



ECOSYNERGY

Facilitation and Capacity Building for Sustainability

INTEGRATING CLIMATE RESILIENCE IN POLICY AND PLANNING OF LOW EMISSION DEVELOPMENT STRATEGIES


Barbara C.P. Oliveira, Jelle H. Behagel and
Luisa S. Sette Câmara Moreira





INDEX

1. INTRODUCTION.....	02
2. KEY CONCEPTS.....	04
3. INTEGRATING CLIMATE RESILIENCE INTO LEDS.....	06
3.1 CONCEPTUAL APPROACHES TO CLIMATE RESILIENT LEDS.....	07
3.1.1 CLIMATE PROOFING.....	07
3.1.2 CLIMATE RESILIENT PATHWAYS.....	08
3.1.3 SOCIETAL RESILIENCE.....	10
3.2 COMMON ELEMENTS IN CLIMATE RESILIENT APPROACHES.....	14
4. PRACTICES FOR CLIMATE RESILIENT LEDS.....	16
4.1 INFORMATION AND KNOWLEDGE EXCHANGE.....	17
4.2 CAPACITY BUILDING.....	19
4.3 POLICY DESIGN.....	21
4.4 INSTITUTION STRENGTHENING AND PARTNERSHIPS.....	23
4.5 FINANCE MECHANISMS.....	25
5. CONCLUSIONS.....	27





INTEGRATING CLIMATE RESILIENCE IN POLICY AND PLANNING OF LOW EMISSION DEVELOPMENT STRATEGIES

Barbara C.P. Oliveira, Jelle H. Behagel and Luisa S. Sette Câmara Moreira

1. INTRODUCTION

The mitigation of greenhouse gas emissions (GHG) contributes to halting dangerous climate change, but the effects of a changing climate are already being felt in many parts of the world. Countries' current and future development strategies will need to consider rising sea levels, changes in precipitation patterns, more extreme weather events, and changes in temperature. Countries will need to find ways to strengthen societal, economic and technical infrastructures so that they can cope with these, and other, impacts of climate change.

The International Panel on Climate Change's (IPCC) Fifth Assessment Report states that:

"climate change calls for new approaches to sustainable development that take into account complex interactions between climate and social and ecological systems. Climate resilient pathways are development trajectories that combine adaptation and mitigation to realize the goal of sustainable development. They can be seen as iterative, continually evolving processes for managing change within complex systems."¹

Low Emission Development Strategies (LEDS) offer the opportunity to build climate resilient development pathways. By seeking synergies to combine mitigation and adaptation efforts within development policies, both the environmental effects of climate change and their socioeconomic impacts are minimized, and win-win-win solutions are maximized to:

- reduce greenhouse gas emissions
- build resilience and decrease vulnerability to a changing climate
- promote sustainable development.

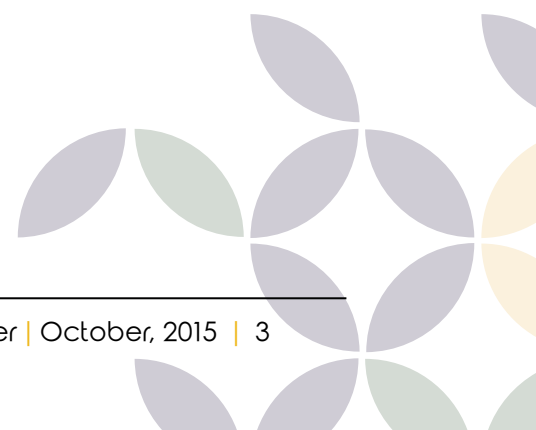
The paper introduces the key concepts of vulnerability, mitigation, adaptation and climate resilient pathways. Three main approaches are outlined for integrating climate resilience considerations into planning LEDS and policies: climate proofing, climate resilient pathways and societal resilience. Sector level examples of climate resilient LEDS, collected from country experiences, illustrate concepts useful to policymakers working the fields of climate and development at national and subnational levels.

Ecosynergy is a social enterprise that offers services in dialogue facilitation, mediation, conflict transformation, strategic negotiation and capacity building for the public and the private sector. For over a decade, Ecosynergy has assisted governments, academia, communities and private organizations in more than 20 countries in collaborative strategy development, strategic analysis, project evaluation, multistakeholder engagement and conflict management in complex projects, in thematic areas such as climate change, and the extractive industry. (www.ecosynergy.com.br)

Climate resilient pathways can be achieved through Low Emission Development Strategies (LEDS). These strategies are designed to include development policies and measures that emit relatively fewer greenhouse gases than traditional development strategies. LEDS also aim at taking into account the impacts of future climate change in its design and implementation so as to improve countries resilience and decrease vulnerability. LEDS as a concept first emerged from the United Nations Framework Convention on Climate Change (UNFCCC) in 2008. Since then, many institutions and organizations have helped developing countries to elaborate their LEDS through a range of frameworks and cooperation programs. Several countries already integrate low emission options in their development plans and strategies. Further elaborating LEDS provides a strong opportunity to develop pathways for integrating climate resilience into development policies.

This paper² presents climate resilience in the context of LEDS – namely policy and plans – and discusses how policymakers can include climate resilience in their development planning. It also considers how policymakers must operate under uncertainty: climate change is happening and its impacts can already be felt, monitored and quantified and this, in turn, is starting to inform the way countries design and review their LEDS. For example, planning for coastal zone transportation may already consider changes in sea levels and the occurrence of extreme events. It is relatively straightforward to incorporate climate resilience considerations into decisions if the changes are already known. But the difficulty for policymakers is when they have to consider

projected or anticipated climate changes on a 20-, 30- or 50-year horizon. These are difficult to predict with certainty. Planning and justifying investments that accommodate different future climate scenarios can be a daunting task.



2. KEY CONCEPTS

DEFINITIONS	
Low emission development strategies (LEDS)	Forward-looking national economic development plans or strategies that encompass low emission and/or climate resilient economic growth. ³
Mitigation	Human interventions to reduce the sources or enhance the sinks of greenhouse gases. ⁴
Mitigation capacity	A country's ability to reduce anthropogenic greenhouse gas emissions or to enhance natural sinks. ⁵
Adaptation	The process of adjustment to actual or expected climate and its effects. ⁶
Incremental adaptation	Actions aimed at keeping the essence and integrity of a system/process at a certain level.
Transformational adaptation	Actions aimed at changing the fundamental characteristics of a system in ways that are responsive to the changing climate.
Adaptive capacity	The preconditions necessary to enable a system (such as a society) to respond to disturbances while using available resources such as physical capital, technology and infrastructure, information, knowledge, institutions, the capacity to learn, and social capital. ⁷
Adaptive management	A process of iteratively planning, implementing, and modifying strategies for managing resources in the face of uncertainty and change. ⁸
Vulnerability	A function of exposure to climate stressors, the sensitivity to the stress associated with that exposure, and the ability to adapt and recover from the impacts of the exposure. ⁹
Resilience	The capacity of a system to absorb disturbance and reorganize while undergoing change so as to retain essentially the same function, structure, identity, and feedbacks ¹⁰ [ecological concept].
Climate resilience	Expands the ecological concept of resilience to socioeconomic systems (a city, region, country, or continent): the ability of a society to learn, innovate, and transform itself in the face of climate change, while building on the available social and natural resources. More than just responding to climate impacts, this is the ability to adapt within the resources of the system itself, and the ability to learn, innovate, and change ¹¹ [societal/transformational concept].
Climate resilient development	Requires climate considerations to be mainstreamed into development planning to ensure a society can cope with current climate variability and adapt to future climate change, while meeting its development goals. ¹²
Climate compatible development	Minimizes the harm caused by climate impacts while maximizing the many human development opportunities presented by a low emissions, more resilient future. Promotes both climate considerations within development policies, and development considerations within climate policies. ¹³

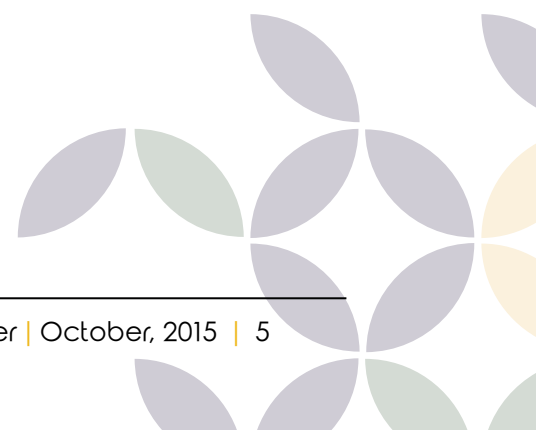
Climate resilience can be viewed as the capacity of societies to transform themselves in the face of climate change; this requires more than re-engineering infrastructures. Climate resilience requires learning and innovation, and many climate scientists stress the need to improve the adaptive capacity of socio-ecological and economic systems to foster development. This can be done “by building capacity for envisaging and embracing transformation through creativity and imagination at institutional, community and individual levels and through cultivating flexibility, resourcefulness and cooperative networks at various scales.”¹⁴ In other words, to be prepared for a future with a changing climate, social processes – such as networks, information exchanges, quality decision making, interfaces between science and policymaking, transparency and collaboration – are a key factor that can enhance or reduce resilience.

