Chapter IV

Coherent, participatory and adaptive policymaking for climate resilience

Key messages

- Building resilience to climate change, an essential component of sustainable development, is a challenge with multiple dimensions, which increases the need for substantive coordination and integration of policy interventions. Designing integrated and coherent policies will strengthen the resilience to climate hazards of the most vulnerable, not only by addressing issues crucial to their livelihoods, but also by taking advantage of potential co-benefits, while avoiding unintended consequences and maladaptation.
- The most intense and direct effects of climate events are experienced at the local level, with a disproportionate impact on the poorest and marginalized groups. The success of interventions aimed at building resilience depends on the participation of all stakeholders, especially stakeholders representing those groups. A broader participation can help policymakers identify development objectives and assess how to achieve them through building synergies and addressing the underlying causes of vulnerability.
- Climate hazards and their effects are characterized by significant uncertainties, which introduce new challenges for policymakers in designing adequate adaptation strategies, with inclusion. Policymakers must fully embed uncertainty into their long-term plans, using iterative and adaptive processes. This requires a more flexible policy process, capable of incorporating the new information and emerging knowledge needed to scope, assess, implement and monitor policy interventions.

The 2030 Agenda elevated the importance of policy coherence. Integration implies vastly different policy frameworks, policies, institutions and capacities. Development cooperation partners need to take a holistic approach to their partnerships, pursuing policies in different sectors that are complementary rather than contradictory…The 2030 Agenda is new to all of us. There is no paved way to follow. Every country needs to find the solution that fits its own national context. This leaves space for innovation in policies, institutions and practices.

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for Economic and Social Affairs,
6 November 2015

Introduction

Socioeconomic systems stumble in the face of climate hazards because some people are particularly exposed and vulnerable. Public policies have an important role to play in addressing people's vulnerability and building climate resilience but they have to be consistent with interventions for mitigation and adaptation within the larger context of policies for sustainable development.

To be successful, mitigation and adaptation policies must be part of the larger sustainable development policy framework

Mitigation policies that aim to reduce the anthropogenic sources of climate change focus on reducing risk over a long-term horizon extending as far as 2100, while adaptation policies focus on reducing current exposure and vulnerabilities so as to strengthen people's capacity to cope and adapt to climate hazards in the present and the medium term. Mitigation and adaptation policies are complementary and need to be strategically crafted to strengthen the overall resilience of socioeconomic systems along a continuum of development policies.

Other policies extending beyond mitigation and adaptation are also needed because, as noted in previous chapters, vulnerability and exposure to climate hazards are closely linked to existing underlying (structural) inequalities. Differences in access to physical and financial assets; unequal opportunities to access quality health services, education and employment; and unequal voice and political representation, as well as the perpetuation of discrimination under cultural and institutional norms, are structural conditions that aggravate the exposure and vulnerability of large population groups to climate hazards. The disproportionate impact of climate hazards further aggravates existing socioeconomic inequalities and may actually undermine the capacity of people to cope and adapt.

Breaking the vicious cycle of vulnerability and climate hazards requires well-integrated policies designed to reduce current underlying structural inequalities

Breaking this vicious cycle requires well-integrated and coherent policies designed to reduce current well-known vulnerabilities, including policies targeting poverty eradication, income diversification and improved access to basic social services such as education, health, and water and sanitation, among many others. Not only is closing the development gaps that leave people vulnerable to climate hazards a goal of sound development policies, but it is also essential to reducing the risk posed by climate change. Investing, for example, in prevention to halt the spread of malaria and other debilitating diseases to improve the quality of life of the most disadvantaged population groups, is both a sound development policy and part and parcel of a sound adaptation policy: healthier and potentially wealthier people will be more resilient to future climate hazards.

There is a clear role for public policies to play in addressing the structural inequalities that underlie vulnerability. Disadvantaged groups typically possess few options for diversifying their income sources, gaining access to insurance and financial markets and improving their education and health status. A continuum of well-integrated economic, social and environmental policies for building climate resilience, as discussed in chapter II, would help harmonize present adaptation efforts within short-term political and funding cycles with longer-term development objectives. Addressing the root causes of poor outcomes requires transformative policies that change the fundamental attributes of systems, particularly the existing governance systems and norms that perpetuate inequalities. Transformative policies should aim towards generating shifts in production and consumption behaviours to encourage sustainable practices, in line with some of the goals set out in the 2030 Agenda for Sustainable Development.[1]

1 General Assembly resolution 70/1.

Effective and coherent implementation of such policies necessitates a sound policy process. The present chapter discusses some of the key features that such a policy process must possess in order for policy decision-making to succeed in building climate resilience. The discussion centres around three principles which, when applied to the policy process, can prove helpful in facilitating adaptation and development, with particular benefits to disadvantaged groups. The underlying uncertainty of climate change, the locality in which its effects materialize, and the interconnected nature of various sectors require a policymaking system that is (1) coherent[2] and integrated, (2) participatory and (3) flexible.

Building climate resilience requires strengthened policymaking systems which are coherent, integrated, participatory and flexible…

Policy coherence is important for achieving climate resilience, particularly because of the need to integrate (or mainstream) adaptation objectives into longer-term development processes. The present *Survey* has noted, more broadly, that building consistency across the economic, social and environmental dimensions of development policy is a core challenge that building climate resilience and achieving sustainable development will have to confront.

Direct consultation with and participation of multiple stakeholders in policy decision-making improves understanding of specific risks and vulnerability at the local level. Further, application of a better understanding of risks and priorities achieved through the engagement of local communities improves both policy design and implementation as well as development outcomes.

In the context of a changing climate and greater weather variability, policymakers, using iterative and adaptive processes, must also fully embed uncertainty into policy planning. This requires a more flexible policy process, capable of incorporating lessons derived from each step of the process, with a view to improving knowledge and outcomes. Within the context of uncertainty, no-regret and low-regret policies constitute a good starting point for adaptation, as they can address immediate vulnerabilities and structural inequalities, without compromising the foundations of future resilience.

A policy process based on the principles of coherence and integration, participation and flexibility should help address underlying inequalities by identifying vulnerable populations, particular intersecting inequalities, and concrete actions for strengthening resilience. These three principles are discussed in greater detail and applied to concrete situations in the following three sections. The final section provides a summary of the requirements that must be met in order for the goals considered in this chapter to be realized.

…through which to address the underlying inequalities that make some people disproportionately vulnerable to climate hazards

Increasing policy coherence and integration across sectors

As already discussed, sustainable development and resilience are multidimensional challenges, which, as this chapter argues, defy single definitions or solutions. The objectives to be pursued in building climate resilience alone encompass multiple sectors, thereby increasing the need for substantive coordination and integration of policy interventions. Particularly within the context of climate hazards, resilience requires that instead of focusing on individual risks, the policymaking process take a more integrated approach to management of change and uncertainty (Arup, 2014).

It is through the integration and coherence of policies across sectors that the root causes of vulnerability, which are often interrelated and cumulative, can be addressed most

Policy integration across sectors is needed to address the root causes of vulnerability, which are often interrelated and cumulative

2 Policy coherence can be defined as the systematic promotion of mutually reinforcing policies across government departments to create synergies towards achieving agreed objectives and to avoid or minimize negative spillovers in other policy areas.

effectively. While poverty and development status, for example, are obvious determinants of the capacity of people to cope with and adapt to shocks, there is also an underlying connection between vulnerabilities and multiple inequities in access, for example, to assets, land, work and political processes. Addressing these inequities requires simultaneous actions, as they all play a role in determining exposure to climate hazards and the capacity to cope and adapt. Designing policies that are coherent and adequately integrated is a critical facet of strengthening the resilience to climate of the most vulnerable groups: such policies will not only help strengthen their livelihoods but also make it possible for potential co-benefits to be taken advantage of and for unintended consequences including maladaptation to be avoided.

Integration in support of a multisectoral approach

The challenge lies in achieving an effective coordination across multisectoral policies that is consistent with long-term objectives without losing sight of immediate needs

Many countries are formulating plans for adaptation to climate change and for development in general. However, it is the building of coherent and integrated policies which take into account the multidimensional nature of livelihoods and address the multiple sources of inequality that is the biggest challenge. Adaptation policies must be an integral part of sustainable development strategies in order to minimize the current and future impacts of climate hazards on livelihoods. The challenge lies in determining how to effectively coordinate and integrate multi-sectoral policies under the aegis of a single overarching vision which is consistent with long-term objectives and does not lose sight of immediate needs and relevant priorities at the sectoral level.

