able to learn first-hand about the crops and techniques that their Burkinabe colleagues currently use.</li> <li>- Farmers in CSV are also testing climate-smart services, such as tailored weather forecasts to plan planting, harvesting and other activities on the farm. Advisories and weather forecasts are being delivered by mobile phones, and phones are also being used to enable farmers to buy index-based insurance that gives them a measure of protection in the event of extreme weather.</li> </ul>		<ul style="list-style-type: none"> <li>- Integration of climate change into planning.</li> </ul>
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There is growing evidence that bundling agro-insurance with credit, climate-smart technologies and/or life insurance attract farmers to invest in farm productivity. Most LDCs have at least signed to one regional risk-pooling scheme offering farmers the opportunity to access weather index agricultural insurance products.

The projects that have been identified as potential best candidates for best practices could look at viable options of integrating an insurance scheme, seed banks and working with nature in such programs to make it a holistic project/program.

## 5.2 Energy Security

Energy security constitutes the uninterrupted production, distribution and efficient management of energy in a manner that is affordable and inclusive. The four main components of energy security covered in this paper are:

- Energy diversification (sources of energy, affordability, etc.)
- Energy demand management (production, distribution, etc.)
- Energy infrastructure (access, expansion)
- Participation in regional power pooling schemes

For many LDCs, energy security is first and foremost about having access to electricity as many communities do not have access to electricity. In LDCs, access to electricity means having access to basic living standards such as improvement in health facilities as they can store critical vaccines and medicines in refrigerators, students can study longer hours, water can be pumped, business entrepreneurs will be boosted etc. In several LDCs such as Benin, Burkina Faso, Ethiopia, Guinea-Bissau, Kenya, Lao People’s Democratic Republic, Mali, Niger, Senegal and Togo several off-grid projects have been implemented and the table below will list few of them.

Table 5.2: Experiences and Best Practices from the Energy Security System

Selected systems	Country Experiences with Adaptation Actions	Source	Candidates for best practices
Strengthening energy infrastructure.	The <b>Rural Renewable Energy Project</b> has led to 54 rural communities receiving electricity for the first time. The project uses solar energy technology to provide up to 4 megawatts of sustainable, low-carbon energy to rural communities. A first of its kind in Sierra Leone and in sub-Saharan Africa, the project will benefit more than 360,000 residents, as well as local businesses and essential services. Started in 2017, the first phase of the project saw the installation of solar-power plants in 54 community health centers, of which 50	<a href="#">UNOPS 2019</a>	<p>✓</p> <p>All these projects include interventions on or more of the following:</p> <ul style="list-style-type: none"> <li>- Providing electricity to fulfil needs of communities,</li> </ul>

	<p>mini-grids were expanded to provide electricity to thousands of households, schools and businesses. The second phase of the project widens access to electricity to community health centers, houses, schools and business to a further 44 communities.</p>		<p>schools, businesses and health centres</p> <ul style="list-style-type: none"> <li>- Using renewable energy such as solar plants, improved stoves and green mini grids.</li> <li>- Energy efficiency</li> <li>- Considers vulnerable communities and gender</li> </ul>
	<p>The <b>Installation of Multi-purpose Infrastructure (for energy and irrigation)</b> project in Liberia, West Africa has resulted in the commissioning of 1MW mini hydropower plant, electrification of households and small-scale industries and capacity building.</p>	<p><a href="#">GEF 2009</a></p>	
	<p>In 2012, UNCDF launched the <b>Local Finance Initiative (LFI)</b>, a “last mile” finance model aimed at correcting market failures and attracting catalytic capital for the investments that are not being picked up by existing public or private investors. In one of its projects, the LFI program facilitates public financing for the Mpale village 50kw Solar Micro Grid in the Tanga region of Tanania. Electricity was brought to the village of Mpale nearly 50 years after it was established as a village which resulted in:</p> <ul style="list-style-type: none"> <li>- Power supply to 250 households, public facilities and small businesses improving the lives and livelihoods of the people in that village.</li> <li>- Mpale has seen a 60% rise in local entrepreneurship and services that previously did not exist.</li> <li>- Improved health and education in the village.</li> </ul> <p>The Mpale project demonstrated that a small seed financing grant can unlock additional public financing schemes and generate a level of impact that is exponential to the size of the initial investment.</p>	<p><a href="#">Mpale, UNCDF 2020</a></p> <p><a href="#">UNCDF Case study 2017</a></p> <p><a href="#">UNCDF</a></p>	
<p>Diversifying energy to reduce impact on food security.</p>	<p>The programme on <b>Support for the Economic Independence of Women in Rural Mali Facing Food Insecurity and Climate Change</b> has 13 pilot units across three regions of Mali (Koulikoro, Ségou and Mopti) and around Bamako. The women received training and solar- and gas-powered equipment allowing them to produce and market local products. In addition, 5000 households were contacted and equipped with improved stoves in 13 townships.</p>	<p><a href="#">UN Women, FAO 2015</a></p>	<p>✓</p> <p>All these projects include interventions on or more of the following:</p> <ul style="list-style-type: none"> <li>- Providing electricity to fulfil needs of communities, schools, businesses and health centres</li> </ul>
<p>Diversifying energy sources.</p>	<p>The <b>Haiti Scaling up Renewable Energy Program (SREP)</b> will result in new or improved electricity access for about one million</p>	<p><a href="#">World Bank, Haiti 2017</a></p>	

	<p>people (including 500,000 women) and 10,000 enterprises/community services. It will displace fossil fuel generation with renewable energy, resulting in an estimated annual reduction of about 100,000 tCO2 at the Program level (42,000 tCO2 at Project level).</p>		<ul style="list-style-type: none"> <li>- Using renewable energy such as solar plants, improved stoves and green mini grids.</li> <li>- Energy efficiency</li> <li>- Considers vulnerable communities and gender</li> </ul>
	<p>The programme, <b>BOAD Climate Finance Facility</b> to scale up solar energy investments in Francophone West Africa LDCs (Benin, Burkina Faso, Guinea-Bissau, Mali, Niger and Togo) targets six LDCs that have one of the lowest access rates to modern energy services in the world. High cost of electricity, overreliance on fossil fuels and subsequent energy security challenges.</p> <p>The programme aims to:</p> <ul style="list-style-type: none"> <li>- Help the selected countries achieve their NDCs and address barriers to solar investments and reach a target of 1192 MW of installed solar capacity by 2030.</li> <li>- Build capacity of BOAD in climate change considerations into project cycle.</li> <li>- Enhance regulatory framework by building capacity of public institutions in the energy sector.</li> </ul>	<a href="#">GCF 2017</a>	<p>✓</p> <p>All these projects include interventions on or more of the following:</p> <ul style="list-style-type: none"> <li>- Providing electricity to fulfil needs of communities, schools, businesses and health centres</li> <li>- Using renewable energy such as solar plants, improved stoves and green mini grids.</li> <li>- Energy efficiency</li> <li>- Considers vulnerable communities and gender</li> <li>- Expansion of energy infrastructure</li> </ul>
Energy efficiency	<p>The Democratic Republic of Congo (DRC) <b>Green mini-grid program</b> will support the development of three solar green mini-grid pilot projects, each with battery storage, aggregating to a capacity of around 30MW in three towns Isiro, Bumba and Gemena and to strengthen the enabling regulatory environment for private investment in green mini-grid projects.</p>	<a href="#">GCF, DRC 2018</a>	
	<p>The <b>Emergency Infrastructure Rehabilitation and Energy Project</b> in Togo had multifaceted objectives. The infrastructure rehabilitation component addressed:</p> <ul style="list-style-type: none"> <li>- Drain cleaning, rehabilitation and construction</li> <li>- Rehabilitation of urban roads</li> <li>- Water supply in the form of boreholes, water towers, distribution networks and pipes.</li> <li>- Rehabilitation of electricity distribution system and improving energy efficiency.</li> </ul>	<a href="#">World Bank, GEF 2016</a>	