The adaptive capacity of socio-ecological systems is influenced by various factors including economic development and technology, human capital and maturity. The type of governance structure is also a factor. Research reviewed for this paper shows that appropriate governance structures play a vital role in allowing societies to respond effectively to both climate change related risks and the need for decarbonization. Appropriate governance structures allow a better composition of trade-offs between policy objectives, as well as knowledge building among those looking at stresses and risk factors in an integrated way – thus promoting climate resilience.¹⁵

Climate change related risks interact with multiple stressors, such as urbanization, increased demand for drinking water, and frequent droughts. When

added to poverty and unsustainable resource use, this increases socioeconomic risks, in particular for vulnerable populations. Resilience is therefore not only about protecting current infrastructures from future shocks, but also about using development opportunities to change infrastructures to become able to deal with these shocks in sustainable ways. The design and implementation of plans and policies for LEDS are great opportunities for countries to enhance the resilience of their socio-ecological systems. This can be done by analyzing the impacts of policies on target populations and the environment, assessing trade-offs between low carbon emission priorities, climate resilience and social development, and where possible adopting win-win-win solutions for adaptation needs, mitigation opportunities and development goals.

Climate resilient LEDS can promote more strategic inclusion of adaptation and mitigation actions in development. In particular, development plans and policies provide a good opportunity to integrate climate resilient, low emission development considerations, since they provide a framework for policy action and the allocation of financial resources. Moreover, development plans are usually implemented through crosscutting sectoral policies and engage with subnational and local institutions, making them a good platform to implement climate resilient actions.



3. INTEGRATING CLIMATE RESILIENCE INTO LEDS

Climate change is already being felt in many parts of the world and policymakers have been responding in several ways: by adjusting economic activities and priorities, adapting land use practices (e.g. ways to maintain or improve agricultural yields), reviewing infrastructure development plans and investments, and adopting public health initiatives (e.g. efforts to cope with the increased occurrence of diseases exacerbated by climate change, such as malaria and dengue fever).¹⁶ These decisions are not always described as climate policy, even though they deal with issues related to climate impacts. Rather, they are usually part of wider sectoral (transport, energy, health etc.) or development policies.

Some of the development policies or plans that tackle climate change directly already include elements for low emission development. In some cases, renewable energy initiatives are primarily aimed at creating an energy infrastructure less vulnerable to fluctuating oil and gas prices, while they also cut greenhouse gas emissions. However, this is not always so. Consider, for example, the conversion of forests to agricultural land to sustain food production in changing climates: this is oftentimes done without integrating approaches that reduce emissions, such as climate smart agriculture. Climate policies, in turn, do not automatically consider the socioeconomic impacts of their implementation. For example, forest conservation strategies that lead to GHG cuts sometimes lead to the displacement of people who are already becoming more vulnerable due to poverty and climate change.

Climate resilient LEDS seek to find synergies between LEDS and the objective to reduce socioeconomic vulnerability to climate change, while aiming to maximize any co-benefits and to avoid negative trade offs between the two.

Climate resilient LEDS offer opportunities for learning, innovation and increasing the ability of societies to transform themselves in the face of climate change. Development policies and plans offer an excellent opportunity to make Climate Resilient LEDS happen.

There is no one-size-fits-all solution to building climate resilient LEDS: approaches, frameworks, and policy design and implementation need to be tailored to national (and subnational, where appropriate) conditions. The international negotiation setting is becoming more tailored to national realities. Nationally appropriate mitigation actions (NAMAs) and Intended Nationally Determined Contributions (INDCs) are great examples of how the climate agenda has increasingly come to include national needs since the Fifteenth Conference of the Parties (COP15) in Copenhagen. Countries have increasingly started to use their international obligations under the UNFCCC as an opportunity to look at both mitigation and adaptation in intergovernmental councils and multidisciplinary task forces.

The remainder of this section introduces three approaches that policymakers can use to look at the synergies between climate mitigation and adaptation and development. These approaches help to inform the decisions governments adopt, as well as their vision and strategies, and the narratives behind them.



3.1 CONCEPTUAL APPROACHES TO CLIMATE RESILIENT LEDS

3.1.1 CLIMATE PROOFING

Institutions including the Organization for Economic Co-operation and Development (OECD),¹⁷ the United States Agency for International Development (USAID),¹⁸ the World Bank,¹⁹ the European Commission²⁰ and the German Agency for International Cooperation (GIZ)²¹ have developed the concept of integrating vulnerability assessment considerations into development actions, commonly known as ‘climate proofing’ (the European Commission also refers to this as ‘climate mainstreaming’).

The World Bank launched an online tool in 2015 to help countries screen their policies for climate and disaster risks.²² OECD²³ has proposed a ‘climate lens’ policy tool to help decision makers analyze the needs and options for climate change adaptation in their policy decisions by asking these guiding questions:

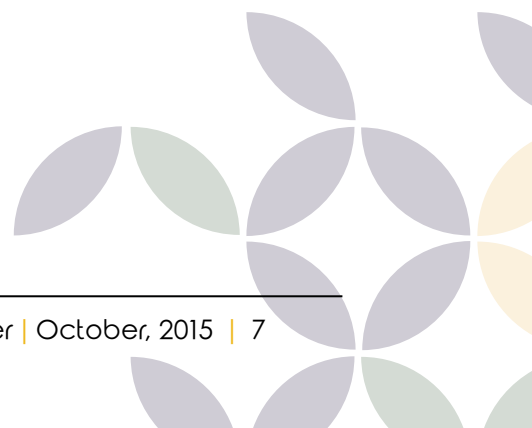
- **vulnerability:** how vulnerable is the decision to climate change?
- **current adaptation:** to what extent have climate change risks already been taken into account?
- **maladaptation:** does the decision increase vulnerability to climate change or overlook opportunities for adaptation?
- **climate proofing:** can the decision be amended to take into account the risks posed by climate

change?

As the European Commission puts it:

“Climate mainstreaming and proofing represents a way to reduce the potential impacts of climate change through the anticipation and allocation of respective program expenditure and project design for planned adaptation and risk management. While the upfront costs of such an approach are higher than for other approaches to dealing with climate change adaptation under expenditure programs, namely not screening for climate risks at all or relying on autonomous, or passive adaptation, the overall socioeconomic benefits are much larger due to the avoided damage and repair costs as well as avoided inappropriate investments.”²⁴

This approach highlights the importance of ensuring that adaptation is recognized explicitly in important development policies such as national visions and poverty reduction strategies, and that policies with substantial adaptation elements (e.g. disaster risk reduction and national adaptation plans) feed into other areas of policymaking. It can also be applied at the sector level (e.g. energy, infrastructure, health, environment).



An OECD²⁵ report notes that the integration of climate resilience planning into economic development priorities is often pursued by including adaptation elements in LEDS. This usually occurs through a vulnerability assessment and the identification of actions to reduce the impact of climate stressors.

In conclusion, climate proofing can be seen as a risk assessment tool that aims to put adaptation at the top of countries' development agendas.²⁶ It does not include an analysis of low emission options *per se*, but can be a useful way to undertake a climate risk assessment of LEDS – including policies and plans to reduce GHG emissions and to foster socioeconomic development, being developed or already in place. This will help to ensure that vulnerabilities are accounted for, using the best information available on climate trends and involving relevant stakeholders and institutions. This should help to identify no-regrets options that are a win-win-win for adaptation needs, mitigation opportunities and development goals.

3.1.2 CLIMATE RESILIENT PATHWAYS

The concept of integrating adaptation and mitigation plans and actions on a development path – also known as climate resilient pathways – was solidified in the IPCC's Fifth Assessment Report, which dedicates a full chapter (Chapter 20, Working Group II)²⁷ to presenting this approach. As the IPCC puts it, climate resilient pathways take

“sustainable development as the ultimate goal, and consider[s] mitigation as a way to keep climate change moderate rather than extreme. Adaptation is considered a response strategy to anticipate and cope with impacts that cannot be (or are not) avoided under different scenarios of climate change. In most cases, sustainable development will also involve capacities for implementing and sustaining appropriate risk management.”²⁸

Climate resilient pathways are about decisions made in the present, as well as those in the future. They include “two overarching attributes: (1) actions to reduce climate change and its impacts, including both mitigation and adaptation, and (2) actions to ensure that effective risk management institutions, strategies, and choices can be identified, implemented, and sustained as an integrated part of development processes.”²⁹

This approach acknowledges that responses will be tailored to the “socioeconomic, cultural, biophysical, and institutional context”³⁰ to which they apply in a complex interplay of these factors. However, the main premise is that climate change is a substantial



threat to sustainable development and should be kept at a moderate level to harness opportunities and prevent harmful impacts.

