

**Twelfth meeting of the Adaptation Committee  
Bonn, Germany, 19-22 September 2017**

**Advancing the engagement of the private sector in adaptation**

**Initial draft report of a literature review undertaken by the secretariat**

**Recommended action by the Adaptation Committee**

The Adaptation Committee (AC) may wish to consider the information contained in this draft literature review as background to document AC/2017/17.

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## 1. Introduction and scope of literature review

1. This literature review gives an overview of private sector adaptation action, including the context for private sector adaptation action (section 2), an overview of climate risks and exposure faced by the private sector (section 3). The business case for adaptation is made in section 4. Section 5 provides an overview of adaptation action undertaken as well as adaptation services provided, including the provision of finance and insurance. Private sector engagement in the process to formulate and implement national adaptation plans (NAPs) is looked at in section 6, while section 7 elaborates on micro and small and medium enterprises. Collaboration between the private sector and governments and the value of private-public-partnerships (PPPs), including case studies and success factors, are examined in section 8. Section 9 considers needs as identified by the private sector, and remaining barriers and opportunities. The review concludes with an overview of tools and frameworks available to support private sector adaptation (section 10).
2. This literature review encompasses a review of about 80 documents. A full reference list and brief summary of documents reviewed is provided in annex 1 to this report.
3. All material reviewed acknowledged the need for the private sector to adapt to the impacts of climate change, and explained the business case for this. Many reports highlighted that companies and their stakeholders, including governments, employees, communities and customers—are increasingly concerned about the costs associated with more frequent and intense floods, droughts, hurricanes and wildfires. Many companies are taking steps to begin to enhance their resilience to these growing risks. The review also showed that companies have traditionally planned based on past weather events, and few have attempted to integrate the increasing risks associated with the changing climate into their planning and operations. Initial efforts to do so suggest that barriers and uncertainties often stand in the way, preventing companies from achieving resilience against the rising risks of climate change impacts (C2ES, 2013).

## 2. Context for private sector adaptation action - relevant UNFCCC and UN activities

4. The Paris Agreement recognises the importance of “...various actors... in addressing climate change.”<sup>1</sup> Specifically, in the context of approaches to assist in the implementation of Parties’ nationally determined contributions, Parties agreed that their approaches should aim to, inter alia, “enhance public and private sector participation in the implementation of nationally determined contributions.”<sup>2</sup>
5. Decision 1/CP.21, adopting the Paris Agreement, recognizes the role of non-party stakeholders in “regional and international cooperation in order to mobilize stronger and more ambitious climate action..” in its Preamble, and “welcomes the efforts of all non-Party stakeholders to address and respond to climate change, including those of... the private sector...”<sup>3</sup> including the private sector. Decision 1/CP.21 also “Invites ...non-Party stakeholders ...to scale up their efforts and support actions to reduce emissions and/or to build resilience and decrease vulnerability to the adverse effects of climate change and demonstrate these efforts via the Non-State Actor Zone for Climate Action platform”<sup>4</sup> Decision 1/CP.21 also recognises the importance of adequate and

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<sup>1</sup> Paris Agreement, Preamble

<sup>2</sup> Paris Agreement, Article 6, paragraph 8

<sup>3</sup> Decision 1/CP.21, paragraph 133

<sup>4</sup> <http://climateaction.unfccc.int/> See also <climateaction.unfccc.int/cooperative-initiatives/themes/resilience>.

predictable financial resources for adaptation “...encouraging the coordination of support from, inter alia, public and private sources...”<sup>5</sup>

6. Parties to the UNFCCC have called for greater engagement of the private sector on adaptation under the Nairobi Work Programme on impacts, vulnerability and adaptation (NWP).<sup>6</sup> The Private Sector Initiative (PSI),<sup>7</sup> developed under the NWP, aims to catalyse the involvement of the private sector in the wider adaptation community. The NWP currently has 60 private sector partners,<sup>8</sup> with 102 case studies of private sector actions on adaptation across a range of business sectors, adaptation activities and regions.<sup>9</sup> In cooperation with the World Business Council for Sustainable Development, PricewaterhouseCoopers undertook an analysis of private sector adaptation efforts, incorporating an analysis of activities and progress made through the PSI (PWC, 2010).