Energy demand management	A <b>Demand Side Management (DSM)</b> program in Bangladesh shows that efficiency improvement in the use of home appliances could reduce electricity demand in the residential sector by about 28.8% but this does require a long time to be implemented, whereas the inclusion of energy saving behavior as a demand response strategy in residences might achieve demand reduction of up to 50.7%.	<a href="#">Khan 2019</a>	
Participation in regional power pooling to help reduce power variability due to climate change	<b>KawiSafi ventures Fund</b> will be the world's first climate change fund targeting low-income populations in developing countries for investments of USD 2-10 million per company will be made in 10-15 clean energy small and medium sized enterprises. Investments will initially be made in Rwanda and Kenya providing solar technologies.	<a href="#">GCF, 2015</a>	
	The <b>West African Power Pool (WAPP)</b> covers 14 of the 15 countries of the regional economic community (Benin, Côte d'Ivoire, Burkina Faso, Ghana, Gambia, Guinea, Guinea Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone and Togo) with a vision to integrate the national power systems into a unified regional electricity market with the ultimate goal of providing in the medium and long term, a regular and reliable energy at competitive cost to the citizenry of the ECOWAS region.	<a href="#">ECOWAPP</a>	
	The <b>South Asia Regional Initiative for Energy (SARI/E)</b> program was initiated in 2000, covering the eight countries in South Asia, viz. Afghanistan, Bangladesh, Bhutan, India, The Maldives, Nepal, Pakistan and Sri Lanka. In the first three phases, the program focused on increasing awareness on regional energy markets, supporting transmission interconnections and building capacity. The fourth and current phase of the program, called SARI/EI, is aimed at advancing regional grid integration through cross border power trade, started in 2012, and is implemented by Integrated Research and Action for Development (IRADe), the leading South Asian Think Tank.	<a href="#">SARI/E, 2019</a>	
	The <b>East Africa Power Pool (EAPP)</b> is a regional institution established in 2005 to coordinate cross-border power trade and grid interconnection among nations of the Eastern Africa region. The EAPP currently has 11 member countries (Burundi, Djibouti,	<a href="#">EAPP</a>	

Democratic Republic of Congo, Rwanda, Egypt, Ethiopia, Kenya, Sudan, Tanzania, Uganda and Libya).		
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### 5.3 Water resources and management

Water resources and management system covers variety of sub-systems such as water sources, means of collection, storage, distribution, quality, spatial scale (rural to urban), sewage and governance. The components of water system are:

- Water availability: Source (surface water, underground water, regional aquifers)
- Access (Affordability, infrastructure, quantity)
- Water safety: Treatment, quality etc.
- Water security: Drinking, sanitation, agriculture, energy, transport, tourism etc
- Regional cooperation for transboundary water management

According to The United Nations World Water Development Report 2020: Water and climate change; food security, human health, urban and rural settlements, energy production, industrial development, economic growth and ecosystems are all water dependent and this vulnerable to climate change (UNESCO 2020). The report also discusses the nexus of water usage and management among sectors and how adaptation and mitigation actions by one sector can directly influence its water demand, which can in turn augment or reduce the local/regional water availability (including quality) for other sectors. In cases of reduced water demand, such actions can lead to multiple benefits across sectors and boundaries, whereas increased water demand can result in the need for trade-offs over the allocation of limited supplies. The need for systemic approach is also highlighted in this report whereby it states that sectoral fragmentation and bureaucratic competition may pose serious challenges for the integration across scales and that there is a need for i) greater public participation to discuss and manage climate risk; ii) building adaptive capacities at multiple levels; and iii) prioritizing risk reduction for socially vulnerable groups.

Some of the recommendations for the water sector from the report include:

- Trade-offs and conflicting interests need to be addressed at all levels in order to negotiate integrated and coordinated solutions given the cross-cutting nature of water and climate through different economic sectors and across society. This requires an equitable, participatory, multi-stakeholder approach to water governance in the context of climate change.
- Combining climate change adaptation and mitigation proposal. First, it benefits water resources management and improves the provision of water supply and sanitation services. Second, it directly contributes to combating both the causes and impacts of climate change, including disaster risk reduction. Third, it contributes, directly and indirectly, to meeting several of the Sustainable Development Goals (hunger, poverty, health, energy, industry, climate action and so on – not to mention SDG 6, the ‘water goal’ itself) and a host of other global objectives.

- Regional approaches to support transformative shifts can play a critical role in national-level implementation by improving collaboration and coordination between responsible institutions; ensuring that action is based on sound information and evidence; and increasing access to both public and private finance for climate-resilient investment.

Table 5.3: Experiences and Best Practices from the Water System

Selected systems	Country Experiences with Adaptation Actions	Source	Candidates for best practices
Enhancing water availability and water safety by diversifying source.	The <b>South Tarawa Water Supply</b> Project in Kiribati will construct a 4000m <sup>3</sup> seawater desalination plant to diversify the sources of water supply in Kiribati. The project will also expand and install new water infrastructures such as pipelines, storage facilities, pumping stations, solar PV plant and reticulation networks.	<a href="#">GCF, Kiribati 2018</a>	
Water availability, safety and water security.	The Governments of Burundi and Rwanda are collaborating on several initiatives under the Water, Climate and Development Programme (WACDEP) which aims to increase climate resilience and water security in the Kagera water basin catchment which is part of the Rwanda-Burundi Cyohoha transboundary catchment area. They launched a pilot project in 2011 on <b>Enhancing Climate Resilience in Burundi-Rwanda Transboundary Catchment</b> which resulted in the following: <ul style="list-style-type: none"> <li>- Improved living conditions and reduced vulnerability to climate change among the 30,000 catchment inhabitants</li> <li>- Sustainable solutions such as biogas facilities, water supply infrastructure and reforestation programs.</li> <li>- The interventions in Rwanda are now considered as integral parts of the Bugesera District Development Plan.</li> </ul>	<a href="#">GWP, Burundi &amp; Rwanda 2011</a>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Improving living conditions</li> <li>- Water source protection and management actions</li> <li>- Tools and technologies</li> <li>- Reducing vulnerabilities</li> <li>- Integration of climate change and water management into planning.</li> </ul>
Water security (health and sanitation)	The project <b>Building Adaptation to climate change in health in LDCs through resilient water, sanitation and hygiene (WASH)</b> aimed at improving	<a href="#">WHO 2012</a>	

	<p>policy and practice on health adaptation to climate change through robust evidence from field testing in Bangladesh, Nepal, Ethiopia and the United Republic of Tanzania. The main outcome of the project was the creation of a clear framework for protecting health and reducing the risk of disease as a consequence of climate change in 4 pilot countries. This was achieved through transforming the way these countries integrated climate change into health programming.</p>		
	<p>The project <b>Delivering climate-resilient water and sanitation in Africa and Asia</b> provides targeted support to five countries in Africa and Asia (Ethiopia, Malawi, Mozambique, Nepal and Bangladesh) to improve climate-resilient health service delivery. The main objectives of the project are to enhance climate-resilient water safety and sanitation management to effectively respond to climate change impacts, as well as to develop integrated surveillance for climate-sensitive diseases and, where feasible, early warning systems. This project builds on a previous initiative on climate-resilient water and sanitation systems in Ethiopia, Tanzania, Malawi, Mozambique, and Nepal.</p>	<p><a href="#">WHO 2018</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Water safety and sanitation</li> <li>- Integrated surveillance and early warning system</li> <li>- Climate and health information and data integration</li> </ul>
Regional cooperation on water management	<p>The objective of the <b>Zambezi River Basin Management</b> project for Southern Africa is to strengthen the role of Zambezi water course Commission (ZAMCOM) in promoting cooperative management and development within the river basin through institutional strengthening, improved information sharing and decision support and strategic planning to facilitate sustainable, climate resilient growth.</p>	<p><a href="#">World Bank, 2015</a></p>	
	<p>The <b>Mekong River Water Utilization</b> Project will assist the member states of the Mekong River Commission (MRC); Cambodia, Laos, Thailand and Vietnam to establish mechanisms to promote and improve coordinated and sustainable water</p>	<p><a href="#">World Bank, 2000</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Climate information</li> </ul>