The case of food security attests to the magnitude of the challenge. Food production, which is one of the most critical sectors affected by climate change, requires a multisectoral approach, given the number of interrelated dimensions that need to be simultaneously addressed in order to minimize current and future impacts of climate change on food systems and livelihoods in general. Agricultural practices, for instance, need to change in order not only to improve yields and ensure sufficient food production, but also to preserve ecosystems and natural resources in the long term. The preservation of ecosystems, through new management responses regarding natural resources, is also a determinant in ensuring sustainable livelihoods and food security. Thus, policies to stimulate agricultural productivity should be designed not in parallel with environmental policies but in such a way as to integrate goals of ecosystem preservation.

A community-based project on forest rehabilitation for slope stability in the Bolivian Altiplano offers a concrete example of the successful integration of natural resources management and adaptation objectives. The project was implemented over the course of 15 years using a community forestry approach both to generate income and to stabilize slopes that had become exposed as a result of environmental degradation and were consequently at risk of landslides. The assessment of the project was conducted in close consultation with communities and the results encompassed a greater diversification of livelihoods and improved watersheds, together with a decrease in the risks from landslides. This highlights the importance of management of ecosystems and livelihoods as the basis for an integrated strategy for climate change adaptation and development (Renaud, Sudmeier-Rieux and Estrella, eds., 2013).

Evidence shows that the right combination of policies has greater impacts on livelihoods and people

The importance of integrating policies is also illustrated by a study on the impact of three adaptation options used by farmers in Ethiopia's Nile Basin — changing crops, water conservation and soil conservation. Veronesi and Di Falco (2012) have found that, when each of the options is taken in isolation, it has no effect on improving net revenues

for farmers. However, when adaptation options are combined, the gains for farmers are significant. For example, the authors found that changing crops, when combined with water conservation strategies, delivers the largest gains of any of the adaptation options. The study concludes that, while adaptation to climate change based upon a portfolio of strategies is superior to single-option strategies, finding the right combination of interventions requires experimentation with different options to iterate the optimal course of action. The study also sheds light on the need to remove the structural barriers encountered by some groups when they attempted to access the full range of strategies, either because of poor socioeconomic status or weak access to financial resources, or owing to an absence of knowledge attributable to low levels of education or lack of information.

A number of broader social and economic policies can contribute to stabilizing and increasing the income levels of the most disadvantaged groups, thereby ensuring that their livelihoods are more resilient. Social protection systems, for instance, including safety nets, can protect lower-income groups against short-term economic and food price shocks, enhancing their coping capacity and maybe even their capacity to contribute to transformative change in the future. Instruments or policies that promote access to insurance and capital markets can, when integrated, complement those protection schemes, thereby helping local small landholders cope with possible negative consequences of extreme weather events and encouraging them to invest in new crops or any other relevant input to facilitate the process of adaptation to future climate hazards.

Complementing policies designed specifically for the agricultural sector with other interventions which improve rural-urban linkages (e.g., transport infrastructure) can promote the production of alternative sources of income, enhance food security for both rural and urban households and reduce poverty, especially in countries where the process of urbanization is accelerating (United Nations, 2013). In China, for example, the existence of areas of high population density areas that are also well served by transportation infrastructure has encouraged the engagement of a rural labour force in labour-intensive manufacturing. Evidence for agriculture-based economies demonstrates that non-farm sources of income account for about 20–30 per cent of total income for rural households, a significant portion of which could consist of remittances from household members who migrated to urban areas (Food and Agriculture Organization of the United Nations, World Food Programme and International Fund for Agricultural Development, 2012). Policies that facilitate the transfer of such remittances would then come to be considered highly necessary for stabilizing and increasing income levels of the most disadvantaged groups.

The challenge is to develop transformative adaptation strategies through which to build resilience to climate hazards

A main challenge is to ensure that multisectoral approaches lead to transformative adaptation strategies which can enhance resilience to climate hazards rather than provide just temporary relief against short-term shocks. How to cope with and adapt to the impact of higher temperatures on human health is a relevant issue in this regard. Increasingly, national heat wave plans are being implemented to deal with extreme heat, especially in countries where temperatures can reach unbearable levels. In response to the devastating heat wave that killed at least 2,500 people across India in 2015, the government is launching a programme designed to protect people from extreme heat in two high-risk regions. In preparation for the onset of summer, the cities involved in the programme will have spent months educating children about heat risk, stocking hospitals with ice packs and extra water, and training medical workers to identify heat stress, dehydration and heat stroke. These plans, which are geared towards reducing health risks incrementally, present a unique opportunity to achieve policy integration. Adequate execution of these plans would require a strengthening of the health system as a whole and the building of closer links with policies

in other sectors, such as transportation, building design, and urban land-use management (World Health Organization, 2009). For instance, the so-called urban heat island[3] effect, a major source of aggressive heat injurious to human health, can be reduced by creating more green spaces or utilizing different materials in construction[4] (Silva, Phelan and Golden, 2010), which could contribute to building climate resilience and more sustainable cities. Further, policies that improve roads, rules and signals for bicyclists, pedestrians and other alternative road users in urban areas not only help improve safety but also, by incentivizing the uptake of these means of transportation, yield health and climate benefits as air pollution is curbed and physical activity is promoted.

Integrated policies that promote co-benefits

Integrated policies are needed to explore synergies between policies for building resilience to climate hazards and sustainable development objectives

Resilience-enhancing policies can yield benefits for development objectives, and vice versa. The potential for such co-benefits has important implications for designing and implementing adaptation and development policies and needs to be properly assessed. It should therefore be mentioned that while policies with potential co-benefits offer cost-effectiveness advantages, which may encourage policymakers to implement them, they are not in all cases easy to devise. In this regard, an integrated approach can both take advantage of and encourage the development of policies that provide co-benefits for resilience to climate hazards and sustainable development.

A good example within the context of food security is the introduction of social protection systems. As already noted, social protection systems, including safety nets, as well as broader social protection policies and programmes, are designed to protect the most vulnerable against short-term economic and food price shocks, thereby enhancing their coping capacity. At the same time, they can also contribute to long-term resilience, by strengthening the ability of small-scale farmers to manage risks and adapt. Evidence has shown that climate change reduces investment incentives in agriculture and the ability to adopt better adaptation strategies, with negative effects on food production. As observed in Ethiopia's Nile Basin, which has been affected by changes in temperatures and rainfall over the past 20 years, farmers experiencing financial constraints were less likely to introduce recommended adaptation methods, while those who could afford to adapt undertook soil conservation, used different crop varieties and irrigated their farms (Deressa and others, 2009). Thus, predictable social security programmes that target the most vulnerable, particularly small landholders, by providing a robust safety net, can stimulate investment in more productive human capital and technologies. By ensuring a basic level of consumption, such safety nets enable small landholders to engage in production strategies that are higher-return, albeit riskier from a subsistence-related point of view. Along similar lines, access to insurance and capital markets can assist local small landholders in coping with the possible negative consequences of extreme weather events and investing in new crops or in any relevant input that can help foster the process of adaptation to climate hazards.

The degrees of uncertainty are particularly high at the local level, making it difficult to predict the impact of climate hazards on the agricultural sector. In the face

3 An urban heat island is a city or metropolitan area that, owing to human activities, is significantly warmer than surrounding rural areas.

4 For example, concrete or more heat-reflective substances could be substituted for bitumen, typically used in road surfacing and roofing.

of such uncertainty, more diversified livelihoods can broaden the options for adaptation, particularly for the most vulnerable population groups. A diversified farming system can also have co-benefits: integrating horticulture and livestock, for instance, can enhance nutritional outcomes by improving rural households' access to food from different sources. In Viet Nam, a diversified farming system at the household level integrating vegetation, aquaculture and use of cages in animal husbandry has contributed to improvements in both income and nutritional outcomes (Food and Agriculture Organization of the United Nations, 2013).