7. The Global Climate Action Agenda also sets out a roadmap for global climate action, including Climate Champions’ engagement with the private sector on various activities.<sup>10</sup>

8. The 2030 Agenda for Sustainable Development (United Nations, 2015) recognizes the importance of the private sector contribution to implementation of the SDGs, including action to advance climate change adaptation, including under Goal 13.

9. The Intergovernmental Panel on Climate Change (2007) indicates that vulnerable industries should adapt to the increasing likelihood of extreme weather events along with slowly shifting mean annual temperatures and precipitation patterns, to prevent major damages or periods of inoperability in the future (IPCC, 2007; Schneider, 2014).

### 3. Exposure to climate related risks

10. Many reports detail the climate impacts and risks that the private sector faces and is already adapting to, and provide examples of where and how impacts have affected private sector organisations, including floods, droughts and severe storms across various levels, sectors, and types of operation (Economist Intelligence Unit 2015; PWC, 2010; International Business Leaders Forum, 2012; C2ES, 2008; Warren et al., 2016). For example, McKinsey & Company (2015) have defined six different kinds of climate risks in figure 1 as divided into two interconnected groups: value-chain risks and external-stakeholder risks

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<sup>5</sup> Decision 1/CP.21, paragraph 54

<sup>6</sup> See <[unfccc.int/9201](http://unfccc.int/9201)>.

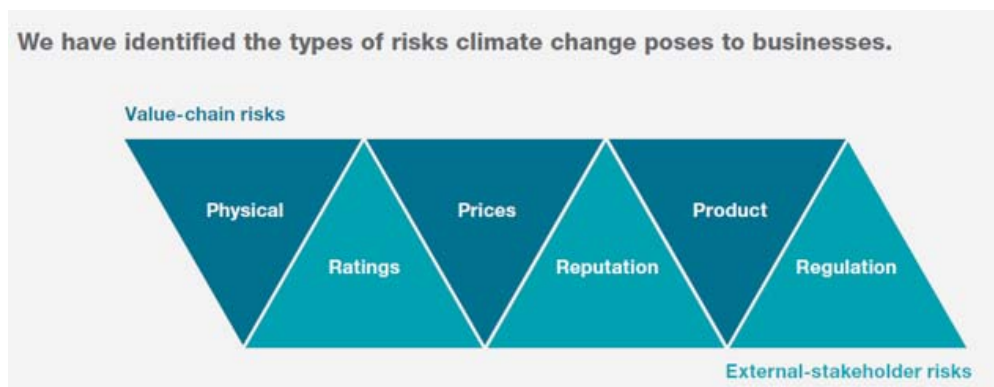
<sup>7</sup> See <[unfccc.int/4623](http://unfccc.int/4623)>.

<sup>8</sup> As of 12 September 2017 there are currently 350 NWP partners.

<sup>9</sup> See <[www4.unfccc.int/sites/NWP/Pages/Search.aspx?k=PSI&tags={%22informationtype%22:%22casestudy%22}#](http://www4.unfccc.int/sites/NWP/Pages/Search.aspx?k=PSI&tags={%22informationtype%22:%22casestudy%22}#>)>.