	management in the Basin including reasonable and equitable water utilization by the countries of the Basin and protection of the environmental aquatic life and ecological balance.		<ul style="list-style-type: none"> <li>- Sustainable water management</li> <li>- Environmental/ecological considerations</li> </ul>
Water security (Early warning)	Developing early warning systems is one of the activities prioritized in the water sector under Colombia's national adaptation plan. The Colombian government and NAP Global Network supported the town of Guatavita to pilot an <b>Early Warning System to help prevent heavy rains and drought</b> from negatively impacting household water supplies and sewage systems in order to prepare the town for climate change.	<a href="#">NGN, Colombia 2020</a>	
Ensuring water availability	The <b>Rainwater harvesting</b> project in Manikkhali village in Bangladesh has led to the installation of 30 rainwater harvesting systems each with a capacity of 1000 liters of water. With a mere investment of US\$ 25 per family, more than 450 poor families have now access to drinking water for the next ten to fifteen years. The families benefitting from the water harvesting tanks came to an agreement with the local government, to ensure the system is maintained through a joint maintenance committee for which training has been provided. The project also envisages that women and girls no longer have to walk hours each day to collect clean, drinkable water – nor risk sexual assault or violation on their journey.	<a href="#">UNCDF, Bangladesh 2020</a>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Improving living conditions</li> <li>- Gender considerations</li> <li>- Tools and technologies</li> <li>- Sustainability through management regimes</li> </ul>
	Burundi has implemented a project <b>Reducing the impact of climate change on the availability of water and land resources</b> with the following results: <ul style="list-style-type: none"> <li>- Through environmentally friendly water and land management in at-risk regions, the project contributes to increasing the water storage capacity of land and water infiltration, while also reducing erosion.</li> </ul>	<a href="#">GIZ, Burundi 2021</a>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Sustainable water and land management</li> <li>- Environmental/ecological considerations</li> </ul>



	<ul style="list-style-type: none"> <li>- Energy-saving ovens are reducing the need for firewood and thus protecting trees.</li> <li>- Improve agricultural production and generating income</li> <li>- Uses biological measures to improve soil fertility</li> <li>- Particular emphasis is placed on giving women better access to their own income from agriculture. The project also promotes the involvement of women in decision-making about how income or savings are used.</li> </ul>		<ul style="list-style-type: none"> <li>- Increase in agricultural production</li> <li>- Gender considerations</li> </ul>
Water security (economic activity, health and safety, agriculture)	<p>This project, <b>Addressing Climate Change Risks in Water Resources and Food Security in the Dry Zone of Myanmar</b>, seeks to minimize the increasing impacts of climate change on agricultural and livestock production cycles in the Myanmar Dry Zone (2015-2019). The project has resulted in 112,357 people who faced water shortages receiving support, 9 drought resilient agricultural practices were introduced and demonstrated and early warning information communicated through traditional media a disaster alert notification application for mobile phones developed.</p>	<p><a href="#">UNDP, Myanmar 2015</a>  <a href="#">AE, Myanmar 2019</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Sustainable water management</li> <li>- Increase in agricultural production</li> <li>- Early warning information</li> </ul>
	<p>Burkina Faso has conducted a vulnerability assessment of its infrastructure in comparison with water and other key systems. Malawi has completed five sector assessment reports which include water resources.</p>	<p>Government of Burkina Faso  Government of Malawi</p>	

The projects identified as potential best practices can be further uplifted by considering the holistic uses of water as well as the other components of water such as water safety, alternative sources etc. These projects generally consider either one or two uses of water such as water and health or water and agriculture. The projects could consider supporting projects that have an integrated approach on water to address all uses of water simultaneously while giving due consideration to making use of data, tools and technologies and environmental and ecological factors.

## 5.4 Life Safety : health and human well being

Health systems vary around the world but are generally made up of six areas: leadership and governance; health workforce; health information systems; essential medical infrastructure, products and technologies; service delivery; and financing (WHO, 2009). For this assessment; the health system can be classified into the following components based on the information from WHO:

- Health information systems: early warning, awareness, surveillance system
- Medical Infrastructure: hospitals, clinics, water and electricity in the infrastructure
- Service Delivery: Products and technologies, doctors and health workforce
- Financing: Leadership and governance, policies and plans, funds

The COP 26 Special Report on Climate Change and Health, 2021 developed by WHO in consultation with over 15- organizations and over 400 experts and health professionals in all six WHO region has identified 10 recommendations for climate change and health:

- Commit to a healthy, green and just recovery from COVID-19
- Place health and social justice at the heart of the UN climate talks
- Prioritise those climate interventions with the largest health, social and economic gains.
- Build climate-resilient and environmentally sustainable health systems and facilities, and support health adaptation and resilience across sectors
- Guide a just and inclusive transition to renewable energy to save lives from air pollution, particularly from coal combustion. End energy poverty in households and health care facilities
- Promote sustainable, healthy urban design and transport systems, with improved land use, access to green, and blue public space, and priority for walking, cycling and public transport.
- Protect and restore natural systems, the foundations for healthy lives, sustainable food systems and livelihoods.
- Promote sustainable and resilient food production and more affordable, nutritious diets that deliver on both climate and health outcomes.
- Transition towards a wellbeing economy.
- Mobilise and support health community in climate action.

Table 5.4: Experiences and Best Practices from the Health System

Selected systems	Country Experiences with Adaptation Actions	Source	Candidates for best practices
Health information systems and service delivery.	<p><b>Vulnerability and adaptation Assessment at the community level</b> were conducted to identify the specific vulnerabilities to climate-related health risks to assess adaptive capacities of the people in 13 villages in Siem Reap Province, Cambodia and seven villages in Chikwawa District in southern Malawi.</p> <p>The assessments have led to identification of suitable adaptation measures for the adaptation projects on strengthening community resilience against the climate sensitive diseases and health-related impacts of climate change in both countries.</p>	<p><a href="#">GIZ, Cambodia</a></p> <p><a href="#">GIZ, Malawi</a></p>	
Health information systems and service delivery.	<p>As part of the global initiative on the <b>Climate Change Adaptation to Protect Human Health</b>; the project implemented in Bhutan had the following objectives:</p> <ul style="list-style-type: none"> <li>- Assessing the country’s vulnerability and developing baselines to understand the health impacts of climate change and the adaptive capacity.</li> <li>- Better information, data collection and surveillance of climate change-related health risks were expected to improve early warning, preparedness and response to potential health risks.</li> <li>- Increasing the capacity of health professionals for assessing the impacts of climate change, climate variability and extreme weather events on the transmission of vector borne diseases and other health effects</li> <li>- Increasing communities’ capacity to prepare for and cope with the increased stresses posed by climate change or emergencies through awareness-raising and capacity building activities.</li> </ul>	<p><a href="#">WHO, Bhutan</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Integrated surveillance and early warning system</li> <li>- Climate and health information and data integration</li> </ul>