The health sector is another domain where spillover effects from a number of policies in other sectors can yield benefits. For instance, improving fuel and combustion efficiency for the purpose of decreasing greenhouse gas emissions requires actions which may generate co-benefits in the health sector if they succeed in curbing air pollution and thereby ameliorate its health-related consequences and reduce the demand for health services. Air pollution is a classic example where public policy is required to enable environmental and health risks to be reduced at the same time.[5] In a significant number of countries, mostly in sub-Saharan Africa, more than 95 per cent of the population uses solid fuels for cooking (Forouzanfar and others, 2015). Poor households, women and children in particular are exposed to indoor air pollution (Smith and others, 2014; World Health Organization, 2014). Relatively simple yet extremely efficient measures, such as using improved cook stoves in households, could have averted many of the 2.9 million deaths that occurred in 2013 as a result of indoor air pollution, while decreasing greenhouse gas and pollutant emissions. Several initiatives are already in place, including the ambitious pledge by the Global Alliance for Clean Cookstoves (a public-private partnership hosted by the UN Foundation) to foster the adoption of clean cook stoves and fuels in 100 million households by 2020.

A need for coherent policies to prevent maladaptation

Maladaptation may arise from short-term solutions or narrow adaptation policies which end up increasing vulnerability or inflicting further environmental damage in the longer term

A sectoral adaptation policy will generally address unidimensional issues, such as vulnerability arising from a specific source. Such a policy would not be designed for integration and coordination with sectoral adaptation policies addressing other sources of vulnerability. Maladaptation (entailing further environmental deterioration, increased vulnerability or decreased welfare) may arise owing to inconsistency among these sectoral adaptation policies, or among short-term solutions and long-term adaptation needs. Maladaptation may then result in greater vulnerability in the future or in negative effects on other communities or sectors. An integrated policy approach, in contrast, possesses the advantage of taking into consideration different priorities and various sources of information, which are crucial in the policymaking process, in order to prevent maladaptation.

The case of the Morogoro region of the United Republic of Tanzania is often invoked to illustrate the maladaptation that may arise from local adaptation strategies (Paavola, 2008). As discussed above, livelihood diversification in agriculture-based economies that incorporates non-farm income activities is considered an effective adaptation strategy. Many

5 Indoor air pollution arises from exposure to particulate matter (comprising small solid particles containing sulphur and other toxic elements mixed with liquid droplets), which is released into the air through the burning of solid fuels (such as wood, dung, crop wastes, charcoal and coal) for cooking, heating, illumination and waste management, and by power plants, industrial manufacturing and vehicle exhaust.

farmers in Morogoro, however, have tapped to a greater extent into natural resources for subsistence and alternative income through, for example, their increased access to mining and development of new artisanal activities. While these strategies have helped them respond to short-term needs, in the long term they pose a number of new challenges arising from natural resources degradation, in particular deforestation and land cover change, which has negative consequences for the condition of land and water. This environmental degradation will likely hamper adaptive capacity in the long term.

At the same time, efficiency in the use of natural resources can also lead to maladaptation. Governments tend to create incentives for farmers to conserve water use through access to more efficient irrigations options. However, irrigation that is more efficient can prompt farmers to use more water through their expansion of the size of the cropland to be irrigated. In some cases, greater efficiency results in greater total water use (Food and Agriculture Organization of the United Nations, 2015a, chap. 3). In another typical example of maladaptation, which occurs more often in richer countries, policies to protect the population from heat waves and avert excessive demand on urgent health services result in greater use of private air conditioning and consequently a greater demand for energy (O'Brien and others, 2012). This type of adaptation initiative is in fact a form of maladaptation, since it shifts the pressure from one sector to another. The overall vulnerability of the system is not reduced: instead, one source of vulnerability is simply replaced by another.

The existence of some trade-offs notwithstanding, an integrated policy approach should be able to implement compensation mechanisms for dealing with the negative effects of specific policies

An integrated approach can avert some of these unintended consequences. In coastal areas, the challenge often exists of preventing the destruction of sand dunes owing to the construction of tourism facilities close to the water. The degradation of sand dunes not only alters the coastal ecosystem but, in the long run, also increases those facilities' exposure to storms and water rise (Magnan, 2014). This situation entails a typical trade-off between economic development and environmental challenges. Ideally, an integrated approach would attenuate the impact of the trade-off by limiting habitat degradation and consequently the collateral effect on assets in terms of their exposure to climate-related hazards. Such an approach may not completely eliminate the trade-off, but, by taking into account the negative effects, it can put in place compensation mechanisms, such as for protecting marine ecosystems so as to allow them to maintain their natural resilience and adaptive capacities, and then ensuring that their buffering function against waves is maintained (ibid.).

Overcoming constraints on integration

Policy integration, in practice, remains an immense challenge

Designing and implementing an integrated approach is not an easy task owing to the complex nature of the policymaking process and the divergent priorities of stakeholders. Notwithstanding the fact that an integrated policy process can benefit greatly from the recognition of diverse interests, circumstances, sociocultural contexts and expectations, in practice integration remains an immense challenge (IPCC, 2014d). The effective integration of policies and agendas entails addressing the following concrete difficulties:

- Complexity of the problems and the options
- Uncertainties regarding policy impacts
- Existence of institutions with specific mandates
- Difficulties created by short-term funding cycles

Adaptation initiatives must be sensitive to social characteristics and cultural values at the local level

Adaptation initiatives must be sensitive to social characteristics and cultural values at the local level. While improvement of women's livelihoods, for example, is undeniably a necessary condition for inclusive and sustainable development, such an initiative sometimes clashes with social norms and cultural values. In some communities in India, for example, participation of women in the labour force has decreased, in spite of rapid economic growth in recent years. Multiple factors explain this decline. In some areas, there are social constraints deeply rooted in local culture that determine what constitute "suitable jobs for women" based on which, women are allowed to work outside the home only under certain conditions (Chatterjee, Murgai and Rama, 2015; 2016). Even when laws are in place to ensure equal rights in labour markets for women and men, cultural barriers prevent women from exercising their rights (Barry, 2016). For communities that are exposed to climate and economic hazards, lack of work opportunities for women further increases existing vulnerabilities. Thus, to ensure that the desired outcomes are achieved, policies designed to build climate change resilience, including through economic empowerment of women, must be sensitive to the cultural context (Le Masson and others, 2016).

Policy integration and coherence require complex coordination processes across different sectoral priorities and stakeholder interests. Disregarding these complexities for the sake of a cross-sectoral ideal bespeaks an overly simplistic perspective. In a recent study of the European experience, it was found that "comprehensive policy integration cannot be achieved through a single multisectoral strategy" (Nordbeck and Steurer, 2015). Through an examination of how each of the countries that are members of the European Union put into practice its sustainable development agenda, the study identified at least two common problems. First, the strategies emphasized a breadth of topics and sectors rather than priorities. This allowed policymakers in each area of government (or sector) to focus on those dimensions that interested them to the detriment both of other dimensions and of overall coordination. Second, the call for a balanced approach across the three dimensions of sustainable development was often undermined by the fact that economic and social priorities prevailed over environmental concerns.

Effective strategies for achieving policy integration require a shared vision of development with clearly defined sectoral action plans focused on well-defined priorities

Policy integration requires multisectoral governance arrangements for developing a shared vision and overarching priorities; but as each stakeholder has its own mandates, specific priorities and funding, political dialogue and negotiation are required for policy coordination. The lesson in this regard is that effective strategies for policy integration require clearly defined sectoral action plans which focus on well-defined priorities. More importantly, the challenge lies in building synergies across other sectoral strategies: political dialogue and negotiation are indispensable in cases where conflicting objectives are identified. In their review of the European experience, Nordbeck and Steurer found that "better policies usually emerge from conflicts between specialists advocating competing solutions, not from a vague consensus" (p. 14). Nonetheless, the coordinating agency has an important role to play in ensuring that all relevant actors are integrated in the policy process and in fostering synergies with their own sectoral needs.

In short, effective policy integration must sustain a balance between a vision that is holistic and coherent and existing sectoral and local contexts, including political and cultural considerations. The opportunities to strengthen policy integration must be explored through ex ante assessments which take into account the specific mandates of sectoral ministries and institutions as well as the local context within which policies are to be implemented. The institutions involved in coordinating multisectoral programmes confront the challenge of building synergies among sectoral mandates, each operating within the framework of its own financial resources, political power structures and implementation mechanisms.

Involving all stakeholders in identifying risks and implementing solutions

Building climate change resilience requires policymaking based on the participation of all relevant stakeholders, including local experts and existing social networks

The importance of consultation and participation in policy decision-making has long been acknowledged. Yet, even if respectfully accommodating diverse perspectives is not an easy task, it is indispensable for building climate resilience. That people's opinions and interests differ and often clash is the result of a multiplicity of factors, including differences related to wealth and educational and cultural backgrounds. Very often, public institutions lack the experience and capacity that they need to be able to interact with the local communities. In most countries, the functioning of institutional mechanisms established to provide broad access to information and enable public engagement is less than optimal; and the resources needed to facilitate engagement in costly and time-consuming consultative processes are often lacking.