Climate resilient pathways have several attributes that make them amenable to strategy development at different policy levels. Table 1 lists good practices in the adoption and implementation of climate resilient pathways.

Table 1. Selected elements of climate resilient pathways

ATTRIBUTES	GOOD PRACTICES
Awareness and capacity	<ul style="list-style-type: none"> • High social awareness of climate risks • A commitment to reducing net greenhouse gas emissions along with development strategies • Effective resource management through institutional change and collective action • Development of human capital to improve risk management and adaptive capacity • Sustainability leadership that can think for complex problem-solving
Resources	<ul style="list-style-type: none"> • Access to expertise (scientific and technical) • Effective mechanisms for generating climate information, services and standards • Access to finance for appropriate climate responses (actions and strategies) • Learning from others on climate responses via information linkages
Practices	<ul style="list-style-type: none"> • Continuous use and improvement of institutionalized vulnerability assessments and risk-management strategies • Climate-impacts monitoring and contingency planning, inclusive of transformational responses • Policy, regulatory and legal frameworks that support voluntary action by many • Assistance for the most vulnerable populations • Systems to cope with climate change impacts via effective programs

Source: Adapted from IPCC (2014a)³¹



Significant transformations may be required, which could affect various decision making processes: economic, social, technological and political. Climate resilient pathways also require iterative learning, deliberative processes and innovation to promote win-win-win results.

This approach provides the opportunity to consider aspects of climate change responses in the planning process, and to look for co-benefits and synergies with sustainable development action,³² with both a short- and a long-term view. It still has a strong component of risk management, but by looking at no-regrets options it also harnesses opportunities for joint gains and cooperation among various levels of decision making institutions.

Most of the country-specific examples presented in this paper refer to the climate resilient pathways approach. They have integrated mitigation and adaptation elements that either were developed at the same time, or were conceived at different times (usually mitigation planning comes earlier in a country's agenda) and coordinated at a later stage (e.g. during a review of national plans).

3.1.3 SOCIETAL RESILIENCE

Societies – like the planet – are complex adaptive systems. It is therefore necessary to look beyond improving the way we currently do things: we need to seriously reconfigure how we organize societies on the Earth. That is, resilience is not about improving fuels to continue to use cars in our overcrowded urban areas, we need to rethink urbanization and transport systems; resilience is not about replacing coal-base thermoelectric with solar power, we should review our energy spending patters and build systems that are more independent from centrally generated electricity to survive.

Resilience in social ecologic systems (that is, in the societies where we live in) can be built by applying seven principles³³ further presented below. Our contemporary way of doing things – much focused on efficiency, productivity, competition and isolation, linear thinking, economies of scale and global model of trade - has seriously compromised the ability of our societies to be resilient: organizations and countries have cut down duplication of efforts in order to streamline production in the most efficient site (externalizing environmental and social costs in the process), they have also simplified complex systems (such as value chains) into simple models so that they are more manageable to managers. Models and preconceived formulas encourage little learning in actors, and education systems replicated what our societies have been done for the last 200 years, and which were valid for societal conditions much different from those we face today in an interconnected, digital world.



The Stockholm Resilience Center suggests that we should reassess our current choices and production and consumption patterns, and strengthen these seven principles, crucial for building resilience in such socio-ecological systems. They are³⁴:

- maintain diversity and redundancy: redundancy works as a buffer or even provides a guarantee against failures in a system by allowing some components of such system to compensate for the loss or failure of others. Promoting diversity in species, landscape types, cultural groups, knowledge systems, institutions, perspectives is a great way to adapt to changing conditions and to respond to changes/shocks. In social systems it also promotes learning and innovation.
- manage connectivity: connectivity is both a positive and negative feature as recovery after a disturbance is facilitated by increased levels while connected systems can also spread disturbances faster.
- manage slow variables and feedbacks: consider the interaction of the variables and strengthen feedbacks that maintain desirable regimes, particularly monitoring important slow variables. Also, make use of this information to support governance structures to make better decisions.
- foster complex adaptive systems thinking: The recommendation is to build systems that consider complexity and societies dynamics and realities, avoiding planning processes that happen in laboratory conditions. Also, decision makers should expect uncertainty and find ways to include it in plans and projects, and the barriers to promoting effective change; also

considering critical thresholds for tipping points (on climate changing, on behavior of consumers, players, citizens changing).

- encourage learning: one can never know the whole system and as much as one tries, social-ecological systems can only be know in a “partial and incomplete” way, in the words of the Stockholm Institute. Continuous learning and experimentation are consequences of valuing the use of different types and sources of knowledge when developing solutions. The quality of thinking and decisions being made depends heavily on the ability of social-ecological system to learn.
- broaden participation: Broaden participation means to promote the active engagement of all relevant stakeholders, with the goal of fostering trust and relationships that support legitimacy: of knowledge, institutions and goals.
- promote polycentric governance systems: allow for horizontal leadership and the sharing of responsibilities among many institutions in finding solutions, by building a governance system in which multiple governing bodies interact to make and enforce rules within a specific policy arena or location. This is most effective to achieve collective action in the face of disturbance and change.

Climate Resilience in the concept of societal resilience – also referred to as societal transformation – is not about doing the same things differently or in an improved way. It is actually about fundamentally reviewing our current societal choices and living in a way that deals with the limits of the planet (the ability the planet has to regenerate its renewable



resources and to absorb and recover from the impact of our living on the planet) and keep it safe for future generations.

Strongly focused on social (but also including technological) innovation, societal and transformational resilience approaches give new value to indigenous knowledge and alternative development pathways. Movements such as the sharing economy³⁵ aim at increasing resilience by requiring fewer natural resources for human needs. This approach is not yet mainstream, but has gained more space among younger generations who are our future decision makers.



Table 2. Three main conceptual approaches to climate resilient LEDS

	CLIMATE PROOFING	CLIMATE RESILIENT PATHWAYS	SOCIETAL RESILIENCE
Definition	A risk assessment tool that aims to put adaptation at the top of countries' development agendas	Integration of adaptation and mitigation plans and actions within a development path	A fundamental review of societal choices that deals with the limits of the planet and keeps it safe for future generations
Also known as	Climate mainstreaming	Climate Compatible Development	Societal transformation
Focus	Adaptation and Climate Risks	Mitigation and adaptation	Rethink the foundations of our current production and consumption patterns (much beyond reducing our environmental footprint through incremental innovation only)
Involves actions to	<ul style="list-style-type: none"> Assess vulnerability Reduce the impact of climate stressors 	<ul style="list-style-type: none"> Reduce climate change and its impacts (mitigation and adaptation) while promoting development Ensure effective risk management institutions, strategies, and choices 	<ul style="list-style-type: none"> Promote iterative learning among actors that are more and more connected and considering the impacts different actions and decisions have on the system as a whole Encourage players to build systems for governance that promote ample participation and sharing of information Foster diversity of institutions and collaborative and parallel work, as some redundancy make the system more resilient to crisis and shocks.
Social dimension	Can be a useful way to foster socioeconomic development under way or already in place	Increasingly tailored to respond to the diversity of the existing socioeconomic, cultural, biophysical, and institutional context	Intrinsically tailored made and respectful of the unique characteristics of a society, while valuing indigenous and local knowledge and the capacity of a system to build strong ties and connections to become more resilient.
Level	<ul style="list-style-type: none"> Development policies such as national visions and poverty reduction strategies Also applied at sector level (energy, infrastructure, health, environment) 	<ul style="list-style-type: none"> Integrated pathways could affect various planning and decision making processes (economic, social, technological, political) Co-benefits and synergies with sustainable development action, both short and long term 	<ul style="list-style-type: none"> Society Level, Institutions, Social Structures and ways entire communities are organized. Strong focus on social (but also including technological) innovation and alternative development pathways
Practiced by	OECD, USAID, World Bank, European Commission, GIZ	CDKN, IPCC	The Stockholm Institute and by mavericks such as the sharing economy movement.

3.2 COMMON ELEMENTS IN CLIMATE RESILIENT APPROACHES

A number of institutions have proposed conceptual frameworks to develop climate resilient LEDS. These frameworks embody, in one way or another, the three conceptual approaches described above. We reviewed four frameworks for this paper, described in Table 3.