Plan and Financing	<p>In 2019, the <b>Caribbean Action Plan on Health and Climate Change</b> was approved by Ministers of Health, Environment and Climate Change of Caribbean countries and territories. The plan addresses the common challenges posed by climate change on health and provides a road map for integrated action to protect health and promote sustainable development under a changing climate. PAHO/WHO are assisting the CARICOM member states in implementing the action plan through a GCF Readiness project. Seven countries are included as direct beneficiaries; Belize, Haiti, Guyana, Jamaica, Saint Lucia, Saint Kitts and Nevis and Trinidad and Tobago.</p>	<p><a href="#">WHO, GCF 2020</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Build a pipeline of projects on health and climate change</li> <li>- Climate and health information and data integration</li> <li>- Estimate health co-benefits and carbon footprint</li> </ul>
	<p>The <b>Special Initiative on Climate Change and Health in Small Island Developing States (SIDS)</b> initiative aims to provide national health authorities in SIDS with the political, technical and evidence and financial support to better understand and address the effects of climate change on health. The initiative will support national and regional partners in SIDS in four key areas:</p> <ul style="list-style-type: none"> <li>- To amplify the voices of health leaders in Small Island Developing States, so they have more impact at home and internationally.</li> <li>- To gather the evidence to support the business case for investment in climate change and health.</li> <li>- To promote policies that improve preparedness and prevention, including "climate proof" health systems.</li> <li>- To triple the levels of international financial support to climate and health in Small Island Developing States.</li> </ul>	<p><a href="#">WHO, SIDS 2018</a></p>	
Climate smart health care	<p>The <b>Climate Smart Healthcare</b> publication provides an array of tools, methods and case studies from around the world on climate-smart healthcare which aims to strengthen health sectors and communities by ensuring</p>	<p><a href="#">World Bank 2017</a></p>	<p>✓</p> <p>The publication includes:</p>

	access to clean and independent energy, safe water, clean transport, and clean waste disposal mechanisms. It will stimulate the development and supply of sustainable products, while also preparing the sector for a future of known and unknown health-related climate hazards		<ul style="list-style-type: none"> <li>- Local carbon health care interventions</li> <li>- Guide and tools to promote climate smart resilience in healthcare</li> </ul>
Health information systems	<b>Implementation of health vulnerability and adaptation assessments</b> in four African countries (Guinea, Madagascar, Malawi and Zambia).	<a href="#">WHO, Sub Saharan Africa 2013</a>	
	The goal of the <b>Building resilience of health systems in Pacific Island LDCs to climate change</b> project is to enhance the capacity of national and local health system institutions, personnel and local communities to manage health risks induced by climate variability and change in four Pacific LDCs – Kiribati, Solomon Islands, Tuvalu and Vanuatu. This goal will be achieved through on-the-ground interventions and policy-level actions.	<a href="#">WHO, Pacific Island 2017</a>	
Health information systems and service delivery	The project on <b>Delivering climate resilient water and sanitation in Africa and Asia</b> supports Ethiopia, Nepal, and Bangladesh to improve the resilience of water and sanitation services to effectively respond to climate-related changes in the incidence of water and sanitation related diseases. The project also aims to support Ethiopia, Malawi, Mozambique, Nepal and Bangladesh to develop integrated surveillance and early warning systems to identify and respond to climate-sensitive diseases.	<a href="#">WHO, Asia &amp; Africa 2018</a>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Water safety and sanitation</li> <li>- Integrated surveillance and early warning system</li> <li>- Climate and health information and data integration</li> </ul>
Health infrastructure and facilities	A health clinic in Mozambique that lost its roof due to unpredictable weather conditions received support and the roof was reconstructed. The new and improved clinic has been able to properly function and address many water and vector borne diseases in the area.	<a href="#">UNCDF 2019</a>	

	In Uganda, the <b>Installation of solar photovoltaic systems</b> in community clinics have improved night services for maternal care, better able to handle emergencies, reduced in-hospital pollution from the use of kerosene, improved communication among workers due to access to energy for phone charging, etc.	<a href="#">UN Foundation, 2019</a>	
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## 5.5 Coastal zone

Coastal zones constitute landward and seaward areas covering both coastal ecosystem wetlands, beaches, rocky coasts, deltas, estuaries and lagoons, barriers and sand dunes, river mouths and coral and the built environment such as transportation infrastructure and networks, water networks, human settlement, agricultural activities and coastal institutions (IPCC, 2014).

Table 5.5: Experiences and Best Practices from the Coastal Zone system

Selected systems	Country Experiences with Adaptation Actions	Source	Candidates for best practices
Nature based solutions and livelihood interventions	The project on <b>Community Based Adaptation to climate change through coastal afforestation</b> in Bangladesh implemented multiple climate change adaptation interventions in four pilot coastal sites, focusing on restoration and replanting of degraded mangrove and wetland areas. The project resulted in the creation of paid work opportunities for community members while generating multiple socio-economic and environmental benefits.	<a href="#">GEF, Bangladesh 2008</a>	✓ The projects include interventions on: <ul style="list-style-type: none"> <li>- Nature based solutions</li> <li>- Livelihood enhancement</li> <li>- Conservation of species and habitats</li> </ul>
Nature based solutions, early warning systems, infrastructure and livelihood interventions.	<b>Coastal Ecosystem based Adaptation</b> project examples from:  <u>Tanzania:</u> Developing Core Capacity To Address Adaptation To Climate Change In Productive Coastal Zones. The approaches used by the project include building and upgrading seawalls, relocating aquifers to protect them from rising seas, and restoring mangrove forests that protect coastal communities from floods.	<a href="#">UNEP, Tanzania 2012-2019</a>  <a href="#">UNEP, Albania 2016-2020</a>  <a href="#">UNEP, Seychelles 2019</a>	

	<p><u>Albania:</u> Building the resilience of Kune Vain lagoon through ecosystem-based adaptation (EBA). Riparian forests are being reforested and dunes are rehabilitated, which mitigate coastal erosion by holding the soil in place and reduce habitat loss in the Kune-Vain Lagoon system.</p> <p><u>Seychelles:</u> EbA South The EbA South project is using nature to defend against climate impacts and initiated mangrove reforestation. However; in the Seychelles; crabs were eating the mangrove seedlings planted by the project. Using plastic tubing to protect the trees resulted in litter sprawled across the landscape when floods washed them away. Applying the approach of nature-based solutions, local tree planters began using biodegradable tubing made from sugarcane. Through the project these lessons were transferred to other regions of the world. They have also developed an EbA protocol to support EbA practitioners to design and plan step by step EbA interventions in coastal wetlands. It is based on the direct experiences, challenges and lessons learned from the EbA South project and can be applied to other coastal communities.</p> <p><u>Madagascar:</u> Adapting coastal zone management to climate change considering ecosystem and livelihoods. Mangrove forests are planted that serve as natural sea defense by reducing the strength and height of the sea waves, in turn, halting flooding and erosion.</p> <p><u>Angola:</u> Addressing urgent coastal adaptation needs and capacity gaps. The main approaches of the project are: Establishing an early warning climate forecasting system (EWS) to help people prepare in advance for extreme weather; restoring wetlands and mangroves to provide flood defenses; promoting climate-resilient land management techniques</p>	<p><a href="#">UNEP, Madagascar 2014-2020</a></p> <p><a href="#">UNEP, Angola 2016-2020</a></p> <p><a href="#">UNEP, Djibouti 2010-2016</a></p>	
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	<p>to mitigate the impacts of drought on livelihoods; and integrating adaptation into national policy.</p> <p><u>Djibouti</u>: Implementing NAPA priority interventions to build resilience in the most vulnerable coastal zones. The project piloted approaches for rehabilitating degraded watersheds and shores to reduce seawater intrusion and floods. Activities were designed to ease pressure on coastal buffer ecosystems like mangroves and increase incentives for ecosystem management (sources of fuel wood, fishing, agriculture, and ecotourism development)</p>		
Nature based solutions and infrastructure.	<p>The objective of the <b>Tuvalu coastal adaptation</b> project supported by GCF is to reduce the vulnerability of three islands of Tuvalu to coastal inundation and erosion. They plan to protect 2780m of high value vulnerable coastline by reducing the impact of increasingly intensive wave action on key infrastructure. The investments will build upon existing initiatives, using a range of measures for coastal protection.</p>	<a href="#">UNDP, GCF 2016</a>	<p>✓</p> <p>The projects include interventions on:</p> <ul style="list-style-type: none"> <li>- Using grey and green infrastructure</li> <li>- Livelihood enhancement</li> </ul>
Nature based solutions, biodiversity conservation and food security.	<p>The objectives of the project <b>Strengthening adaptive capacities to address climate change threats on sustainable development strategies for coastal communities</b> in Haiti include strengthening food security of local farmers, enhancing watershed management in the face of climate change, and reforestation of mangroves and forests to protect against climate induced hazards, erosion, and sea level rise. The project demonstrates that ecosystem management and biodiversity conservation can play a key role in reducing human and natural vulnerability to the multiple threats of climate change.</p>	<a href="#">UNDP, GEF 2009</a>	<p>✓</p> <p>The projects include interventions on:</p> <ul style="list-style-type: none"> <li>- Nature based solutions</li> <li>- Livelihood enhancement</li> <li>- Conservation of species and habitats</li> </ul>
Early warning systems	<p>The project, <b>Strengthening climate information and EWS in São Tomé and Príncipe to support climate resilient development</b>, responds to priorities and actions identified in the NAPA of São Tomé and Príncipe. It is focused on strengthening the capacity of national and sub-national entities to monitor climate change, generate</p>	<a href="#">UNDP, GEF 2013</a>	