To the extent that the impacts of climate hazards are largely local, stakeholder engagement is critical both in identifying the challenges of adaptation vis-à-vis the needs of communities and in formulating alternative solutions that are relevant to the community and effective in building resilience. However, to be effective, stakeholder engagement must meet three criteria: (i) it must include the participation of all relevant stakeholders on an equitable basis; (ii) it must encompass a process open to incorporating local knowledge so as to improve the identification of problems and alternative policy options and (iii) it must engage communities' existing social networks in order to improve project implementation.

Why involve all stakeholders?

Processes characterized by an imbalance in the representation of stakeholders reinforce inequalities and may result in the adoption of inefficient and ineffective policies

The complexity of the process of building climate resilience with a focus on reducing vulnerability and structural inequalities demands the participation of all relevant stakeholders. Imbalances in representation in policymaking may prevent the identification of and attention to critical problems and may potentially have dire consequences, since those who could have identified those problems and offered suggestions on how to resolve them were not present. Even if problems have been identified correctly, the solutions chosen may have unintended consequences for the groups that did not participate in the consultations and negotiations. Also, owing to the lack of a diversity of viewpoints, analyses may be constrained and the range of solutions less inventive. Lastly, the solutions may turn out to be — or may be perceived as being — non-representative of the very community whose problems they have been chosen to address, or they may not be adopted owing to their irrelevance and/or the lack of consensus, or, if adopted, they may ultimately turn out to be ineffective. Involvement of all stakeholders is essential to improving the outcomes at each stage of the policymaking process. And, within the context of climate change, it is critical that negative trade-offs, unintended consequences and maladaptation be avoided.

As noted in chapter II, inequality in political participation and representation in policy decision-making is a key determinant of vulnerability and exposure to climate hazards. Regrettably, those most vulnerable to climate hazards are often excluded from policy discussions or are inadequately represented. This is an issue well recognized in the Rio Declaration on Environment and Development, which includes a provision on guaranteeing citizens' rights to information, participation and environmental justice (principle 10) (see box IV.1). Under the 2030 Agenda for Sustainable Development (United Nations (1993),

the importance of ensuring full and effective participation and equal opportunities for leadership at all levels of decision-making in political, economic and public life for those traditionally excluded is reiterated.[6] There exist well-known instruments designed to make such participation part of policy practice. In the context of climate change, new tools for engaging stakeholders in the design of climate impact assessments and consideration of policy options are emerging, including at the local level as discussed in chapter III.

Box IV.1

Access to information, participation and justice in environmental matters: key instruments in ensuring equality in adaptation and resilience-building strategies

Adopted on 14 June 1992 by the United Nations Conference on Environment and Development, the Rio Declaration on Environment and Development,[a] comprising 27 principles, laid the foundations for national and international efforts towards achieving sustainable development. According to principle 10:

> *Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.*

The three provisions under principle 10 — access to information, participation in decision-making processes, and access to justice in environmental matters, also referred to as "access rights" — serve as key instruments. They ensure both that the environmental problems affecting disadvantaged groups and vulnerable communities are adequately addressed and that policy decisions, either on environmental issues or as affecting the environment, take into consideration the needs of those groups. In so doing, those provisions also serve as key instruments in ensuring that climate change adaptation and resilience-building strategies (as well as mitigation measures) promote equality.

Access rights, as defined above, are enshrined in the legislation in many countries, both developed and developing. Yet, even in countries that have enacted such legislation, challenges to implementation remain. International agreements and cooperation are important means of supporting implementation. Through the Economic Commission for Europe Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention),[b] which was adopted on 25 June 1998 and entered into force on 30 October 2001, countries have been engaged in ensuring that access rights become effective. In Latin America and the Caribbean, a regional instrument whose aim is to ensure the full implementation of access rights and to promote international cooperation in that regard, is currently under negotiation, with the support of the Economic Commission for Latin America and the Caribbean. Further, at the eleventh special session of the United Nations Environment Programme (UNEP) Governing Council/Global Ministerial Environment Forum, held in Bali, Indonesia, from 24 to 26 February 2010, the Governing Council of UNEP adopted the Guidelines for the Development of National Legislation on Access to Information, Public Participation and Access to Justice in Environmental Matters (Bali Guidelines).[c]

a *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-24 June 1992, vol. I, Resolutions Adopted by the Conference* (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex I.

b United Nations, *Treaty Series*, vol. 2161, No. 37770.

c *Official Records of the General Assembly, Sixty-fifth Session, Supplement No. 25* (A/65/25), annex I, decision SS.XI/5 A, annex.

7 Several targets under the Sustainable Development Goals refer directly to the importance of expanding participation and political representation of groups traditionally excluded. This is also amply recognized in the preamble and principles of the 2030 Agenda.

Adaptation requires the mobilization of collective action in many different areas to implement integrated and coherent initiatives which are efficient, sustainable and equitable; and as building climate resilience is an objective most likely to be in competition with other priorities, early recognition of diverse interests, sociocultural contexts and expectations will facilitate effective policy decision-making processes. Governments, which have a unique capacity to convene all relevant stakeholders from the private sector, civil society and the scientific community, have an important role to play in facilitating consultations with, interactions among and the participation of those stakeholders so as to enhance reciprocal trust. Governments also have an important role to play in ensuring the balanced representation needed to facilitate equitable and inclusive processes and outcomes.[7]

Ensuring equitable participation

Building climate resilience is a particularly complex endeavour and defies any simple solution. As highlighted above, actions in multiple sectors (including energy, health, agriculture, transportation and technology, among many others) and at different levels of governance are therefore required to provide coordinated and coherent policy support. An additional layer of complexity is imposed by the fact that the negative impact of climate hazards is usually localized. Further, improving coordination and policy coherence between national and local governments is particularly important in this regard.

Both national and local governments have a role to play in ensuring equitable participation of all stakeholders in building climate change resilience

National Governments have a role to play in creating the policy space — involving legal frameworks, information and financial resources — required to strengthen policy decision-making and policy implementation among local governments, which are closer to communities and have a better understanding of risks and local needs. Coordination across sectors for coherent programme/project implementation is also made easier at the local level, where there is closer interaction across sectors and among stakeholders.

However, the legitimacy of actions frequently depends on the capacity of local governments to engage all stakeholders in the process. Vulnerabilities are usually more visible at the local level, where structural inequalities such as differences in social status and political power, among others, critically shape them. Giving voice and agency to those who are otherwise invisible to the process would serve to address vulnerabilities and inequalities at their source and create the conditions for building consensus and mobilizing collective actions towards resilient development.

The occurrence of climate hazards usually exposes deep inequalities in political participation, representation and decision-making

Many factors — including economic status, political voice, religion, culture, tradition and disability — have the potential to limit the participation of individuals and groups in the process. In many cases, those with greater experience in decision-making processes and greater social and political capital may dominate those processes. The case of Hurricane Katrina, referred to in chapter II, provides a good example in this regard. It has been argued that the Industrial Canal, bounding the Lower Ninth Ward to the west, which failed and flooded the city of New Orleans, was constructed in that area partly owing to the limited political power of its residents. During the recovery period, those same residents had less access to the political resources needed to draw attention to their specific needs. Even when the key groups are included, interests and priorities may be irreconcilable, with outcomes

7 Chap. V of *Report on the World Social Situation 2016* (United Nations, forthcoming) elaborates on the policy areas that are relevant for equitable and inclusive societies.

often reflecting an imbalance in political resources and power (Few, Brown and Tompkins, 2007).

Thus, without participation of *all* stakeholders, there is the risk that existing inequalities will remain, owing to the differentials in political influence of various groups of people. In this regard, public institutions have a major role to play in strengthening the capacity of key local stakeholders to deliberate and engage in the decision-making processes. Achieving this in practice requires identification of key local stakeholders at the beginning of the policy cycle or of any given project.