Table 3. Four conceptual frameworks

INSTITUTION	FRAMEWORK	DESCRIPTION
USAID	Climate-Resilient Development Framework ³⁶	A development-first approach focusing on achieving development goals despite the effects of climate change. The simplified process helps decision makers understand the risks and opportunities posed by climate change and how to address them in ways that enable development in spite of climate change.
United Nations Development Programme (UNDP)	Preparing Low-Emission Climate-Resilient Development Strategies ³⁷	The first in a series drawing on UNDP's experience in supporting climate change adaptation and mitigation projects. It provides decision makers with a detailed step-by-step guide to identifying key stakeholders and establishing participatory planning and coordination frameworks; generating vulnerability scenarios; identifying and prioritizing mitigation and adaptation options; assessing of finance requirements; and developing low emission, climate resilient strategies.
World Bank	Adaptation Coalition Framework ³⁸	Aims to train local communities in the knowledge and tools they need to identify the long-term drivers of social vulnerability to climate change and mobilize the necessary resources to adapt to them. Builds bonding and bridging through social capital via four steps: knowledge exchange; training and information gathering; feedback and planning; strengthening coalitions. Has been tested and refined in over 20 communities in five Latin American countries.
Energy Research Centre of the Netherlands (ERCN)	Paving the Way for Low-Carbon Development Strategies ³⁹	Through a historical perspective on the use of LEDS, provides high-level guidance to governments and decision makers involved designing LEDS.

Source: The authors

These four frameworks are similar in structure, although there are differences in the order of steps and whether some steps are bundled, or not implicitly included. All four involve multi-stakeholder participation, vulnerability assessments, analysis of low-carbon development options and the implementation of strategies and policies. Additional elements are found in some of the frameworks, with the UNDP and the ERCN ones including the identification of financing options and the USAID and the World Bank ones mentioning

the importance of monitoring and reporting, specifically.

Such elements can also be viewed as steps in the policy cycle, which sets up policymaking as an iterative process involving complex dynamics and levels of mutual influence. They are presented as elements in Table 4, to emphasize that the processes are not linear and that many of the elements may appear in different steps of policy design and planning.⁴⁰

Table 4. Elements in policy development

ELEMENT	ACTIVITIES
Scoping	<ul style="list-style-type: none"> Establish development context and overall policy goal
(Participatory) assessment and information gathering	<ul style="list-style-type: none"> Prepare climate change profiles and vulnerability scenarios Undertake detailed assessments of current situation and vulnerability of key inputs: data collection, capacity assessment, stakeholder mapping, institutional setup. This should be done through community-wide collaboration and/or engaging with relevant stakeholders. Local research teams should be trained to participate in data collection to promote relationship development and local data availability, and to improve the capacity for policy implementation at a later stage. Analyze low-carbon development alternatives: identify policy actions; gaps and barriers to policy implementation and impact; scenarios and modeling; baseline and targets; policy and impact assessment; priorities; needs assessment Develop a multi-stakeholder planning process
Designing policy options	<ul style="list-style-type: none"> Identify policy aims, actions and interventions: long-term vision; targets and actions; strategic options leading to more equitable low emission, climate resilient development trajectories; financing options for implementing priority climate change actions; government interventions; private sector investments; international support; plans for implementation; international reporting Prepare a low emission climate resilient development roadmap Strengthen coalitions among all actors, especially different government levels: develop agreements and governance structures; monitor and maintain coalitions Select actions to reduce impacts of climate and non-climate stressors and conduct pilot initiatives, where possible.
Implementing and managing	<ul style="list-style-type: none"> Put the actions selected in the previous step into practice (possibly expand pilot initiatives)
Evaluating and adjusting	<ul style="list-style-type: none"> Analyze implementation progress and adjust the strategy, program or policy accordingly

Source: The authors

Many countries have used these elements, either self-contained or as steps of a policy design process, but with different emphases, for example in their focus on mitigation versus adaptation, capacity building versus decision making, stakeholder involvement versus reliance on specialists. Although these are all concurrent goals, countries give more weight to one or another in accordance with their national development priorities and social contexts.

Alternative approaches to the elements/steps approach presented in Table 4 include creative problem solving methods such as 'Design thinking for policy'⁴¹, through which countries prototype solutions – a 'start small and implement/fail fast' mindset for innovation. In Design Thinking, governments move from a policy; process, systems; users; stasis logic into one of user(s); services (re) design; system development; policy check and feedback.⁴² This is a fundamental change, as in Design Thinking, the design is "user" focused, not "mandate/policy objectives" focused. Adaptive management, on the other hand, allows governments to develop pilot projects and experiment with or adjust policies as they progress with implementation.

4. PRACTICES FOR CLIMATE RESILIENT LEDS

To be prepared for future climate change, social processes - networks, information exchange, quality decision making, the interface between science and policymaking, transparency, and collaboration - are important factors in enhancing resilience or reducing vulnerability.⁴³

Here we focus on how five areas of practice for successful climate resilient LEDS – as repeatedly highlighted by policy makers and reviewed literature - are informed by these social processes and introduce ideas on how to address challenges and harness opportunities presented when developing climate and development policy, in different countries. These five areas are:

- information and knowledge exchange;
- capacity building;
- policy design;
- institution strengthening;
- finance mechanisms.



4.1 INFORMATION AND KNOWLEDGE EXCHANGE

The availability of reliable data, on both climate trends (and associated risks) and emissions paths (and their socioeconomic impacts), is essential for guiding strategies, plans and decision making processes. Data are needed to support decision making at all levels, especially at the subnational levels, where policymakers require specific data on regional climate variability and change.⁴⁴ If data are not available, this may lead to problems for policymakers. For example, if data about changes in the seasonal timing of precipitation are lacking – because the data are not collected, or not organized and shared properly – it can result in a plan that is inefficient or unfeasible to implement.

Similarly, knowledge gaps on the links between climate resilience and economic development prevent an accurate analysis of the opportunities for integrating climate resilience into LEDS. For example, accounting for climate (and, consequently, socioeconomic) uncertainties within economic forecasts and future scenarios can help to persuade public and private sector decision makers to opt for more resilient LEDS, but this requires the involvement of sociologists, demographers, health professionals, civil servants and climatologists, among others. As a result, the knowledge required for decision making is not always available when it is most needed.

Communicating results to relevant stakeholders and decision makers is also vital. Science based knowledge needs to be applicable and relevant to be integrated into policy. This requires translating scientific data on climate change into policy-relevant

information, but this continues to be a challenge. The lack of integration of science into policy contributes to the broader challenge of engaging stakeholders to integrate climate resilience considerations into their LEDS and other practices.

National governments can address the information and knowledge gaps in several ways.

- Build partnerships with international and national researchers. These partnerships promote the exchange of expertise among stakeholders and specialists involved in building mitigation scenarios, and support the building of data that can be used regionally by decision makers. A good example is the Mitigation Action Plans and Scenarios (MAPS) project.⁴⁵ This supports in-country research teams and key stakeholders in Brazil, Chile, Colombia and Peru to produce collaborative, country-specific mitigation scenarios and analyze long-term socioeconomic effects from adopting these actions (e.g. on gross domestic product, international trade, income distribution and purchasing power).
- Engage with academia. Involving academic institutions can help to produce policy-relevant information. For example, four major publicly funded research groups in Thailand are working on several aspects of the country's transition to a low-carbon economy (including greenhouse gas inventories, emissions scenarios, adaptation analysis and mitigation policies).⁴⁶
- Seek outside expertise. Outside expertise can help to avoid political influence in the



determination of mitigation potential and costs. In Guyana, for example, decision makers used external consultant reports as a data source for developing LEDS. Beware that outside expert data should not be taken at face value and increased collaboration with civil society and local experts may improve transparency and the reliability of such data.

- Analyze data at the national level. An efficient way to deal with uncertainty is to analyze and consider data at the national level where possible, rather than at regional or continental level. This sort of information is limited by uncertainty and it is important to incorporate up-to-date and precise national data sets, as they become available. This can be done through periodic reviews of plans, aimed at incorporating new data and revisiting decisions made based on previous data.
- Use National Communications as a basis for LEDS. The process of developing National Communications, as required by the UNFCCC, can also provide useful information for LEDS. Mexico is a good example of a country that has used the data collected for its four National Communications as the basis for developing baseline emissions projections for its National Strategy on Climate Change.⁴⁷

COUNTRY PRACTICE

Thailand's Climate Change Knowledge Management group⁴⁸

Thailand has established a Climate Change Knowledge Management (CCKM) group within the Ministry of Science and Technology and in partnership with Chulalongkorn University.⁴⁹ The goal of CCKM is to gather the knowledge available on climate change and vulnerability. Its activities include:

- synthesizing current knowledge on climate change in Thailand;
- developing a national road map on climate change science and technology;
- coordinating and facilitating data collection;
- communicating science-based knowledge on climate change;
- creating networks of climate resilience in villages and local climate knowledge centers in Krabi, Trang, Nakorn Sri Thammarat, Roi Et, Kalasin and Yasothon, with international support.