	reliable hydro-meteorological information (including forecasts) and to be able to combine this information with other environmental and socio-economic data to improve evidence-based decision-making for early warning and adaptation responses as well as planning.		
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## 5.6 Economic planning and activities

Economic planning and activities cover a broad range of activities including fiscal planning, labour management, provision of public goods and the implementation of social protection programmes. The system can be categorized into the following components:

- Employment: labour force, social protection
- National Economic system: Import and Export systems, Monetary system, Banking system
- Economic growth engine: Major contributions to GDP, Major sources of foreign income
- Rural economy/lower circuit economy: Rural livelihoods
- Small and Medium Enterprises: Credit mechanism

Table 5.6: Experiences and Best Practices from the Economic Planning and activities system

Selected systems	Country Experiences with Adaptation Actions	Source	Candidates for best practices
Adopting climate budgeting (local government fiscal planning)	The <b>Local Climate Adaptive Living Facility (LoCAL)</b> has been operating in countries in Africa (Benin, Ghana, Mali, Mozambique, Niger and Tanzania), Asia (Bangladesh, Bhutan, Cambodia, Loa PDR and Nepal) and the Pacific (Tuvalu) totaling to 12 countries. LoCAL combines performance-based climate resilience grants (PBCRGs) with technical and capacity-building support. PBCRGs ensure programming and verification of climate change expenditures at the local level and offer strong incentives for general performance improvements targeting areas of importance for enhanced resilience.	<a href="#">UNCDF</a>	<p>✓</p> <p>The program includes interventions on:</p> <ul style="list-style-type: none"> <li>- Bridging finance gap</li> <li>- Local level interventions</li> <li>- Empowering local governments</li> <li>- Embedding into country system</li> <li>- Integration of climate change adaptation into local government's planning and budgeting.</li> </ul>

<p>Employment, small and medium enterprises and rural economy</p>	<p>The <b>Jobs, skills and finance for women and youth (JSF)</b> programme is designed to support the democratic transition of The Gambia by promoting financial and social inclusion as well as employment of the youth and women through green and resilient economies. Using a “Cash For Work” model, vulnerable groups are provided with temporary employment opportunities in public projects, such as irrigation canals, vegetable gardens and infrastructure projects. The goal is to provide the basis for long-term sustainable opportunities, especially by supporting Micro, Small and Medium-sized Enterprises. So far, 45,000 people have directly benefitted from the cash for work programme, with the creation of about 1,000 temporary full-time jobs.</p>	<p><a href="#">UNCDF, Gambia 2021</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Job opportunities</li> <li>- Consideration of vulnerable groups</li> <li>- Sustainable opportunities through micro, small and medium sized enterprises.</li> </ul>
<p>Employment and social protection</p>	<p>The <b>Social Protection and Climate Change -Scaling up Ambition</b> paper aims to articulate the role of social protection in addressing major socioeconomic challenges arising from climate change and the need to strategically link social protection and national climate change responses. Social protection can complement current disaster response, climate adaptation and mitigation measures through addressing climate vulnerability and risk.</p> <p>This paper presents entry points where efforts and investments should be prioritized to support the strategic integration of social protection and climate risk mitigation, with recommendations for social protection and climate actors to:</p> <ul style="list-style-type: none"> <li>- Advance a bold policy vision for social protection to address the growing risks arising from climate change.</li> <li>- Expand core social protection provision and shock-responsive systems, to manage the impacts of climate change.</li> <li>- Increase financing for social protection to achieve climate change objectives.</li> </ul>	<p><a href="#">SPACE 2021</a></p>	

	<ul style="list-style-type: none"> <li>- Integrate climate risk information and metrics into social protection for comprehensive risk management and smarter investments.</li> <li>- Adopt innovative and strategic coordination across sectors to deal with complex climate risks</li> </ul>		
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## 5.7 Human Settlements/Housing Living Space

Human settlements cover all forms of human dwellings that possess a collection of economic assets, social materials and cultural endowments. They range from the smallest of a hamlet to cosmopolitan cities.

The publication “Climate Emergency, Urban Opportunity, 2019” by Coalition for Urban Transitions that has collaborated with more than 50 organizations state that pursuing zero-carbon, resilient cities in an inclusive way will simultaneously raise the living standards of countries, tackle inequality and address the climate crisis. To enable this to happen; they propose six priorities for national action:

- i) Develop an overarching strategy to deliver shared responsibility while reaching net zero emissions and place cities at its heart.
- ii) Align national policies behind compact, connected, clean cities
- iii) Fund and finance sustainable urban infrastructure
- iv) Coordinate and support local climate action in cities
- v) Build a multilateral system that foster inclusive, zero carbon cities.
- vi) Proactively plan for a just urban transition.

The Sectoral Guide on Cities, Buildings and Urban Systems by the Green Climate Fund (GCF, 2021) has identified four paradigm shifting pathways in both mega/large and secondary cities, which have strong potential to deliver high impact, cost effective climate benefits at scale with local benefits:

1. Decarbonisation of urban energy systems- Scaling up distributed renewable energy
2. Energy efficiency in building stock- Retrofits of existing buildings and construction of new green buildings with more energy conscious constructions using ecosystems based approaches where appropriate.
3. Compact and resilient urban development- Provisions for compact urban growth, transit-oriented development to avoid or reduce transportation demand and integrate ecosystem based approaches to urban planning.