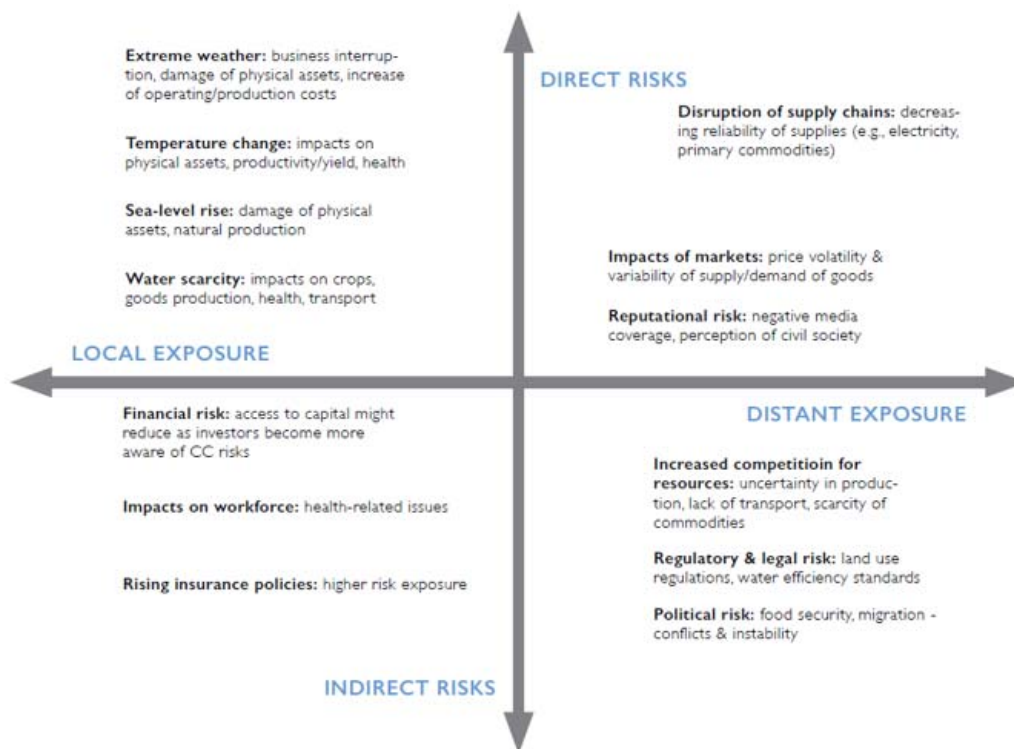
<sup>10</sup> See <<http://newsroom.unfccc.int/climate-action/global-climate-action-agenda>>

**Figure 1. Six different kinds of climate risks as divided into two interconnected groups**



Source: McKinsey analysis

11. Reports further elaborate how the private sector should focus on risks first and determines how vulnerable their business processes and operations are to climate change with a view to enabling adaptation (International Business Leaders Forum 2012; UKCIP, 2010; Climate Expert 2017). Many reports highlighted examples of direct and indirect risks that companies, including asset managers, have already experienced and/or are concerned about, including the prospect of significant losses from the effects of climate change through exposure, either directly or indirectly, to natural resource constraints, manufacturing or logistical interruptions and financial or economic crises as a result of climate change, including direct risks to core operations, and/or indirect risks via supply chain or other dependencies, as well as weaker growth and lower asset returns, direct impacts on production capacity such as property damage or supply interruptions and impacts on operational costs such as higher commodity prices or maintenance costs (C2ES, 2013; PWC, 2010; OECD, 2011). Examples include concerns about the availability of water for manufacturing processes or potential impacts on critical inputs and supply chains, as well as broader linkages as a result of other stresses caused by increasing population, migration, urbanization, or coastal development (C2ES, 2013). In figure 2, Druce et al (2016) explain four climate impacts (water scarcity & drought, flooding, extreme heat events & health related climate risks) and provide examples of how they might typically affect private enterprises at different points of their business models.

**Figure 2. Direct and Indirect Climate Risks to Business**

Source: Druce et al (2016)

12. The literature also showed that companies have experienced external risks that they cannot directly manage but that can significantly affect their bottom line. For example, extreme weather events can impact the ability of employees to get to work, disrupt transportation and communication systems, and threaten the availability of energy or other raw materials. Many of these hazards are under the control of other entities such as local governments or utilities, and private sector companies cannot take direct action to enhance their resilience to these risks, but can seek to indirectly mitigate their impacts by updating their business continuity or emergency preparedness plans so that they specify, for example, the provision of back-up power or arrangements for alternative modes of transportation (C2ES, 2008 and 2013). Reports show that a company's geographical location, industry type and value chain all influence how it should best adapt. Some businesses, for example, may identify climate change risks in their core operations that require immediate action. For others, the impacts may be less direct. In such cases, helping build levels of adaptive capacity in their various spheres of influence may represent a more suitable approach (International Business Leaders Forum, 2012).