Source: CLAPP et al., 2010

4.2 CAPACITY BUILDING

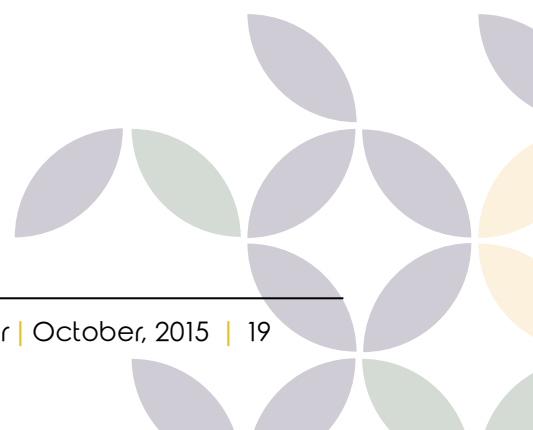
Climate resilient LEDS require the implementation of different measures on multiple scales. All countries need their government and impacted citizens to have some capacity to do this. This is needed at all levels, but particularly at the local level, where climate impacts tend to be very concrete and immediate (e.g. Lower water availability, agricultural yields dropping, hydroelectricity generation impacted).

Considering climate resilience during national and regional development planning and review processes requires not only tools and strategies to deal with climate uncertainty, but also dialogue skills that allow different ministries and societal stakeholders – often with conflicting agendas and time frames – to reach a consensus on development priorities.

Human capital is required for LEDS. Policies must be adapted to local economic, cultural and social conditions to be effective. Thus LEDS are better when local citizens are involved in the process. However, a high level of scientific knowledge and analytical skills are often needed for this; developing countries have to deal with challenges on the availability of skilled staff and technical expertise at various sectors of society to integrate climate resilience into LEDS.⁵⁰

Building a country's capacity, according to Agenda 21⁵¹, "encompasses the country's human, scientific, technological, organizational, institutional and resource capabilities".⁵² To do this, national governments need to do the following.

- Identify priorities at the subnational level. Identifying priorities for subnational activities can assist overcoming capacity constraints by building capacity on climate resilient planning at the subnational level and empowering localities to become less reliant on external support, as demonstrated by an OECD study on Colombia⁵³. This might lead to scaling up pilot projects from the subnational level to the national level.
- Provide technical training. Training and workshops involving civil servants, academia, community leaders, media, youth, gender based groups, corporate leaders, unions, among others are of utmost importance to ensure that a country's institutional framework is able to integrate climate resilience into development planning. This can also ensure that networks of collaboration and information exchange are in place for policy design and implementation that ensue. In Colombia, for example, the EC-LEDS initiative has built the capacity of dedicated staff at the government to develop the inter-ministerial expertise, while MAPS processes have built capacity among various kinds of stakeholders, all of these needed to create LEDS.⁵⁴
- Build on local skills and indigenous knowledge. Engaging with local people, and taking local skills and knowledge seriously, can increase local support for climate interventions and catalyze adaptive capacity. For example, searching out synergies between local capabilities and local needs and demands can increase commitment



and local capabilities, which can be more easily integrated in climate resilient LEDS. In Nepal, a study under its Pilot Program on Climate Change Resilience was conducted to identify indigenous, traditional and local knowledge and practices that could be applied to resilience-building at local levels. Knowledge and practices in the areas of water, forestry, rural transport, settlements

and housing and traditional social institutions from 18 different districts in Nepal were analyzed. The findings highlight that building on local skills and indigenous knowledge are integral to autonomous adaptation, due to its comprehensives of the local context and ability to quickly adjust to changing climate dynamics.⁵⁵

COUNTRY PRACTICE

Climate smart agriculture in Guatemala

An example of a highly transformative approach is the CCAFS⁵⁶ Climate-Smart Agriculture Prioritization Framework (CSA-PF), exemplified by the Guatemalan case, developed as a collaboration between CCAFS/International Center for Tropical Agriculture (CIAT) researchers and the Guatemalan Government throughout 2014 and 2015.

Using a methodology that involves local stakeholders at all levels of the initiative, and striving for local data collection in agricultural practices, the CSA-PF allows government and stakeholder to assess different agricultural practices from a productivity, adaptation and mitigation perspective, and to use development indicators to assess the relevance and prioritization of such practices. The CSA-PF becomes a key tool in order to guide stakeholders in optimizing national and subnational climate change and agricultural planning with the objective of building an investment portfolio to boost sustainable agricultural development in the country. The three perspectives are not given the same weight, and different practices are analyzed for synergies, trade-offs and barriers for implementation.

More than 20 stakeholders – including NGOs, producer associations and academic institutions, in addition to various Ministries led by MAGA (Ministerio de Agricultura y Ganaderia), were involved in developing the portfolio, which included participatory meetings, information exchange, economic analyses, surveys and *in situ* visits. As a result, in addition to generating an investment portfolio, more than 50 agricultural producers and 20 institutions have developed knowledge on climate smart agricultural practices and possibilities to mitigate and adapt to climate change while increasing production yields.

Source: CCAFS/CGIAR (no date)⁵⁷

4.3 POLICY DESIGN

Even with the available data and modeling of different scenarios, climate change will remain uncertain. National and regional decision makers find it difficult to take decisions that recognize and incorporate this uncertainty. If efforts to develop and implement the policies that form LEDS are focused on progressive learning and innovation, piloting policies and managing in an adaptive manner, the concept of resilience can help decision makers accept and use uncertainty. For example, this can be a justification for making smaller, faster decisions and adapting while acting, without needing to wait for the collection of additional data.

Societal stakeholders (e.g. industry, businesses, NGOs, academia and local communities) are crucial for catalyzing resilient LEDS at national and regional scales, and they represent a key building block for adaptive capacity. To take advantage of this capacity, these stakeholders need to be involved in policy design processes. There are challenges to their participation, however, including a mismatch between international climate debates and national/regional development priorities and planning processes, as well as the availability of effective participatory mechanisms with dedicated resources and intersectoral frameworks to keep the dialogue permanently flowing.

The following strategies have proven successful in promoting the design of more effective development policies, which are better aligned with climate resilience goals.

- Establish an enabling policy framework. During the design of climate resilient LEDS, it is

important to establish an enabling governance framework that addresses barriers (legal, behavioral, financial and institutional) to the implementation of climate interventions, and that provides mechanisms for identifying the most appropriate measures required to implement resilient LEDS. This can be done by creating or adopting newly designed policies for LEDS, or by reviewing existing development plans and policies. It is important that the possible impacts of resilient LEDS on overall existing policies are considered.⁵⁸ Peru, for example, with support from GIZ, updated its policy framework and now considers climate change in all project planning processes. Since 2013, all public investment projects need to pass a climate risk analysis.⁵⁹

- Align policies with development goals. Aligning climate resilient objectives with economic development priorities is a good way to build political support and to engage actors across a government. This in turn improves coordination within the government.⁶⁰ In Nigeria, for example, most climate change policies are linked to poverty eradication – a priority for the country.⁶¹
- Find synergies across policy sectors. Resilient LEDS often cut across various policy sectors. The water–energy–food security nexus is a good example of building resilience by bringing together historically separate sectors of decision making.⁶²
- Identify no-regrets options. Identifying no-regrets options is a good way to overcome



uncertainty. Once adopted, such measures will benefit a country's development regardless of future climate change. Increasing energy efficiency is a good example of a no-regret option: it brings financial benefits while reducing dependency on fossil fuels and curbing greenhouse gas emissions. Another example

is promoting agroforestry and integrated agricultural approaches, which can improve local livelihoods while increasing resilience to higher temperatures and drought, and could include adopting less carbon intensive farming methods.⁶³

COUNTRY PRACTICE

Colombia's Low Carbon Development Strategy

Colombia's Climate Change Policy was designed in parallel to the formulation of the National Development Plan (NDP) 2010/14. The NDP recognized the importance of linking climate change with socioeconomic development and made dealing with climate change one of its main objectives. By doing so, the Government accorded high importance to climate resilience, which is now monitored by the Office of the General Controller.

The National Economic and Social Policy Council sets the political framework for the implementation of Colombia's four climate change priority strategies:

- Climate Change National Adaptation Plan (CCNAP; PNACC in Spanish);
- Colombian Low Carbon Development Strategy (CLCDS; ECDBC in Spanish);
- National REDD+ Strategy (ENREDD+);
- Strategy for Fiscal Protection Against Natural Disasters.

Eight Ministries have developed Sectoral Mitigation Action Plans (SMAP) under the coordination of the Ministry of Environment: Industry, Energy, Mining, Transport, Housing, Waste Management and Agriculture. These ministries and other engaged institutions adopted an integrated approach that considered the co-benefits of mitigation and adaptation action, and the many LEDS measures developed by the CLCDS were analyzed for synergies with adaptation measures under the Adaptation Plan. The measures were developed on parallel tracks with check points for integration of adaptation and mitigation, supported by capacity building among the actors for the analysis of co-benefits between mitigation, adaptation and development.