Participatory budgeting in the allocation of climate funds can help reduce fund mismanagement while also reducing inequalities

Involving local communities in the management of funds, including those for climate adaptation projects, could be a means of improving transparency in the use of those funds, especially in areas, such as forestry and water resources management, where there is a particular proneness to misuse of public resources. The implementation of participatory budgeting programmes is a potentially effective mechanism in this regard, through which ordinary citizens become involved in budget meetings with local government officials and have the opportunity to vote on how the budget (or, as is usually the case, part of it) will be spent. In Brazil, for example, where participatory budgeting was first adopted (in 1989), municipalities utilizing such programmes appear to manage their public finances with a significantly greater effectiveness than those where the programmes have not been implemented (Petherick, 2014). Concerned experts might wish to keep decision-making power out of the hands of local stakeholders in cases where more complex matters such as climate adaptation need to be confronted, not recognizing that local stakeholders can provide different but complementary forms of expertise (ibid.). While local buy-in and ownership do contribute to successful project implementation, participatory budgeting is sometimes not sufficient to deter corruption, as vulnerable groups may become victims of elite capture or bribing. Therefore, a participatory accountability framework must be implemented alongside participatory decision-making.

Taking advantage of local knowledge

Incorporating the voice of people in their local context contributes to an increase in policy effectiveness and a decrease in inequalities

Because the most intense and direct effects of climate events are experienced at the local level, scoping (or identifying) objectives and risks can benefit tremendously from the knowledge accumulated by local communities. There is an obvious role for this knowledge in tailoring interventions to the local context and conditions; for example, local knowledge can inform technical assessments of adaptation options while those assessments can inform local communities on how to better deal with climate change (see chap. III). As stated in the Sendai Framework for Disaster Risk Reduction 2015–2030:[8] "Indigenous peoples, through their experience and traditional knowledge, provide an important contribution to the development and implementation of plans and mechanisms, including for early warning" (para. 36 (a) (v)). Furthermore, local experience and knowledge may help reduce inequalities, as they can provide particular insights regarding the causes of vulnerability and exposure as well as insights applicable in the search for solutions. Tapping into local knowledge has brought significant benefits in terms of climate resilience to the citizens of the city of Gorakphur in India, where communities are constantly challenged by floods, heat waves, storms and other climate-related shocks (see box IV.2).

8 General Assembly resolution 69/283, annex II.

Box IV.2

Building resilience of local communities in the city of Gorakhpur, India

Hydro-meteorological disasters have been a part of life in the city of Gorakhpur in northern India, where the population has had to cope with constant floods, heat waves, storms and other shocks. In response, the city embarked on a resilience-building project which integrates climate vulnerability assessments and micro planning and implementation. It was designed, implemented and monitored using a community-led bottom-up approach which began with the identification of climate vulnerabilities. Some key lessons have been derived from that experience.

The project defined resilience as a desired characteristic of a system (economic, political, infrastructure, ecological, social and institutional) that includes multiple activities, interactions and relationships. The focus of the interventions was on local communities that were well positioned to participate in the process. Engagement was driven by four main principles:

- Engagement of local communities and individuals is key to the formulation of a realistic and effective resilience plan
- The resilience plan should be based on practical experiences gained through pilot programmes
- A facilitator (or "champion") is required to lead the process
- The process needs to be flexible and to evolve, since building resilience is a dynamic process

The project found that the administrative systems in the ward were ill suited to providing basic services and sustaining the residents' quality of life. To redress this, the project started by defining the baseline conditions in the ward and then assessed vulnerabilities to climate hazards using the local knowledge provided by the community and its own perceptions regarding the relevance of development interventions.

The community was instrumental in generating an understanding of local climate threshold risks derived from historical events. These were compared with climate projections to estimate how often those thresholds would be reached in the future. Progress on resilience was monitored using indicators created to track the performance of the system, actors and institutions, which facilitated fulfilment of one of the most important requirements under this model: continuous review of the implementation of interventions to ensure that they contributed to producing the expected results. This kind of process of iteration helps to identify problems as they arise and to ensure the incorporation of new information so as to improve project implementation, which is particularly important as new information on climate impacts is continuously evolving.

This project illustrates the usefulness and applicability of a bottom-up approach and offers a template for identifying key elements and their nuances which are important for local implementation of resilience interventions by focusing on local communities in planning, implementation and monitoring. Such an example also sets out a clear-cut path towards integration of disaster risk, climate change adaptation and implementation of sustainable development agendas in such a way as to reduce inequalities and build climate-resilient livelihoods.

Source: Gorakhpur Environmental Action Group (2014).

Understanding local impacts and contexts also helps to eliminate actions that may lead to maladaptation. In Sri Lanka, for example, while the introduction of high-yielding hybrid varieties of rice seeds had initially had a beneficial effect on yields, support for their use led to an undermining of the ability of farmers to adapt to changing conditions.

Indigenous knowledge of the almost 2,000 existing traditional varieties was eroded and the operation of local seed banks undermined. Further, to the detriment of the livelihood of small farmers in Sri Lanka, those new, fertilizer-dependent seeds proved less able to cope with the increasing water salinity in the region caused by higher temperatures, the rise of sea level and the failure of irrigation systems (Weragoda, Ensor and Berger, 2009, chap. 5).

Maladaptation can best be avoided through constructive and transparent engagement with the local community

Studies have shown that choice of type of adaptation and its implementation are facilitated when there is constructive and transparent engagement with the communities at risk (Nurse and others, 2014). Such engagement can help prevent the outcomes described above. A study of Fiji's tourism sector concluded that "approaches that explicitly integrate stakeholders into each step of the process from vulnerability assessment right through to consideration of alternative measures can provide a sound basis for assisting…the implementation of appropriate adaptation interventions" (Moreno and Becken, 2009). The study also concluded that stakeholder participation can better incorporate people's priorities and expectations when there are multiple adaptation options available.

Taking advantage of local social networks

Policy implementation benefits from tapping into existing social structures to enable dissemination of information and monitoring of results

Policy implementation benefits largely from closer interaction between public implementing agencies and local communities. The effort to engage communities at the stage of policy implementation will benefit from the presence of existing social networks which can be effectively mobilized to disseminate information, for example, health messages (Frumkin and McMichael, 2008) and to improve monitoring of results. Sharing of information derived from climate impact assessments can be a means of influencing action and strengthening systemic resilience (see chap. III).

In the context of food security, such fruitful interaction is exemplified by the Southern Agricultural Growth Corridor of the United Republic of Tanzania (SAGCOT). The Growth Corridor integrates several stakeholders — the private sector, government and civil society — within a common platform in order to achieve the multiple objectives of increasing agricultural productivity, improving food security and protecting local livelihoods and ecosystems (United Nations, 2013, p. 100). The participation of all relevant stakeholders, including at the local level, has helped to improve the use not only of natural resources but of the ecosystem as a whole. This is considered an important determinant of the sustainability of the entire agricultural and food system.

Timely information and support for mobilizing communities are also important. In the city of Manizales in Colombia, for instance, national and regional authorities worked together with local communities and leaders to discourage settlements on slopes characterized by instability, which posed a threaten to people's lives and livelihoods. A public awareness campaign provided information on the risks of living in areas deemed dangerous, and a scheme was put in place for those willing to relocate. In addition, women in the community received training, involving the participation of local institutions including the municipal government, academic institutions, technical specialists and non-governmental organizations, on how to stabilize slopes in their respective locations. Further, a local committee representing all actors was called upon to review the new plans for urban relocation (Arup, 2014).

The need for an iterative and flexible policy process to cope with uncertainties

Flexibility and adaptability of policy processes are fundamental to building climate-resilient development

Achieving climate-resilient development, under scenarios of climate uncertainty and taking into account the complexities of policy implementation, requires policy processes that are flexible and adaptable. Moreover, addressing the structural inequalities that perpetuate social exclusion and vulnerability requires integrated and coherent policies which are consistent over time. Policymakers increasingly recognize this challenge and the need to focus on immediate and near-future decisions that have longer-term impacts, while maintaining the flexibility needed to adjust to changing conditions and information.

Uncertainty

The uncertainty of climate and weather predictions and the complex interaction between environment and socioeconomic conditions have implications for policymakers

Determinations of the magnitude of the impacts of climate change are being constantly revised as new climate projections and impact assessments are generated and new information becomes available through improvement in environment statistics and those data provided, albeit more limitedly, by local stakeholders. A recent report on the melting of the West Antarctic ice sheet, for example, found that sea levels will possibly have risen by as much as three feet by the end of the century, with severe implications for the world's coastal cities (Gillis, 2016). This new estimate of the speed of sea-level rise yields roughly twice the increase expected under the plausible worst-case scenario produced by IPCC in 2013 (Church and others, 2013). Rapid improvements in climate technologies is facilitating new assessments, better environment statistics and more information, although important gaps do remain (see chaps. III and V).