Table 5.7: Experiences and Best Practices from the Human Settlement system

Selected systems	Country Experiences with Adaptation Actions	Source	Candidates for best practices
Investing in real time forecasting and warning systems against climate hazards	<p><b>Bangladesh Water Development Board</b> is responsible for flood management through structural and non-structural measures. It also provides hydrological services in Bangladesh. As part of non-structural measures, the Board has been providing flood forecasting and warning services through its Flood Forecasting and Warning Centre (FFWC), established in 1972. Early warning systems can help disaster preparedness programmes to establish measures, such as emergency relief operations and evacuations, in advance. The FFWC disseminates flood warning information through media and communication outlets using the Internet, fax, telephone, mobile SMS, etc., and uploads the forecasted information daily on its user-friendly website.</p>	<p><a href="#">WMO 2018</a></p>	
Adaptation of existing built assets from climate change and the integration of resilience measures into all new construction	<p>The <b>Saint Louis Emergency Recovery and Resilience</b> Project aims to help reduce the population’s vulnerability to coastal hazards along the Langue de Barbarie, and strengthen the urban and coastal resilience planning of Saint Louis, a city registered as a World Heritage Site by UNESCO.</p> <p>The five-year project has adopted an inclusive, participatory approach to plans for the relocation of the affected communities by ensuring the active involvement of local communities throughout the project cycle. This is intended to strengthen existing community networks, promote the sense of ownership and solidarity within communities, and provide an opportunity to build overall community resilience to future disaster risks and climate change.</p>	<p><a href="#">World Bank 2018</a></p>	
	<p>Since 2002, Mozambique has been working with <b>innovative architectural solutions</b> adopted as preventive measures for floods, cyclones and droughts. Emphasis has been given on starting from the roots of local practices, in terms of materials and building techniques to improve and make them resistant to environmental conditions where</p>	<p><a href="#">UN-HABITAT 2012</a></p>	

	communities live. The concept of living with these different kinds of natural hazards in areas prone to small and moderate events is based on the identification of sustainable architectural alternatives to massive resettlement operations of the population.		
Greening urban infrastructure to increase natural resilience	The <b>Cities and Climate Change Project-PPCR Additional financing</b> program in Mozambique has activities that plan to improve urban green infrastructure for building climate resilience, help restore the functioning of natural drainage channels in the city to complement the ongoing renovation of the open canal system and then promote the sharing of knowledge and experience with other cities. The project would increase the capacity of the city of Beira to address climate resilience by protecting and enhancing ecosystem services, which includes biodiversity, drainage and flood mitigation improving shade and cooling effects within the city and reducing vector and water-borne disease burdens through better environmental management. This goes beyond “business-as-usual” practices in the urban infrastructure provision and environmental management and allows Mozambique to pilot in a vulnerable coastal city the green infrastructure approach to increase climate resilience.	<a href="#">CIE. Mozambique 2013</a>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Green infrastructure approach</li> <li>- Protecting ecosystem services</li> <li>- Reducing health risks from water borne diseases</li> </ul>
	UN-Habitat’s <b>Cities and Climate Change Initiative (CCCI)</b> is the Agency’s flagship Initiative supporting cities in emerging and developing countries to address the climate challenge. The Initiative supports cities responding to the negative impact of climate change that is already being felt worldwide, and to put in place appropriate mitigation measures. Under this program several initiatives have been implemented: <ul style="list-style-type: none"> <li>- Promoted urban and peri-urban agriculture in three cities in Burkina Faso, Nepal and Sri Lanka to improve climate resilience and food security,</li> </ul>	<a href="#">UN-Habitat</a>	<p>✓</p> <p>The program includes interventions on:</p> <ul style="list-style-type: none"> <li>- Assessing climate vulnerabilities</li> <li>- Improving or informing urban planning processes</li> <li>- Bridging climate finance gaps</li> </ul>

	<p>support environment protection, reduce GHG emissions and support livelihoods.</p> <ul style="list-style-type: none"> <li>- In Port Vila, Vanuatu; government officials used the CCCI climate change vulnerability assessment to develop early recovery actions after Typhoon Pam (March 2015)</li> <li>- Based on city level assessments of climate vulnerability or emissions, over twenty five cities worldwide have been supported to elaborate climate change strategy or climate action plans.</li> </ul>		<ul style="list-style-type: none"> <li>- Integrating climate change into urban policies</li> <li>- Implementing climate action in cities</li> </ul>
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## 5.8 Ecosystems

Ecosystems can be characterized into three components:

- Specific ecosystems (wetlands, woodlands etc)
- Biodiversity ecosystems (endemic species, unique habitat, regional/global biodiversity systems)
- General ecosystems services

### 5.8.1 Unique Biodiversity

The report covers ecoregions with highly distinctive and irreplaceable biodiversity for their biome or realm. They are centres of endemism, areas with rare, declining, threatened or endangered species, and areas with slow-maturing or long-lived species. It addresses mechanisms that have been implemented to conserve the unique biodiversity.

Table 5.8.1: Experiences and Best Practices for unique biodiversity systems

Selected systems	Country Experiences with Adaptation Actions	Source	Candidates for best practices
Creating national funds for the protection, conservation and rehabilitation of	The discussion paper on <b>National Climate Funds: Learning from experiences of Asia Pacific Countries looks at Asia Pacific Funds</b> and synthesizes the experiences of establishment and management of national funds, and builds on the UNDP Guidebook for the Design and Establishment of National Funds. The	<a href="#">Irawan et al., UNDP 2012</a>	

<p>unique biodiversity</p>	<p>funds in the LDC countries assessed under this paper are:</p> <ul style="list-style-type: none"> <li>- Lao PDR: Environmental Protection Fund</li> <li>- Cambodia Climate Alliance Fund Trust Fund</li> <li>- Tuvalu Trust Fund</li> <li>- The Bhutan Trust Fund for Environmental Conservation,</li> </ul> <p>The paper starts with presenting different modalities, which countries can consider for accessing and managing climate finance. The findings are classified into three phases: decision making, designing and managing NCFs.</p> <p>To assist decision makers to make an informed decision, a set of feasibility criteria is then proposed for assessing whether an NCF is a feasible option for a country. Then the design and management features of NCFs are presented, before lessons-learned and experiences from the Asia-Pacific region are synthesized.</p>		
<p>Creating national funds for the protection, conservation and rehabilitation of unique biodiversity</p>	<p>The <b>Bwindi Mgahinga Conservation Trust (BMCT)</b> was established under the Uganda Trust Act in 1994, as a registered Conservation Trust Fund mandated to support conservation of Mgahinga Gorilla National Park (MGNP) and Bwindi Impenetrable National Park (BINP) and contribute to uplifting the livelihoods of the people in communities adjacent to these national parks. It was the first Conservation Trust Fund in Africa established by Global Environment Facility (GEF) after the 1992 Rio Earth Summit.</p> <p>The aim of BMCT is to provide long-term reliable support for projects promoting research or conservation of biological diversity and sustainable use of natural resources in the Mgahinga Gorilla National Park (MGNP) and Bwindi Impenetrable National Park (BINP) while at the same time promoting the well-being of neighboring communities. BMCT uses a unique approach of</p>	<p><a href="#">Bwindi Trust, Uganda</a></p>	

	conservation through community development to achieve its vision. BMCT works to improve the quality of life in park surrounding communities by providing education, health services, safe water, vocational training and sustainable resource use skills in this impoverished and most densely populated region in Uganda.		
Promoting special programmes for the conservation and rehabilitation of unique ecosystems	The project <b>Biodiversity Conservation at Sapo National Park</b> in Liberia has a long term goal of contributing to the establishment and sustainability of Sapo National Park as the flagship protected area of Liberia. This project's five-year development objective is to consolidate management and development of Sapo national Park and peripheral communal forests as part of landscape-level development.	<a href="#">World Bank, Liberia 2004</a>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Community and local knowledge approach</li> <li>- Protection of unique ecosystems for sustainability</li> </ul>
	<p><b>Incorporation of sacred forests into protected areas system of Benin</b> preserves tracts of forest with religious and ecological significance in Benin. These sacred forests are at high risk, and the recent addition of Sacred Forest as a category of Benin's protected areas legislation paves the way for greater protection of the forests included in the project scope as well as other forests around the country. This legislation is the first of its kind in Africa, and the legitimization of local religious beliefs builds community support for the project as well as contributing to conservation efforts. Some of the project outcomes are:</p> <ul style="list-style-type: none"> <li>- Legal recognition of sacred forests as a category of protected area through Inter-Ministerial Order No. 0121/MEHU/MDGLAAT/DC/SGM/DGFRN/SA of 16 Nov, 2012. The Order establishes the definitions for sacred forests and its management principles; defines the procedures for the legal recognition, integration, and withdrawal of a sacred forest from the commune's forestry area;</li> </ul>	<p><a href="#">GEF 2010</a></p> <p><a href="#">NBSAP Forum, 2014</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Community and local knowledge approach</li> <li>- Protection of unique ecosystems for sustainability</li> </ul>