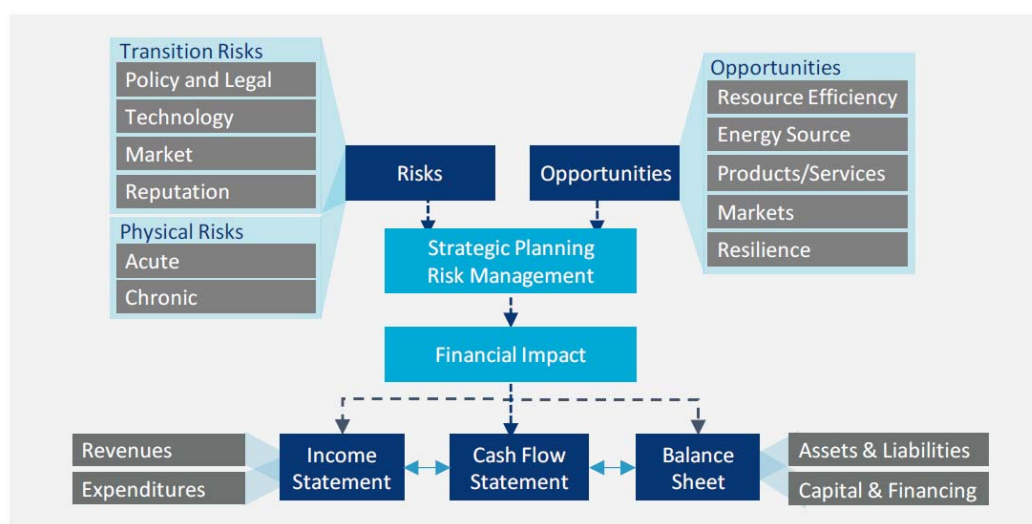
13. Many enterprises will face indirect exposure through other market changes, with sectors particularly affected including food retail, finance and insurance (PWC 2010). Supply chains will be disrupted with, for instance, challenges to agricultural production and increased competition for some resources. There is evidence that climate change is reducing the competitiveness of agricultural exports in the perception of agri-food exporters of climate change in Uganda and in Peru (ITC, 2015). Market demand will also change as customers respond to climate change. These risks are becoming increasingly serious for companies. For instance, the number of enterprises already affected by extreme weather events is growing, with examples of droughts in wheat growing regions leading to dramatic price rises and food riots, and floods in Thailand severely disrupting global manufacturing (GEF 2012; Donor Committee for Enterprise Development, 2016).

14. Although many companies are aware of risks, they are likely to focus more on risks from extreme events than on those from gradual changes (OECD, 2011). However, not all companies carry out assessments of risks or of possible adaptation responses. Most companies assessed risks from current climate variability and extreme events, but fewer also assessed risks from future climate change. Assessments are generally more concerned with direct impacts and often focus on increases in frequency and intensity of extreme events.

15. Some companies are using existing systems for assessments, such as incorporating climate change into risk management processes, while others are adapting existing tools, and in some cases developing new tools for considering climate risk (OECD, 2011). Many companies do not possess the in-house capacity to conduct assessments, especially of future risks, and may utilise external expertise (OECD, 2011).

16. Figure 3 shows an overview of the financial impact of climate-related risks and opportunities on an organization (Task Force on Climate-Related Financial Disclosures, 2017b). This report provides a framework for the private sector to assess types of climate risks, in consideration of various climate change scenarios, as well as guidelines for large companies to disclose their climate risk. Disclosing climate risk may not only help large companies to adapt and drive the preparation of adaptation strategies, but all types of companies.