The Ministry of Housing, Cities and Territories SMAP, for example, included climate change criteria on the Land Development Standards, which promoted urban land development while also protecting carbon sink areas outside city limits – with the goal of ensuring water and energy supply to urban areas in the short, medium and long term. Another example is the waste and waste water management measures that both deal with disaster (flood) risk reduction and mitigation of greenhouse gas emissions from waste water, and also promote health improvement due to the implementation of sanitation and air quality objectives.

Source: Colombian Climate Change Legislation⁶⁴

4.4 INSTITUTION STRENGTHENING AND PARTNERSHIPS

Institutions shape and constrain decision making and policy implementation in multiple ways. To successfully address climate change, different governmental sectors need to engage with each other and coordinate efforts. This requires institutional mechanisms, communication, commitment and leadership and, in turn, can promote smart spending and win-win-win goals and, thus, results.

Institutional fragmentation is a well known challenge to realizing commitment and tapping into opportunities, not only in LEDS but also in other policy areas. The lack of a shared vision when adopting a low emissions development pathway creates unnecessary delays in policy adoption and, at many times, duplication of efforts by institutions and different levels of government. Meanwhile, lobbying by vested interests and a lack of political interest help maintain climate resilience low on political agendas.

The challenges of insufficient institutional capacity and a lack of proper governance mechanisms are often recognized as a main reason for policies not being implemented effectively.⁶⁵ Institutional structures need to be able to support coordination among different sectors to achieve low emissions, climate resilient development, and to embed international treaties on climate change into national laws.

In terms of partnerships and collaboration, engaging societal stakeholders and lower levels of government are key to successful strategies. This is especially true for adaptation strategies, which

are very local in character and usually benefit from indigenous knowledge and improved network connections in their implementation. As mentioned above, redundancy and collaboration are vital to create more resilient societies.

The following measures can help to promote climate resilient LEDS:

- Institutional mechanisms: Traditional approaches to improving institutional coordination include inter-ministerial commissions and committees, which involve various ministries or levels of government. For example, Brazil's Climate governance system has created two bodies: the Interministerial Committee on Climate Change, established to prepare and implemented the National Climate Change Policy and the National Climate Change Plan and the Interministerial Commission on Global Climate Change, focused on Brazil's climate actions related to the UNFCCC (See Brazil's Country Practice under Finances below).
- Improve Connections and Informal Networks among agents A good strategy to increase collaboration and coordination among government institutions and ministries is joint training programs for civil servants from different Ministries. In Colombia the EC-LEDS project in partnership with the United States did this by training staff in the following key sectors: transportation; agriculture; commerce; industry and tourism; housing and water; planning; and energy and mines and thus developing inter-ministerial expertise on



Climate Resilience Planning. These trainings were of course opportunities to break silos, deepen relationships, and build trust among the agents involved.⁶⁶

- Involve societal stakeholders. This helps to identify priorities for action and assures societal support for climate resilient LEDS. Involving those most impacted by the policies can help with buy-in from actors and also catalyze private investments in climate resilient actions and measures from those who can afford investing, which can complement international development funds. For example, platforms such as the Corporate Leaders Group, founded by HRH the Prince of Wales to engage corporate actors on climate change action have harnessed funds for innovation and collaborative action in numerous sectors (retail, food industry, energy, telecom, banking). In addition, stakeholders from the private sector and civil society can bring in different knowledge and expertise. This builds resilience in a broader sense by strengthening society's capacity to respond more flexibly to climate variability. For example, the Government of Kenya engaged stakeholders including government representatives, civil society groups and academia, in a process to identify mitigation and adaptation actions for its National Climate Change Action Plan during 2011 and 2012.⁶⁷

COUNTRY PRACTICE

The Philippines Ecotown Framework

The Municipality of San Vicente, in the Philippines, has applied the Ecotown Framework, in which economic growth and climate change adaptation are recognized as one single process. Ecotowns are defined by the Climate Change Commission of the Philippines as “ecologically stable” and “economically resilient” local communities.

The Ecotown approach comprises an analysis of a municipality's vulnerabilities and identification of appropriate measures, based not only in science but also in local knowledge. The first step is a study of baseline projections and future scenario projections. Following that, an assessment is conducted of the climate change risks and adaptive capacity. The third step is the formulation and prioritization of potential adaptive measures, which include the identification of financing schemes and a pre-feasibility study. The final step is the climate proofing of local development plans, conducted in consultation with local stakeholders and combining a capacity building component.

The stakeholder engagement in the process aims to revise local development plans and to validate the results from activities led on the ground. Engagement forums have been created in which group discussions enable stakeholders to understand the issue and take responsibility towards it. Local stakeholders are treated as ‘development partners’ rather than ‘aid recipients,’ greatly furthering stakeholder commitment.

Source: Global Green Growth Institute (2012, 2014)⁶⁸

4.5 FINANCE MECHANISMS

Allocating financial resources in an efficient way is a challenge for climate change action. Mitigation and adaptation funding streams are often separate – institutionally at the government level and within international development funds and institutions – which has inhibited greater and faster results thus far.

Financial mechanisms are only now catching up with the idea that mitigation and adaptation are not two separate activities. To identify climate resilient pathways in a more systemic manner, it will be necessary to look actively at co-benefits and joint gains from combined mitigation and adaptation action.

Climate funding streams are not always connected or coordinated with general development funding. As a result, climate change activities in many countries are dealt with separately from mainstream development policy. This leads to the duplication of efforts and diminished resilience within systems to deal with quick responses for integrated climate management that addresses both climate risks and vulnerabilities, and cutting carbon emissions and its sources. The lack of coordination can also overburden institutions and public resources managing a climate agenda in areas on which they may lack expertise and/or human and technical resources.⁶⁹

Funding mechanisms for policy options that deal with uncertainty, or that take step-by-step approaches, are not always available. This prevents further investment to adaptation and mitigation action. In this sense, public investment benefits from adaptive management approaches as well as from

private investment techniques such as *real options*⁷⁰ or *multi-criteria decision making*⁷¹, which allows for analysis of co-benefits and implications for taking phased investment decisions.

The challenge of gathering climate information and developing capacity within governments and relevant sectors is also a financial issue. Funds for collecting data and evidence to be used in decision making can increase resilience and allow for climate risks to be quantified, financially or otherwise. But if this finance is lacking, it can lead to innovative solutions to complex problems being missed.

National governments and policymakers can overcome these finance challenges and secure funding for integrating climate resilience into LEDS through the following approaches.

- Develop sustainable financing mechanisms. Sustainable financing mechanisms can direct resources towards climate resilient development agendas. One interesting tool is the Climate Public Expenditures and Institutional Review. This analyses the quality and quantity of a country's public expenditure and assesses how that expenditure relates to climate change. Since 2011, several Asian countries have conducted such reviews, with the technical assistance of the UNDP.⁷²
- Coordinate funding streams. Institutions can coordinate their funding streams to initiate climate resilient development more effectively and to target national priorities. For example, Colombia created a Committee for Financial Management as part of its Institutional Framework for Climate Change. The Committee



conducted a review of the available domestic and international mechanisms for financing climate change action and analyzed the barriers to assessing and managing climate financing.⁷³

- Align LEDS with national budgets. Countries can identify activities and policies that support climate resilient LEDS and align these with their national budgets. For example, Mexico's Special Program on Climate Change was aligned with its national budget during 2012⁷⁴ by establishing budget estimates for each action line, among which the ones related to its objective of reducing social vulnerability and increasing resilience of strategic infrastructure.⁷⁵
- Embed climate resilience in international development funds. More ambitious actions to combat climate change may require international financial support. It is therefore useful to identify opportunities for funding of LEDS by international funding agencies.⁷⁶ For example, Norway has supported climate resilient development in Guyana by tying development funding to the achievement of resilient outcomes.⁷⁷
- Redirect financial flows for social development. Resilience is as critical for social development as it is for economic development – the poorest populations are usually the most vulnerable to the impacts of climate change. Integrating resilience into financing mechanisms for poverty reduction and social infrastructure can lead to climate resilient LEDS. In Guyana, an initiative that began in 2012 to restore mangroves (financed by the government with additional support from the European Union) was planned as a climate action, but made major improvements to the livelihoods of local communities as well.⁷⁸

COUNTRY PRACTICE

Brazil's Climate Change Governance Architecture and its Funding Mechanisms

Brazil has created two institutions to coordinate its policy agenda for climate change. The Interministerial Commission on Global Climate Change, created in 1999 and presided by the Ministry of Science, Technology and Innovation, focuses on Brazil's climate actions related to the UNFCCC. The Interministerial Committee on Climate Change and its executive group, on the other hand, were established to prepare and implement the National Climate Change Policy and the National Climate Change Plan.

In 2008, the Interministerial Committee on Climate Change prepared the National Climate Change Plan, which comprises a set of actions to be adopted by many economic sectors to mitigate and adapt to the effects of climate change. In order to stimulate the adoption of mitigation and adaptation actions, two financial instruments were established: the Amazon Fund and the National Climate Change Fund. These Funds are additional to the budget dedicated to climate action in the Ministries and are open to the public via open calls/bids. The calls require the implementation of sustainable development objectives within the climate projects presented, for their approval.