	<ul style="list-style-type: none"> <li>- 66 sacred forests are now official protected areas (surpassing a target of 58 sacred forests), and at least 14 more have initiated the process. Degradation and encroachment of these forests has been halted, and visible boundaries have been demarcated for all of the target 58 sacred forests.</li> </ul>		
Biodiversity conservation and coastal management for sustainable development	<p>The <b>Coastal and Biodiversity Management Project of Guinea-Bissau</b> aims to build the capacity of the government agencies and natural resource users in Guinea-Bissau to collaboratively manage coastal environments and biodiversity for both conservation and sustainable development. The objectives of the project are to:</p> <ul style="list-style-type: none"> <li>- Strengthen the institutional framework and management capacity for biodiversity and protected areas.</li> <li>- Promote sustainable use of biological resources at the local level through a (i) grant funding mechanism (Fund for Local Environmental Initiatives - FIAL) to promote sustainable use activities inside and outside of the targeted protected areas, and (ii) to build the capacity to strengthen the management, monitoring, control and surveillance of reserved fishing zones and fisheries.</li> <li>- Establish and implement an environmental and social safeguards framework.</li> </ul>	<a href="#">World Bank, Guinea-Bissau</a>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Community and local knowledge approach</li> <li>- Consideration of livelihoods</li> <li>- Sustainable use of biological resources</li> </ul>

### 5.8.2 General Ecosystem

This publication covers community of species (plants and animals) and non-species that interact within a given habitat (coastal, forest, mountains, savannah, desert and semi desert areas). Protection of ecosystems have several co-benefits some of which also translates into climate action benefits either in the form of nature based solutions for adaptation or climate change mitigation from reduced greenhouse gas emissions and increased landscape for carbon stocks.

Table 5.8.2: Experiences and Best Practices for general ecosystems

Selected systems	Country Experiences with Adaptation Actions	Source	Candidates for best practices
Empowering local communities (including through safety net programmes) and private sector to champion biodiversity conservation.	A study by Cornell University and CCAFS on Ethiopia's <b>Productive Safety Net Program</b> (PSNP) has shown that safety net programs are not only a mechanism to provide social protection but also a means to support international and national response to climate change. The strategy of the PSNP was to provide food and financial support to beneficiaries in exchange for public works. One of the focuses of the public work was rehabilitation of degraded land and agro-ecosystems to enhance societal and ecosystem resilience. This has resulted in the unintended co benefit of climate change mitigation from reduced GHG emissions and increased landscape carbon stocks.	<a href="#">CCAFS 2018</a>	
Regional cooperation and programme for ecosystem management, livelihood and climate change adaptation.	<p>The <b>Kangchenjunga Landscape Conservation and Development Initiative</b> (KLCDI) is a transboundary conservation and development programme jointly implemented by the government of Bhutan, India and Nepal which is facilitated and supported by the International Centre for Integrated Mountain Development (ICIMOD). A Regional Cooperation Framework was prepared as the basis for implementing the subsequent phases of the KLCDI. As an outcome from the process, a 20 years strategic programme has been developed with five years operational plan (2016-2020).</p> <p>The initiative focuses on five main intervention areas: livelihoods and climate change adaptation (socio-economic development), community-based participatory ecosystem management (ecosystem wellbeing), resources governance, long-term monitoring, and regional cooperation.</p>	<a href="#">ICIMOD 2013</a>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Regional approach</li> <li>- Consideration of livelihoods and ecosystem wellbeing</li> </ul>
Climate change adaptation through biodiversity conservation,	The objectives of the <b>Hariyo Ban Program</b> in Nepal is to empower Nepal's local communities in safeguarding the country's living heritage and adapting to climate change through sound conservation and livelihood approaches. The Program emphasizes the links between people and forests have two interwoven components – biodiversity	<a href="#">WWF 2016</a>	<p>✓</p> <p>The project includes interventions on:</p>

safeguarding living heritage	<p>conservation and climate change adaptation including market based livelihoods.</p> <p>The first phase of the program which ended in 2016 has resulted in:</p> <ul style="list-style-type: none"> <li>- 280,000 beneficiaries</li> <li>- An estimated 4.9 million tons of carbon emissions were avoided/sequestered</li> <li>- 398 climate adaptation plans were implemented</li> <li>- Over 12,000 women were empowered through community learning and action centres</li> <li>- Over 1,000 people were trained in post-earthquake green recovery and reconstruction.</li> </ul>		<ul style="list-style-type: none"> <li>- Community and local knowledge approach</li> <li>- Consideration of livelihoods and ecosystem wellbeing</li> </ul>
Applying traditional and indigenous knowledge in protecting ecosystems	<p>The <b>Satoyama Initiative</b> is a global effort to realize "societies in harmony with nature" through landscape approaches to biodiversity conservation and human well-being. In particular, the focus is on the concept of "socio-ecological production landscapes and seascapes" (SEPLS). The "three-fold approach" of the Satoyama Initiative is intended to maintain and rebuild landscapes and seascapes in which land and natural resources are used and managed in a more sustainable manner by:</p> <ul style="list-style-type: none"> <li>- Consolidating wisdom on securing diverse ecosystem services and values,</li> <li>- Integrating traditional ecological knowledge and modern science to promote innovations, and</li> <li>- Exploring new forms of co-management systems or evolving frameworks of "commons" while respecting traditional communal land tenure.</li> </ul>	<a href="#">Satoyama-initiative</a>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Community and local knowledge approach</li> <li>- Consideration of livelihoods and ecosystem wellbeing</li> </ul>
Agrobiodiversity and traditional knowledge for climate change adaptation	<p>Adapting to climate change using agrobiodiversity resources in the rain fed highlands of Yemen focuses on the conservation and utilization of biodiversity important to agriculture (particularly the local landraces and their wild relatives) and associated local traditional knowledge. The project has four components:</p>	<p><a href="#">World Bank 2008</a></p> <p><a href="#">GEF 2010</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Community and local knowledge approach</li> </ul>

	<ul style="list-style-type: none"> <li>- Agrobiodiversity and local knowledge assessment to document farmer’s knowledge on (adaptive) characteristics of local landraces and their wild relatives</li> <li>- Climate modelling and scenarios for these rain-fed areas.</li> <li>- Enhancement of coping mechanisms by identifying a menu of coping mechanisms (such as in-situ conservation, improved terracing with soil and water conservation practices, choice of crops and cropping patterns) designed and piloted to increase resilience of farmers to climate variability and reduce vulnerability to climatic shifts.</li> <li>- Enabling policies, institutional and capacity development</li> </ul>		<ul style="list-style-type: none"> <li>- Climate information and scenarios</li> <li>- Consideration of livelihoods and ecosystem wellbeing</li> </ul>
Modifying conservation projects to adapt to climate change.	To address the gap in incorporating climate considerations into biodiversity conservation efforts, 20 conservation projects were selected to apply a common process for developing climate adaptation strategies. This assessment highlights lessons about how, when, and how often conservation projects may need to be modified to adapt to climate change.	<a href="#">Poiani et al. 2010</a>	
Tree planting programme.	Under the country’s <b>National Green Development</b> programme launched in May 2019 in a bid to combat climate change and environmental degradation—Ethiopia plans to plant 4 billion trees on 1.5 million hectares across the country: 40 trees per person. The government recently established a five-member expert group to monitor and assess the tree-planting programme. Members are drawn from four ministries, the United Nations Development Programme, as well as Ethiopia’s Environment, Forest and Climate Change Commission. The plan is to devolve responsibility to relevant institutions and local authorities for planting, monitoring progress, and improving the survivability of seedlings.	<a href="#">UNEP 2019</a>	

## 5.9 Infrastructure

Infrastructure is a broad array of interrelated units, including transportation facilities, industrial facilities, and information and communication technology, that are essential for the functioning of the economy and society.