**Figure 3. Overview of the financial impact of climate-related risks and opportunities**



Source: Task Force on Climate-Related Financial Disclosures (2017b)

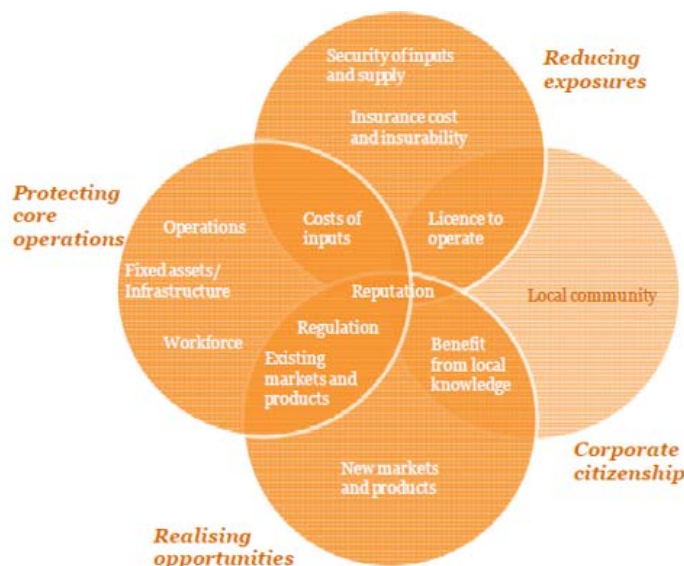
#### 4. The business case for private sector engagement on adaptation

17. All material reviewed reported that climate change will significantly impact the private sector, presenting a risk to businesses that are unwilling or unable to adapt, but an opportunity for those companies with the foresight and capacity to respond (UKCIP, 2010; McKinsey, 2015; International Business Leaders Forum 2012) (see figure 4).

18. The business case for adaptation action for the private sector was articulated on the basis of maximising profits and maintaining a competitive edge, managing risks and improving business resilience, innovating and capitalizing on strategic and new market opportunities and provision of new products and services, and in some cases by regulatory and other requirements (UKCIP, 2010; PWC, 2010; GEF, 2012; IFC, 2013; C2ES, 2013; Meister Consultants Group Inc. 2013; WRI, 2012a).

19. A 2015 study by the Economist Intelligence Unit estimated the value at risk, because of climate change, to the total global stock of manageable assets as ranging from USD 4.2 trillion to USD 43 trillion between now and the end of the century, with tail risks being more extreme; 6°C of warming could lead to a present value loss worth USD 13.8 trillion.

**Figure 4. The exposure of businesses to climate change risk and opportunity: a rationale for action**



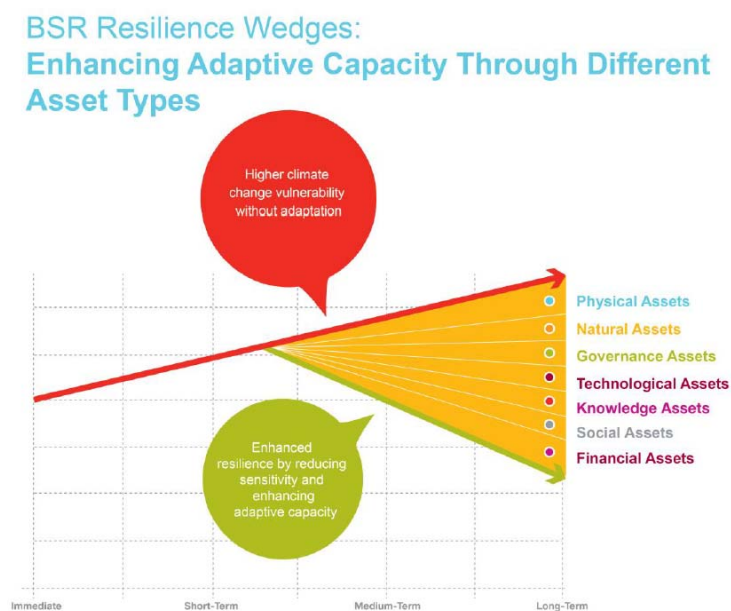
Source: PricewaterhouseCoopers (2010)

20. Many companies face large climate change implications. Looking at water as an example, by 2030 demand is projected to outstrip supply by 40 per cent, with half the world's population may find themselves living in areas of high water stress. Almost every business depends, to some extent, on ready access to water for everyday activities and it is not only direct operations that will suffer from a water shortage. Water scarcity poses a pressing threat to supply chains, distribution networks and consumer markets too. Given the severity of the risks, 'business-as-usual' models are no longer tenable. (International Business Leaders Forum, 2012). Many companies are aware of possible opportunities arising from climate change, such as consulting services, water management services and technologies, and climate-proofing construction services (OECD 2011).