Owing to the nature of the problem, climate and weather predictions, despite continuous improvements, are characterized by large margins of uncertainty (National Academies of Sciences, Engineering, and Medicine, 2016). At the same time, long-term trends in inequality, population growth, urbanization, economic globalization, technological change and other socioeconomic processes will exert profound impacts on the changing climate which are difficult to envisage (see chap. I). In addition, future climate trends will depend on national and international actions aimed at mitigation over the next few decades.

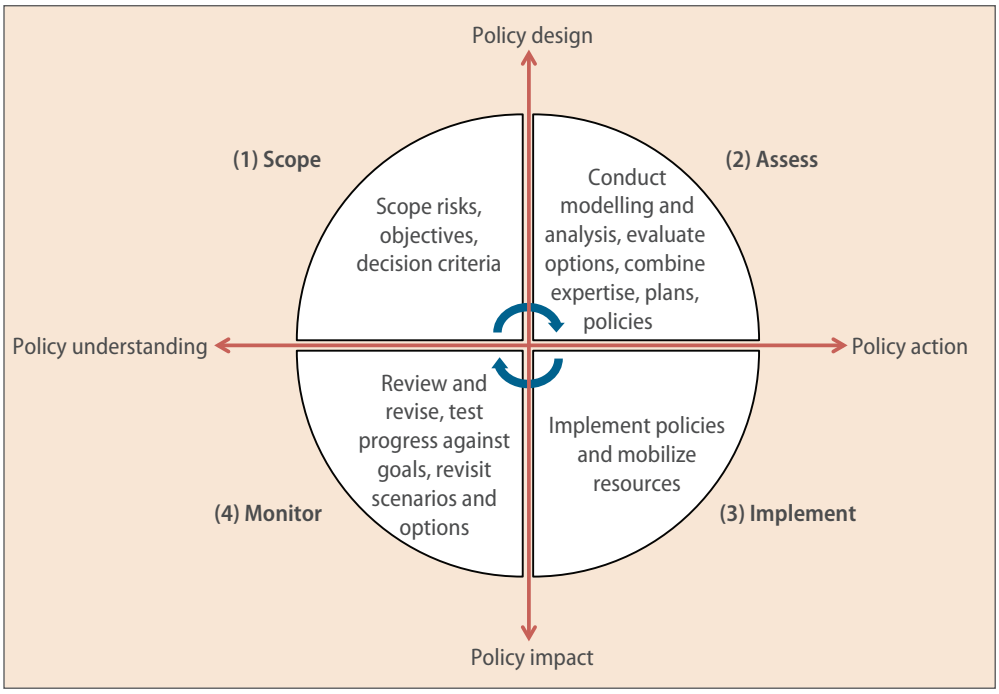
Policymakers require information on the local impact of larger trends

All of these uncertainties have profound implications for policymaking. The uncertainty associated with forecasting long-term climate trends and their effect on weather patterns is complicated by the need to be geographically precise, since the effects of climate hazards are felt at the local level. Policymakers need information not only on global and regional climate trends, but also on their expected effect on local weather and local communities. The uncertainty of climate trends and the need to incorporate the new information that is becoming available demand that policymaking be responsive and relevant to the needs of people through short-term actions which are coherent with longer-term sustainable development objectives and actions.

Implementation requires proper monitoring and assessment

The multiple actions required to achieve adaptation should be viewed as steps on an evolving pathway along which implementation is properly monitored and repeatedly assessed and revised (Reisinger and others, 2014) to enable the incorporation of new information and changing priorities (Davoudi, Brooks and Mehmood, 2013). Incorporating uncertainty within policy action day by day through iterative and adaptive policy processes helps to reduce the risks of lock-in solutions and path dependency. Those processes also enable

Figure IV.1
The four stages of the decision-making process



Source: UN/DESA, adapted from Jones and others (2014), fig. 2-3.

policymakers to benefit from flexibility and risk diversification and to adopt a portfolio approach encompassing complementary policy options.

An iterative policy process

A decision-making process comprises a series of activities, starting from policy design, followed by implementation, monitoring and evaluation of impacts. Sometimes referred to as iterative risk management, the process can be divided into four stages, as illustrated in figure IV.1. Each quadrant represents one of the steps of the policy cycle, which encompasses formulation of objectives and assessment of risks, assessments of the effect of policy options-related decisions on the course of action, policy implementation, and monitoring and review of outcomes. At each stage, progress can be measured in terms of the quantity and quality of outcomes along each of the four axes: policy design, policy action, policy impact and policy understanding.

Improving outcomes requires a process of continuous evaluation and learning

Acquisition of learning at the various stages of the decision-making process and review of results are important for tracking progress and improving outcomes. Lessons learned from practical experiences and from pilot programmes need to be reinvested in the decision-making process. Within the context of hazards caused by climate change and the need for resilient sustainable development, flexibility must be a key characteristic of the policymaking process if it is to be useful in situations characterized by persistent uncertainties, long time frames, emergence of new information, and the multidimensionality of the problem. Maintaining both flexibility through the various stages of the policy process and the capacity to change and iterate towards improved outcomes is crucial to ensuring that policy interventions are properly informed by the knowledge gained in the process.

Flexibility and adaptability constitute an integral component of continuous improvement

Flexibility and adaptability underpin the ability to incorporate lessons derived at each step of the policymaking process. They are integral contributors to the continuous process of improving existing policy frameworks (Watkiss, 2015). The capacity to change as new knowledge and information are gathered is important for delivering on the multiple objectives of effective climate change adaptation (Arup, 2014).

The static picture of the decision-making process as presented in figure IV.1 belies the fact that underlying the structure are dynamic forces in constant change. If, for example, as circumstances change, intended outcomes are not achieved or if unintended consequences are identified, a flexible policymaking system will have the capacity to adjust the scope, the implementation modalities, or the expected outcomes when necessary. This iteration is strengthened by the participation of stakeholders, which begins with the identification of policy objectives and the scoping of options and continues with contributions to the design of policy interventions and follow-up of implementation. It is important that, throughout the process, the scope and assumptions of the project be revisited based on experience (Jones and others, 2014).

An iterative policy cycle is one in constant evolution

Building on the illustration of the policy cycle in figure IV.1, figure IV.2 presents the circuitry encompassing policy design, assessments, implementation, monitoring and evaluation as constituting a dynamic system. An ideal iterative policy cycle is one in constant evolution, adjusting to new information and learning throughout the process. A flexible policymaking process will have the capacity to iterate best possible outcomes when it is sensitive to the context, involves all stakeholders, leverages expert and local knowledge, and establishes clear pathway connecting knowledge-generation, decision-making and action.

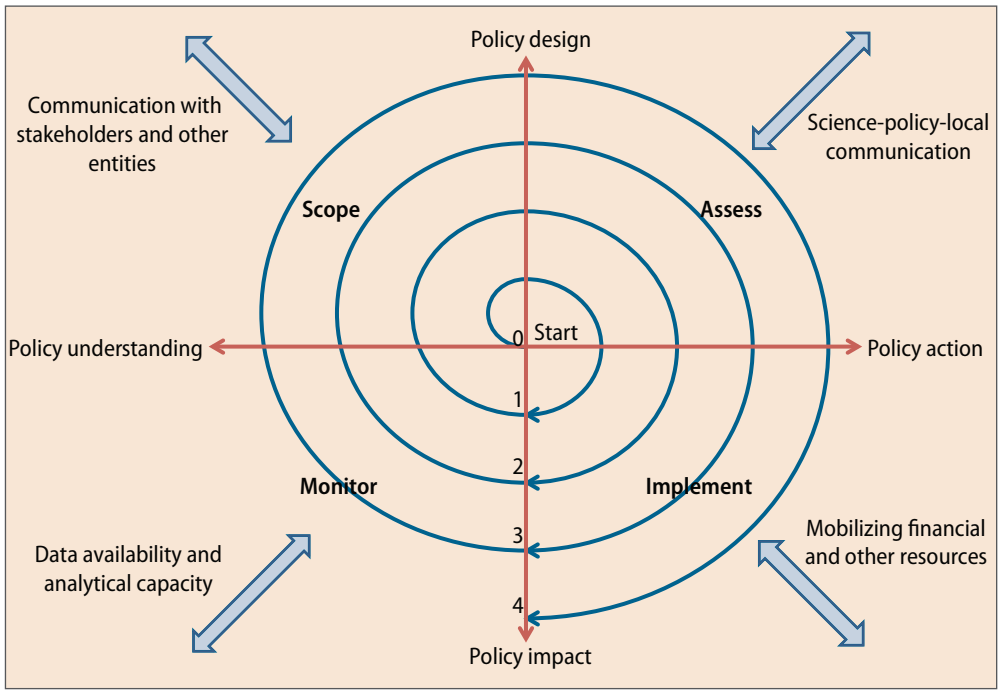
Active participation of stakeholders is important in all stages of the policy cycle