Table 5.9: Experiences and Best Practices for infrastructure systems

Selected systems	Country Experiences with Adaptation Actions	Source	Candidates for best practices
Strengthening information and communication technology infrastructure and systems that provide weather, climate and hydrological data.	Fiji developed a <b>roadmap of actions for maintaining and improving Fiji’s hydro meteorological observation equipment</b> . This advanced the implementation of Action on climate information service and management in Fiji’s NAP document.	<a href="#">NGN, Fiji 2019</a>	
Strengthening data and information management systems	Kiribati, Tuvalu and Solomon Islands have developed <b>National Integrated Vulnerability Assessment (IVA)</b> databases to support data and information management (e.g., data storage, visualization, reporting and sharing). These national IVA databases are a means to consolidate and centralize all outputs from the IVA (e.g. IVA Participatory Rapid Appraisal data; IVA Household Survey data) as well as other types of data and information collected at the national, sectoral, island and village levels.	<a href="#">NGN, Kiribati 2021</a>	

<p>Decentralizing early warning systems for climate change-related disasters</p>	<p><b>Community-based flood early warning systems (CBFEWS)</b> is people-centered, timely, simple and low-cost technology. It disseminates information to the vulnerable communities downstream through a network of communities and government bodies. Although the detection of flood risk and its communication to vulnerable communities are driven by technology, the primary functioning of the CBFEWS lies in a people-centered approach to flood response. The system has been piloted along flood-prone transboundary rivers in the HKH, helping communities across Afghanistan, India, Nepal, and Pakistan. The intervention received the 2014 United Nations Framework Convention on Climate Change Lighthouse Award under the Information and Communication Technology category.</p>	<p><a href="#">ICIMOD 2021</a></p>	
<p>Building conservation and nature-based solutions into infrastructure projects</p>	<p>The <b>Greater Mekong Subregion East-West Economic Corridor Towns Development Project</b> in Lao People's Democratic Republic plans to transform three towns along the East-West Economic Corridor into economic hubs. The project will improve urban environmental infrastructure which includes flood control measures and improvements in waste management and roads. This is intended to significantly improve productivity and sustainability of economic enterprises in these towns, as the flood control measures will increase climate resilience. The environment will be improved through clean wastewater, disposal of solid waste, and enhanced mobility on improved urban roads. The additional objective is to help reduce the carbon footprint of the towns, making them cleaner and greener, and thus more livable. The project will finance seven subprojects in the three towns to strengthen the institutional capacity of provincial and local authorities in Kaysone Phomvihane, Phine, and Dansavanh.</p>	<p><a href="#">ADB 2021</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Nature based solutions</li> <li>- Reduce carbon footprint of the towns</li> <li>- Strengthen economic activities</li> </ul>

	<p>The project <b>Enhancing Resilience of Vulnerable Coastal Areas and Communities to Climate Change</b> in the Republic of Gambia, will restore and maintain 2,500 ha of the mangroves forests of Tanbi Wetlands (of which 177,285 Gambian depends directly or indirectly on their economic activities, its buffer zones, sewage sinks and coastal stabilization roles), through a co-management approach to act as an additional buffer against climate-induced pressures in coastal areas. These mangroves are to complement hard physical measures designed to protect lowland rice growing and economic investment in coastal areas (fish landing sites, hotels) and will be implemented alongside these hard measures through participatory planning. Climate resilient wetland and fisheries management strategies will be introduced and transferred to vulnerable communities.</p>	<p><a href="#">GEF, Gambia 2013</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Green and grey infrastructure approach</li> <li>- Protecting ecosystem services</li> <li>- Consideration of vulnerable communities</li> <li>- Livelihood options</li> </ul>
<p>Upgrading physical infrastructure through hard engineering (construct and retrofit, relocate, accept or abandon)</p>	<p>Till date, 47 infrastructure projects were implemented under <b>Local Climate Adaptive Living Facility (LoCAL)</b> in Bhutan benefiting directly 10,693 people in participating communities and indirectly benefiting a wider population of some 50,000 people in the surrounding area. One particular example is the additional financial gap that was met by the project to upgrade a wooden log bridge in Phobjika valley to a stronger more climate resilient bridge in order to withstand intense rain and rise in water levels due to changing climate</p>	<p><a href="#">UNCDF, Bhutan 2021</a></p>	
	<p>The objective of the <b>Cyclone Idai and Kenneth Emergency Recovery and Resilience</b> Project for Mozambique is to support the recovery of public and private infrastructure and livelihoods while strengthening climate resilience in the areas most affected by cyclones Idai and Kenneth. This includes the repair and reconstruction of housing for selected vulnerable communities, the repair and reconstruction of housing for selected vulnerable communities, the repair</p>	<p><a href="#">World Bank, Mozambique 2019</a></p>	<p>✓</p> <p>The project includes interventions on:</p> <ul style="list-style-type: none"> <li>- Reconstruction of cities aimed at reducing vulnerability</li> <li>- Recovery of private sector and economic activities</li> </ul>

	and reconstruction of key public infrastructure, and the recovery of the private sector and economic activities. The project also plans to build climate resilience which is holistic and has a strategic approach to reconstruction aimed at reducing the vulnerability of the city of Biera, an important economic hub that suffered large losses due to cyclone Idai, climate related hazards.		
Upgrading physical infrastructure through hard engineering (construct and retrofit, relocate, accept or abandon)	The project on <b>Strengthening the Resilience of Small Scale Rural Infrastructure and Local government Systems to Climate Variability and Risk</b> in Timor-Leste expects to ensure that future small scale rural infrastructure, that is essential to local needs, is designed and constructed in a way that takes into account climate related risks including existing variability and longer term fundamental change. This will be built on an existing and ongoing process of strengthening local governance systems and public participation.	<a href="#">UNDP, Timor-Leste 2013</a>	
Observatory for data and information.	The <b>Nepal Climate Observatory-Pyramid</b> is part of the ABC-Pyramid Atmospheric Research Observatory located in Nepal. This measurement station has been set-up with the aim of investigating natural and human-induced environmental changes at different scales (local, regional and global). Since March 2006, continuous measurements of aerosol particles (optical and physical properties), ozone (O3) and meteorological parameters as well as weekly samplings of particulate matter (for chemical analyses) and grab air samples for the determination of 27 halocarbons, have been carried out. These measurements provide data on the typical atmospheric composition of the Himalayan area between India and China and make investigations of the principal differences and similarities between the monsoon and pre-monsoon seasons possible.	<a href="#">Bonasoni et al. 2007</a>	



## 6. Conclusion

As indicated in the beginning of this publication; this is not a comprehensive work of lessons on NAPs and experiences from countries but rather listing down of approaches that are widely promoted as solutions by major programmes and other critical components of systems. So, the LEG will continue to expand on this ongoing process and assemble more experiences and form firmer criteria for the best practices candidates. It will also work towards drawing out lessons learnt and how the experiences can be shaped and designed to become best practices.

## 7. References:

Least developed Countries Expert Group (LEG) Report 26, 28, 30 and 40 available [here](#).

<https://www.greenclimate.fund/sites/default/files/document/agriculture-and-food-security-sectoral-guide.pdf>

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