21. It was seen that over the long term, the companies most able to adapt their operations and services to climate change would likely be the most competitive and would have a first-mover advantage (C2ES 2013; International Business Leaders Forum 2012). The United Nations Food and Agriculture Organisation (FAO) reports that the benefits of early adaptation will "considerably outweigh any incurred costs." Early action is would enable businesses to pre-empt future regulation while also securing the long-term competitiveness and sustainability of their operations (International Business Leaders Forum, 2012). Some reports pointed to the value of acknowledging adaptation co-benefits and linkages with, where in practice, adaptation and mitigation activities often fall within the same project scope. Some studies reported that businesses see the reputational benefits adapting, along with mitigation, supporting sustainable development and corporate social responsibility (CSR), recognizing that the private sector is an important contributor to job creation, economic growth and poverty reduction (Donor Committee for Enterprise Development 2016; C2ES 2008).

22. As outlined in figure 5 below, companies can enhance their resilience and adaptive capacity through various asset types, as well as incorporating climate change resilience-building as a dimension of risk management; seeking to understand the total climate exposure and risk to the business and map material risks and opportunities by engaging internal and external stakeholders, as well as looking to identify opportunities to collaborate to maximize the impacts of resilience efforts (BSR, 2015).

**Figure 5. Resilience Wedges: Enhancing adaptive capacity through different asset types**



Source BSR, 2015

## 5. Adaptation action undertaken and services provided

23. The literature reviewed shows that the private sector is acting on the business case and is engaging in adaptation, with many examples from companies across a range of sectors, types of company and regions, including those captured in the NWP PSI (Intellicap, 2010). Many organisations are altering their long-term business models in response to the commercial opportunities and challenges posed by climate change (Climate Change Support Team of the United Nations Secretary-General, 2015). As in most cases the private sector's efforts, goods and services are not specifically labelled as 'adaptation', and actions to improve the management of climate risks may be happening as part of standard risk management or planning processes, the private sector may be more engaged in adaptation action than what is shown in reports and surveys (WRI, 2013a; OECD, 2011; Gutierrez, 2016). Some reports noted that there is little incentive for companies to identify and publicise the work they are doing on adaptation, considering that many of the benefits are private and the messages sometimes complex, which give adaptation less potential as a source of positive publicity than action on mitigation. In addition, information on adaptation can be a source of competitive advantage (OECD, 2011).

24. Many reports highlighted that private sector action is driven by and an important complement to secure commitments and concerted action by governments; and many areas of adaptation, including the need for technology development and transfer, finance and capacity building, will be implemented by or with the involvement of the private sector (PWC, 2010). An overview of driving factors is shown in figure 6.



25. Although companies are in some cases driven by regulation, some multi-national companies are acting largely without government mandate, with efforts driven by opportunities to become a more efficient business, to manage critical short- and long-term risks to the company, to reduce costs, and provide greater value to customers (C2ES 2013). While uncertainties exist about how climate change will manifest over time, leading companies are recognizing that, given the already substantial risks associated with the full range of projected climate change impacts, waiting to act can be a costly response. Reports provided examples of how for many private sector organisations, building resilience is doing what companies have always done— including strategic planning, risk assessment, investing in infrastructure, diversifying the supply chain, safeguarding employees—using the most up-to-date information available about risks, however now building resilience requires understanding and responding to developments in climate science (C2ES 2013).