Brazil's strategy included the development of Climate Change Adaptation and Mitigation Sector Plans for the Health, Transport and Urban Mobility, Industry and Mining Sectors. The sectoral plans were prepared between 2011 and 2012 and had a participatory process component – public consultations and meetings - led in 2012 by the Brazilian Forum on Climate Change, an open Forum presided by the President of the Republic and involving private sector organizations, academia, unions, civil society organizations, state fora on climate change, among others.

Source: Ministry of Development, Industry and Foreign Trade (2012)⁷⁹

5. CONCLUSIONS

In this paper, we have reviewed the key concepts, approaches and elements applicable to integrating climate resilience into LEDS. The key idea presented herein is that climate resilient approaches enrich the design and implementation of LEDS by identifying ways to reduce socioeconomic vulnerability to climate change, while maximizing co-benefits and preventing negative trade-offs between mitigation, adaptation and development. Climate resilient approaches thus seek to find synergies between LEDS and the objective of increasing the ability of societies to learn and cope with a changing climate.

Three approaches for integrating climate-resilience into LEDS are described: climate proofing, climate resilient pathways and societal resilience. There is no one-size-fits-all solution to integrating climate resilience into LEDS, but these approaches can inform a country's policy goals and the way policies are designed. They also highlight the many ways in which climate resilient LEDS can be implemented, such as sectoral policies and plans, development maps and goals, and integrated projects and investment objectives. These can follow the general steps of policy design while integrating climate data, risk assessments, and stakeholder knowledge and dialogue.

Social processes in a country or society are key factors that can enhance or reduce resilience.⁸⁰ Throughout this paper, different country approaches have been presented. These demonstrate that climate change policies and development policies should not follow separate paths, but should be intertwined from the moment of their inception and during policy review cycles.

Our review of current country experiences and the literature demonstrates that five pillars must be strengthened to allow climate resilient LEDS to be successfully developed and implemented: information and knowledge exchange, capacity building, policy design, institutions, and finance.

While challenges remain in integrating climate resilience into LEDS, a wide array of frameworks, experiences and knowledge are already available, developed by communities, intergovernmental organizations, development agencies and countries. This reservoir of knowledge can enable policymakers to venture into the design and implementation of LEDS to improve countries' readiness for a changing climate, and to tailor LEDS to address societies' vulnerabilities through tapping into their wisdom and strengths.



REFERENCES

- ¹IPCC (2014a). Chapter 20: Climate-resilient pathway: adaptation, mitigation and sustainable development. *Working Group II. IPCC 5th Assessment Report*. Intergovernmental Panel on Climate Change. www.ipcc.ch/report/ar5/wg2/, p. 1104.
- ²This paper was elaborated within the context of LEDS GP efforts to promote the sharing of technical information on climate resilience issues to improve decision making among its members - policymakers, consultants, academics, technical institutes, and those assisting governments – in their planning and implementing of LEDS. The paper is not an exhaustive analysis of climate resilience in LEDS. Examples here are limited to policies and plans; we do not address projects or technological advances for assessing adaptation and mitigation needs. Assessing implementation results, challenges and opportunities is also beyond the scope of this paper as most of the data available at the time of writing focus on policy assessment and design. We thank LEDS GP partners for the great amount of support and openness in conversations, interviews and exchange of ideas around this paper focus, as well as colleagues at NREL and CDKN who have demonstrated excellent leadership in making climate resilience a priority in LEDS discussions, planning and implementation.
- ³Clapp, C., Briner, G. and Karousakis, K. (2010) 'Low-Emissions Development Strategies (LEDS). Technical, institutional and policy lessons'. OECD paper. Paris: Organisation for Economic Co-operation and Development. www.oecd.org/env/cc/46553489.pdf
- ⁴IPCC (2014b) *Working Group II. IPCC 5th Assessment Report. Glossary*. Intergovernmental Panel on Climate Change. www.ipcc.ch/report/ar5/wg2/
- ⁵IPCC (2014c) *Working Group III. IPCC 5th Assessment Report. Glossary*. Geneva: Intergovernmental Panel on Climate Change (IPCC). www.ipcc.ch/report/ar5/wg3/
- ⁶IPCC (2014b).
- ⁷Tol, R. and Yohe, G. (2007). 'The weakest link hypothesis for adaptive capacity: an empirical test'. *Global Environmental Change*, 17:218–227.
- ⁸IPCC (2014b).
- ⁹IPCC (2014b). Adger, W. (2006) . Vulnerability. *Global Environmental Change* 16: 268-281.
- ¹⁰Folke, C. (2006) 'Resilience: The emergence of a perspective for social-ecological systems analyses'. *Global Environmental Change*, 16:253–267.
- ¹¹Adger *et al.*(2011). Resilience implications of policy responses to climate change. *WIREs Climate Change*, Vol. 2, September/October 2011. 757-768.
- ¹²USAID (2014). *Climate-resilient development: a framework for understanding and addressing climate change*, available at http://pdf.usaid.gov/pdf_docs/PBAAA245.pdf
- ¹³Mitchell, T. and Maxwell, S. (2010) *Defining Climate Compatible Development*. Climate & Development Knowledge Network, London. <http://cdkn.org/wp-content/uploads/2010/11/CDKN-CCD-DIGI-MASTER.pdf>. This concept marks a transition from considering mitigation and development in isolation from adaptation and development; until recently, climate resilient approaches mainly focused on integrating adaptation considerations into development policies.
- ¹⁴Davoudi *et al.* (2013). Evolutionary Resilience and Strategies for Climate Adaptation. *Planning, Practice & Research*, Vol. 28, No. 3, 307–322, p. 319.
- ¹⁵*Ibidem.*
- ¹⁶Adger *et al.* (2011).
- ¹⁷OECD (2009). *Integrating Climate Change Adaptation into Development Co-operation*. Paris: OECD. Available at: www.oecd.org/env/cc/adaptation/guidance
- ¹⁸USAID (2014).
- ¹⁹World Bank (2011) *The Adaptation Coalition Toolkit: Building Community Resilience to Climate Change.*

INTEGRATING CLIMATE RESILIENCE IN POLICY AND PLANNING OF LOW EMISSION DEVELOPMENT STRATEGIES

International Bank for Reconstruction and Development/ World Bank, Washington. http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2012/06/23/000426104_20120623100913/Rendered/PDF/700420ESW0P1120e0Climate0Change0web.pdf

The World Bank Climate & Disaster Risk Screening Tool serves to both Policies and Projects, at the National and/or Sectoral Levels, including Agriculture, Coastal Flood Protection, Energy, Health, Roads and Water. The tool is available at <http://climatescreeningtools.worldbank.org>

²⁰HJERP, p. *et al.* (2012). Methodologies for Climate Proofing Investments and Measures under Cohesion and Regional Policy and the Common Agricultural Policy. A report for DG Climate, August, 2012

²¹GIZ. (2013). Sub-national involvement in NAMA development: Current and emerging practice towards vertical integration. GIZ, Germany.

²²The World Bank Climate & Disaster Risk Screening Tool serves to both Policies and Projects, at the National and/or Sectoral Levels, including Agriculture, Coastal Flood Protection, Energy, Health, Roads and Water. The tool is available at <http://climatescreeningtools.worldbank.org>

²³OECD (2009).

²⁴HJERP *et al.* (2012), p. 23

²⁵OECD (2010) *Low-Emission Development Strategies: Technical, Institutional and Policy Lessons*. Available at <http://www.oecd.org/env/cc/46553489.pdf>

²⁶OECD (2009).

²⁷IPCC (2014b).

²⁸IPCC (2014a), p. 1104

²⁹Edenhofer *et al.*, (2012) cited in IPCC (2014a), p. 1112.

³⁰*Ibidem.*

³¹IPCC (2014a), p. 1113.

³²It is interesting to note that LEDS Global Partnership has developed a Development Impact Assessment (DIA) Tool, which can be adapted to include climate resilience considerations and indicators. For more information on the DIA tool, check <http://ledsgp.org/DIA-Toolkit>

³³STOCKHOLM RESILIENCE CENTRE (2014). Applying Resilience Thinking: Seven Principles for Building Resilience in Socio-Ecological Systems available at www.stockholmresilience.se

³⁴*Idem*

³⁵The sharing economy - general term that includes for-profit and not for profit structures alike - was developed around the idea that finite and volatility in costs of natural resources and increased access to technology and social media would create an environment in which singular ownership of goods is longer required/necessary/desirable. It can be described as a post-capitalist view on ways of satisfying human needs and includes all, private and public sector as well as individuals as participants in this "commercial" structure for satisfying needs through borrowing, exchange and alternative means of payment and ownership/sharing of goods. See: <http://www.thepeoplewhoshare.com/blog/what-is-the-sharing-economy/>

³⁶USAID (2014).