At each stage, leveraging other resources and benefiting from the participation of stakeholders also play a role. For example, during the stage of design of policy options, the process will be well served by the decision to involve stakeholders, representing many different organizations, communities and government agencies, which can present their priorities and concerns (see the sect. on participation). When assessing policy options, policymakers may benefit from the interactions of members of academia and experts in the area of quantitative modelling, as well as from local knowledge and experiences (see chap. III). When implementing policies, there is a need to mobilize the resources that will impact outcomes. When policy outcomes are being monitored, participation of multiple stakeholders will improve transparency and accountability. As the process benefits from more information and from greater participation, a virtuous cycle should lead to successive improvements in development outcomes, including strengthened accountability and improved governance (represented by the movement along the red arrows away from the origin in figure IV.2). Some of the key characteristics of such an iterative policy process aimed towards achieving adaptation and climate resilience are better understood using specific examples, as shown below.

Iterative improvement in practice: three examples

The three examples provided below highlight the practical advantages derived from incorporating an iterative process of learning as part of the policy decision-making process. The Sustainable Water Management Improves Tomorrow's Cities' Health (SWITCH) project in Lima was designed was designed to enable continuous learning from local experience and from the experience of stakeholders, and to build on small-scale experiments. In Chicago, the city's Climate Action Plan recognizes the uncertain nature of the challenge and is expected to evolve as new information from assessments and changing priorities comes to light. In London, plans to deal with sea-level rise include contingent actions which are

Figure IV.2
The iterative decision-making process



Source: UN/DESA.
Note: : The four quadrants correspond to the four steps of the policy cycle: scoping, assessment, implementation and monitoring. The directed spiral (with arrows), whose origin is the point of intersection of the x- and y-axes, represents an ideal policy path. The movement along any one of the red arrows, representing design, action, impact and understanding, further away from the origin signifies some type of qualitative or quantitative increase in one of the four dimensions of the process.

activated based on different forecasts of sea-level rise. All three initiatives exemplify clear-cut approaches to avoidance of path dependence, constant re-evaluation of information and redesign of policy interventions so as to improve outcomes.

Sustainable water management in Lima[9]

Building connections among all stakeholders and decision makers to facilitate knowledge-sharing can have profound impacts

The aim of the SWITCH action research project was to catalyse change directed towards more sustainable urban water management in the "city of the future". Under the programme, research was conducted and pilot projects were implemented which demonstrated the importance of learning from experiences and from stakeholder dialogue and knowledge exchange. The objective of SWITCH was to develop new solutions with regard to increasing the efficiency of urban water systems and their resilience to a range of future climate change scenarios. The project's approach was one of strengthening the connections between experts and stakeholders, and decision makers, so as to facilitate knowledge-sharing. The project's major outcome was the development of the SWITCH approach, encompassing the following four key features:

- Creation of a strategic planning process which encourages all city stakeholders to view the city's water cycle as an integrated system, so as to promote integrated and coherent solutions for water management
- Building on pilot experiences that are designed for upscaling
- Creation of learning alliance platforms which involve all relevant stakeholders during the process of research, design and implementation of activities

9 Based on information published on the project's website (www.switchurbanwater.eu), and Arup (2014).

- Development of a training toolkit in partnership with members of the learning alliance platform

In Lima, the SWITCH project aimed at transforming a region where annual rainfall is scarce into one of green sustainable areas through the development of innovative approaches to the reuse of wastewater. The SWITCH project built on the lessons derived from previous efforts to reuse treated wastewater for urban agriculture and city greening. One major barrier to the reuse of treated water, however, is the lack of a proper institutional setting and relevant legislation.

The SWITCH project was able to identify means of surmounting those barriers by involving national and local authorities, ranging from the water authority in national ministries to local governments and non-governmental organizations. The focus of the contributions of the learning alliances ranged from national policy issues related to water treatment to local issues derived from the lessons learned during the pilot projects. The project was able to present ways of reusing treated wastewater effectively for irrigation of green areas and meeting the needs of the local population. This experience led to the development of national policy guidelines on the safe reuse of wastewater, increased public awareness on water recycling and created incentives for the development of new financial mechanisms for promoting small-scale wastewater treatment initiatives.

The SWITCH approach enabled the project to learn from local knowledge and to leverage that knowledge in the identification, development and implementation of relevant solutions. The project has also provided new projects with a template for improving governance and financial management structures, identifying new uses for water and incorporating natural systems in water treatment cycles.

Chicago Climate Action Plan

Long-term plans which recognize the uncertain nature of the challenge can adjust more easily to changing information and priorities

The Chicago Climate Action Plan is another example of an approach that embraces the uncertainty and risks of climate change by building flexibility into decision-making processes. Based on existing future scenarios, the Plan aims at adapting to future conditions instead of trying to build resilience on the basis of the status quo (City of Chicago, 2016). More importantly, the Plan acknowledges the inherent uncertainty associated with forecasting tools. It uses projections and scenarios of climate change and its likely effects on the city to propose specific actions under five main rubrics: energy-efficient buildings, clean and renewable energy sources, improved transportation options, reduced waste and industrial pollution, and adaptation. In the case of adaptation, the Plan calls for achievement of nine specific goals, ranging from management of heat and improvement of cooling capacities to monitoring of air quality with the engagement of multiple stakeholders.

To prepare for the possibility of hotter summers and more intense heat waves, for example, the city has worked with other organizations to identify populations at risk and to update emergency response plans. In this regard, the Plan also calls for the introduction of new ideas and anticipates that new knowledge derived from research on how to eliminate *urban heat islands* will lead to new initiatives. The city uses satellite imagery to identify hotspots and targets for policy interventions and has also identified the link connecting heat, respiratory illnesses and smog. With regard to smog, the Climate Action Plan calls for lower emissions from power plants and the modes of transportation that cause it.

Chicago's Climate Action Plan is expected to evolve as new information emerges. Progress is continuously monitored against goals and the results of such monitoring will inform the possible changes to be made to goals, targets and indicators. Those responsible

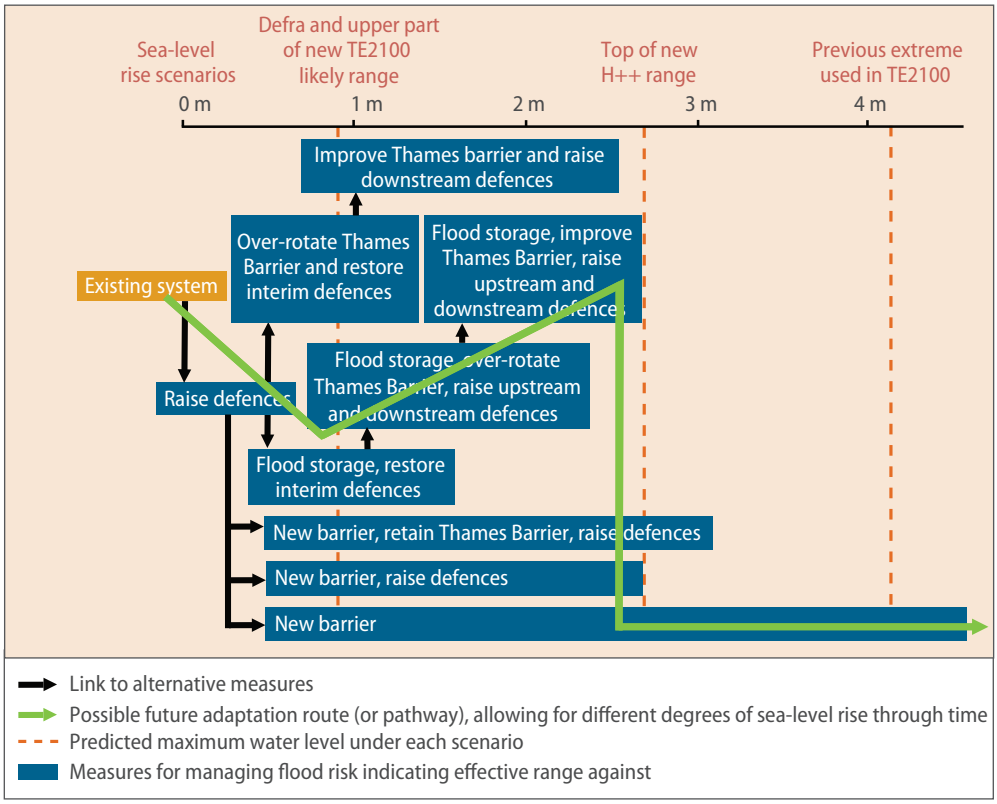
for the Plan are aware that strategies may become obsolete and that new technologies may be utilized to address expected future challenges. For this purpose, the city has created a Green Steering Committee whose function is to gather the information and acquire the knowledge needed to inform future policy actions. Introducing flexibility as an integral part of the Climate Action Plan helps policymakers avoid path dependence and will enable the cost of future adjustments in response to unexpected events and the emergence of new information to be lowered.