³⁷UNDP (2011). *Preparing Low-Emission Climate Resilient Development Strategies – Executive Summary*. Available at: www.undp.org/content/dam/undp/library/Environment%20and%20Energy/Climate%20Strategies/UNDP-LECRDS-Guidebook-v17-web.pdf

³⁸World Bank (2011).

³⁹van Tilburg, X., Würtenberger, L., de Coninck, H. and Bakker, S. (2011) *Paving the Way for Low-Carbon Development Strategies*. Energy Research Centre of the Netherlands, Petten. www.ecn.nl/docs/library/report/2011/e11059.pdf

⁴⁰USAID (2014); UNDP/ODI (2012). Climate Public Expenditures



and Institutional Review (CPEIR): Methodological Note. www.asia-pacific.undp.org/content/dam/rbap/docs/Research%20&%20Publications/democratic_governance/APRC-DG-2013-CPEIR-Methodological-Note.pdf; World Bank (2011); van Tilburg, X. *et al.* (2011).

⁴¹ Design thinking puts end-users' needs at the centre of the policy formulation system. It is an explicit human and user-centred approach. It leads to solutions that are progressively refined through an iterative process of providing voice to end-users and engaging them in shaping decisions (professional empathy and co-creation); considering multiple cause of and diversified perspectives to the problems at hand (scaling); and experiment with initial ideas (prototyping and testing). Design thinking seeks to stimulate creative thinking within the decision-making process and accelerate the synthesis of increasingly effective and efficient policy solutions. See: <http://www.undp.org/content/dam/undp/library/capacity-development/English/Singapore%20Centre/GCPSE%20Design%20Thinking%20Summary.pdf>

⁴² *Ibidem*

⁴³ Davoudi *et al.* (2013).

⁴⁴ Clapp *et al.* (2010); GIZ (no date) Mainstreaming climate change into public investment in Peru. www.giz.de/expertise/html/18168.html

⁴⁵ www.southsouthnorth.org/mitigation-action-plans-and-scenarios-maps/

⁴⁶ Clapp *et al.* (2010)

⁴⁷ *Ibidem*

⁴⁸ *Ibidem*

⁴⁹ Center of Excellence for Climate Change Knowledge Management, www.cckm.or.th/CCKM/webpage/en.html

⁵⁰ IPCC (2014d) Chapter 15: National and sub-national policies and institutions. *Working Group III. IPCC 5th Assessment Report.*

Intergovernmental Panel on Climate Change (IPCC). www.ipcc.ch/report/ar5/wg3/

⁵¹ United Nations (1992). *Agenda 21 Earth Summit: United Nations Program of Action from Rio*. New York: United Nations.

⁵² United Nations (1992), Art. 37.1

⁵³ OECD (2014), *Climate Resilience in Development Planning: Experiences in Colombia and Ethiopia*, OECD Publishing.

⁵⁴ *Ibidem*.

⁵⁵ MoSTE (2015). *Indigenous and Local Knowledge and Practices for Climate Resilience in Nepal, Mainstreaming Climate Change Risk Management in Development*, Ministry of Science, Technology and Environment (MoSTE), Kathmandu, Nepal.

⁵⁶ CGIAR Research Program on Climate Change, Agriculture and Food Security, <https://ccafs.cgiar.org>

⁵⁷ CCAFS/CGIAR (no date) How to fight food insecurity in Guatemala (in Spanish). <https://ccafs.cgiar.org/es/blog/¿cómo-combatir-la-inseguridad-alimentaria-en-guatemala#.VgJEc7ShLA4>

⁵⁸ Clapp *et al.* (2010)

⁵⁹ GIZ (no date).

⁶⁰ Clapp *et al.* (2010)

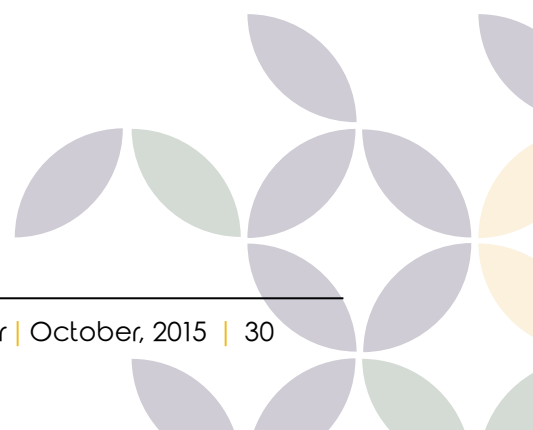
⁶¹ *Ibid.* p. 41

⁶² See: www.water-energy-food.org

⁶³ Climate Action (2015) *Adapting agriculture to climate change: a no regrets option for development*, available at <http://www.climateactionprogramme.org/climate-leader-papers>

⁶⁴ Colombian Climate Change Legislation available at <http://www.lse.ac.uk/GranthamInstitute/legislation/countries/colombia/>, Colombian National Strategy for Low Carbon Development and Sectoral Action Plan by the Ministry of Housing, Cities and Territory.

⁶⁵ UN-HABITAT (2013). *State of the World's Cities 2012/2013:*



Prosperity of Cities. UN-Habitat, Kenya.

⁶⁶ EC-LEDS. Colombia Fact Sheet. Available at: http://prod-http-80-800498448.us-east-1.elb.amazonaws.com/w/images/3/3c/Colombia_EC-LEDS.pdf

⁶⁷ INTERNATIONAL PARTNERSHIP ON MITIGATION AND MRV. (no date) Global Good Practice Analysis on LEDES, NAMAs and MRV, available at: http://mitigationpartnership.net/sites/default/files/kenya_gpa_long_1.pdf

⁶⁸ Engaging Decision Makers and Other Stakeholders: Green Growth and Climate Change Adaptation (2012), available at: http://forums.asialeds.org/wp-content/uploads/2013/10/3.-GGGI_Yong-Sung-Kim.pdf and Demonstration of the Eco-town Framework Project in San Vicente, Palawan, Philippines (2014), available at http://gggi.org/wp-content/uploads/2014/04/Eco_Town_Framework.pdf

⁶⁹ UNDP/ODI (2012).

⁷⁰ "Real Options Analysis quantifies the investment risk associated with uncertain future outcomes. It is particularly useful when considering the value of flexibility of investments. This includes the flexibility over the timing of the capital investment, but also the flexibility to adjust the investment as it progresses over time, i.e. allowing a project to adapt, expand or scale-back in response to unfolding events. The approach can therefore assess whether it is better to invest now or to wait – or whether it is better to invest in options that offer greater flexibility in the future." Source: <http://www.mediation-project.eu/platform/pbs/pdf/Briefing-Note-4-LR.pdf>

⁷¹ Integrated Assessment (IA) considers the interactions of physical, biological and human systems in order to assess the long-term consequences of environmental and energy policies such as limits on emissions of greenhouse gases, and other strategies to avoid climate change. IA users are faced with the difficult task of interpreting large amounts of data and uncertainties. The method of multi-criteria decision making (MCDM) can help users process IA data, understand

policy trade-offs, and learn how their value judgments affect decisions. Source: <http://www.mediation-project.eu/platform/pbs/pdf/Briefing-Note-6-LR.pdf> See also the document to find a spread sheet for policy makers developed by GIZ (German Development Cooperation): https://gc21.giz.de/ibt/var/app/wp342deP/1443/?wpfb_dl=32

⁷² UNDP/ODI (2012).

⁷³ OECD (2014) Op. cit.

⁷⁴ OECD (2010): *Low-Emissions Development Strategies (LEDS): Technical, Institutional and Policy Lessons*, available at <http://www.oecd.org/env/cc/46553489.pdf>

⁷⁵ Mexico. Secretaria de Medio Ambiente y Recursos Naturales. *Programa Especial de Cambio Climático 2014-2018*. Available at: <http://biblioteca.semarnat.gob.mx/janium/Documentos/Ciga/agenda/PPD02/DO3301.pdf>

⁷⁶ Centre For Policy Development (2013) *Post Carbon Pathways: Towards A Just And Resilient Post Carbon Future*, Melbourne Sustainable Society Institute, University of Melbourne. (CPD)

⁷⁷ Clapp *et al.* (2010)

⁷⁸ Mary Robinson Foundation (2014). *Innovative uses of climate finance in climate vulnerable countries*. www.mrfcj.org/media/pdf/2014/MRFCJ_-_Innovative_Uses_of_Climate_Finance.pdf

⁷⁹ Ministry of Development, Industry and Foreign Trade (2012) *Climate Change Mitigation and Adaptation Sector Plan For the Consolidation of a Low Carbon Economy In the Manufacturing Industry*. www.mdic.gov.br/arquivos/dwnl_1432732103.pdf

⁸⁰ Davoudi *et al.* (2013)