Thames Estuary protection plan (London)

Addressing contingencies under a range of scenarios helps build a fully adaptable system

The plan to protect London's Thames Estuary, a subject mentioned in chapter III, offers a more clear-cut example of an iterative and flexible adaptation policy designed to meet the uncertain long-term risks arising from climate change. The plan was developed by the United Kingdom Environment Agency as a means of addressing sea-level rise and the threat of flooding that it poses to London. Since engineering projects for protecting the city entail lead times for planning and construction that are measured in decades, the acceleration of sea-level rise presents a difficult policy challenge. The protection plan addresses this challenge through an iterative approach which builds incrementally upon the existing system, selectively raising defences and taking other measures to elevate the protection standards of the current system (see figure IV.3). If sea-level rise accelerates, the plan calls for measures that are more substantial in the longer term, including the construction of a

Figure IV.3
Adaptation measures and pathways in the Thames Estuary 2100 plan



Source: Wong and others (2014), box 5-1.
Note: Each measure is drawn according to the range of sea-level rise over which it is considered effective. The black arrows point to alternative measures which may be applied once a measure is no longer effective. The red dotted lines signify three sea-level scenarios used in the analysis. The green line signifies a possible adaptation pathway as the forecasts on sea-level rising change. Note that the recently revised forecast of sea-level rise (three feet) (Gillis, 2016) is within the likely range of 0.9 metres which is used in this analysis.

new barrier or a coastal barrage. The plan will be adjusted based on careful monitoring of the drivers of risk to obviate the need for emergency measures (Wong and others, 2014, box 5-1). It may be noted that the newly revised estimates of the speed of melting of the West Antarctic ice sheet highlighted above has implications for the options under the plan.

Low- or no-regret interventions

Policies under average-range scenarios are inefficient: they must confront the challenge of addressing underlying structural inequalities which define vulnerabilities, while also responding to the need for short-term actions

Policymaking aimed at building climate resilience entails a high level of complexity. This stems from the fact that incremental policies designed to address immediate needs must be consistent with longer-term investments and initiatives aimed at facilitating the more substantial transformative changes required to address the underlying determinants of poverty, marginalization and vulnerability to climate hazards. Policymakers are confronted with the challenge of delivering immediate responses to current risks and adaptation deficits while ensuring that short-term interventions are consistent with longer-term strategies for building resilience and sustainable development (see discussion in chap. II and table A-II.1). While some problems require long-term horizons for analysis and planning, others must be addressed within the framework of the present. In the absence of a flexible and comprehensive plan which lays out the strategic objectives and their internal consistency with more immediate interventions, there is a tendency to focus on the middle ground, or on intermediate solutions, which, as time elapses, prove to be either insufficient for addressing extreme shocks or inefficient, should the shock not materialize. At the same time, policy action must aim for transformative solutions, which address the underlying structural inequalities that perpetuate the vulnerabilities of certain groups. All these challenges must be tackled within a context of climate uncertainty, which poses its own particular problems with respect to the assessment of policy options: different climate scenarios may require different policy options. Making decisions under scenarios characterized by uncertainty may increase the risk of path dependence and under- or overinvestment, depending on whether or not the climate hazards actually materialize and if they do, on their characteristics.

Achieving a balanced solution which takes into account all of the above challenges is a difficult task, but not an impossible one. Proper timing and phasing of actions, including the separation of those requiring immediate attention from those that can be deferred or that cannot be pursued without additional information, is a first step towards incorporating uncertainties into the process of designing and implementing policy interventions (Watkiss, 2015; Wong and others, 2014). Giving priority to low- or no-regret interventions provides policymakers with the space required for responding to immediate needs without incurring the risk of maladaptation or of being faced with unintended consequences.

Low-regret interventions for decreasing vulnerability are a powerful development tool

Low- or no-regret interventions are those that can be justified from an economic, social or environmental perspective even if the climate hazard does not occur. The health sector provides a vast number of examples of low-regret actions, such as distributing mosquito nets, improving child nutrition, extending the coverage of health services, developing hygiene education campaigns, and improving water and sanitation facilities, among many others. Early warning systems constitute another example, as they grant authorities the flexibility to act pre-emptively and adjust civil security plans to the expected weather conditions, thereby reducing the number of lives at risk and/or the quantity of resources used. They include heat-wave early warning systems and early warning systems for vector- and food-borne infections, such as malaria and dengue, and (more recently)

Zika. Low-regret interventions reduce people's vulnerability, including to climate hazards, while contributing to the closure of development gaps that remain.

Final considerations

Addressing underlying structural inequalities is at the heart of the challenge of ensuring climate-resilient development

In order to ensure climate change-resilient livelihoods and advance towards achieving the goals set out in the 2030 Agenda for Sustainable Development, it is critical that public policy address the structural inequalities that perpetuate poverty and increase the vulnerability and exposure of people and communities to climate hazards. This could generate a virtuous cycle of lower vulnerabilities and exposure, better socioeconomic opportunities and outcomes, and a greater resilience of livelihoods to climate. The various facets of these objectives are well reflected in the Sustainable Development Goals, which constitute an important global framework for national policy decision-making. However, meeting the goals of sustainable development and climate resilience will require a systemic improvement in policymaking systems, particularly in those countries where population groups are most exposed and most vulnerable to climate hazards.

This chapter has provided a thoroughgoing description of the characteristics that policymaking systems need to possess if they are to be up to the task of building climate resilience while reducing inequalities. First, there is the need to integrate (or mainstream) adaptation objectives into longer-term development processes, with careful consideration given to the uncertainties inherent in forecasting under the climate change scenarios and the hazards created by a changing climate. Second, a participatory approach is fundamental to acquiring a better understanding of risks and vulnerability and the various priorities and interests of stakeholders, particularly at the local level. Direct engagement of local communities and stakeholders leads to a better identification of problems and an improved policy design in accordance with people's needs, and allows local problems to be addressed through local solutions, thereby increasing policy ownership and implementation. Third, in the context of a changing climate, policymakers must fully embed uncertainty into their long-term plans, using iterative and adaptive processes. This requires a more flexible policy process, capable of incorporating lessons derived from each step of the process, for improved outcomes.

To have a better chance of succeeding, policy processes must be integrated, participatory and flexible

A policy process that meets these three core criteria should be able to help address underlying inequalities through identification of vulnerable populations, particular intersecting vulnerabilities and relevant actions. However, as mentioned above, there are deeper underlying reasons why vulnerable groups are disproportionately at risk from climate hazards, which must not be left unexamined. Building greater resilience for long-term sustainable development requires addressing those underlying factors through transformative policies capable of closing the remaining development gaps which leave people exposed and vulnerable to shocks. This will benefit from a more flexible, participatory and integrated policy process.

Realizing a transformative agenda requires a longer-term strategic vision of development, an integrated approach across the economic, social and environmental dimensions of development, and support of policy planning and implementation through the effective inclusion of stakeholders. While the 2030 Agenda for Sustainable Development conveys a respect for the mechanisms through which countries formulate their policies in order to achieve the transformations that sustainable development demands, it also emphasizes the importance of strengthened development cooperation, which is particularly important

for those countries at higher risk from a changing climate. The mobilization of financial resources as well as capacity-building at many levels, not least of all in the area of data and statistics, will constitute important elements of support to countries in their efforts to build resilience to climate change, as further discussed in chapter V.