**Figure 6. Key factors driving private sector adaptation**

| <b>Box 2. Summary of key factors driving private sector adaptation.</b>   |
|---|
| <i>Internal Factors</i>   |
| <ul style="list-style-type: none"> <li>• Presence of a climate change leader/champion within the business (not limited to the business owner)</li> <li>• Firm characteristics: Internal capacity; climate change relevant knowledge/expertise and skills amongst employees, and sufficient resources, including financial</li> <li>• Access to resources including data, knowledge and information</li> <li>• Experience of climatic impacts or awareness of risks</li> </ul> |
| <i>External Factors</i>   |
| <ul style="list-style-type: none"> <li>• Legal and regulatory drivers to stimulate private sector adaptation</li> <li>• Appropriate policies and incentive structures to engage private sector in climate change adaptation</li> <li>• Economic and financial incentives to encourage and support private sector investment in climate resilience</li> <li>• Market drivers can create new opportunities for the private sector from climate change</li> </ul>                |

Source: Crick et al (2016)

26. There is evidence that the majority of private sector adaptation effort has gone towards climate-proofing operations, including relocating buildings to low-risk areas, purchasing weather insurance, and reducing water and energy usage to protect them against climate hazards (WRI, 2013a). Considering supply chain vulnerability, some companies have taken steps to work with their suppliers to ensure they have their own plans to minimize the adverse impacts from extreme weather events (C2ES, 2013). Other companies look to further geographically diversify their sources of supply or bring more of their supply chain closer to home operations. The main examples of such actions are regulated utilities companies, which rely on long-term fixed assets, and may be better able to finance adaptation investments as they can pass costs of adaptation on to customers more easily than other companies (OECD, 2011). Some companies have implemented hard measures, such as infrastructure investments, as particularly relevant for companies which are more vulnerable to climate change impacts, which have restricted operational flexibility and which rely on fixed assets (OECD, 2011). Some companies have also implemented “no-regret” or soft measures as measures that are also beneficial to general business operations, or which address current climate or environmental concerns, such as addressing water scarcity or supply issues, which allow companies to react flexibly to climate change while limiting the risk of potentially unnecessary investments in adaptation measures (OECD, 2011).

27. Many reports recognized that climate change is creating markets for private enterprises with new adaptation-relevant products and services, and expand demand for existing products or services, in

what Oxfam USA (2009) calls the new “adaptation marketplace”. Businesses across all sectors are identifying a wide range of products and services that meet new and expanding market demand caused by increased risks and impacts of extreme weather (C2ES, 2013). Drought- and salinity-resistant crops, technologies that enhance water use efficiency, weather-related insurance products, enhanced land management techniques, and storm-resistant building materials are examples of the market opportunities that companies have identified. Companies saw expanding markets for existing products and services as the most promising opportunities for business and revenue growth. In agriculture, for example, climate and drought resilient seeds, and drip irrigation technologies, are becoming more important. In ICTs, weather forecasts and crop information services are seeing higher demand. Disaster risk management needs are leading to increased demand for insurance and resilient building materials. Publicly-funded infrastructure projects will be needed, such as in coastal zone protection and flood prevention leading to increased demand for climate change information, and adaptation and risk management consulting services (Donor Committee for Enterprise Development, 2016).

28. As evidenced in the case studies of the NWP PSI, the private sector can reach and make a difference for poorer countries and people, including in the agricultural sector (Pauw, 2015). For instance, Cafe’direct trains thousands of coffee and tea farmers in Africa and Latin America to adapt, while Unilever Tea, at its growing farms in East Africa, responds to deforestation and changing rainfall patterns by investing in efficient irrigation equipment, drought-tolerant tea varieties, and reforestation (UNFCCC, 2014). In both cases, the benefits of companies’ investments in their supply chains trickle down to (smallholder) farmers, which enables them to increase their agricultural outputs.

29. The adaptation measures matrix included in figure 7 provides an overview of measures that businesses have taken and can take to mitigate or benefit from climate impacts, and how they can be financed, including sources, financial instruments and actors that could be involved (Druce et al.,2016).

Figure 7. Adaptation Measures Matrix – Populated with Examples from Case Study Analysis

|               | Climate Impacts                           | Water Scarcity and Drought  | Increased Flooding (including coastal flooding)  | Extreme Heat Events (including UHI Effect)  | Health-related climate risks   |
|---------------|---|---|--|---|--|
| ACTIVITY TYPE | <b>SME/Corporate</b>                      |   |  |   |  |
|               | Upstream supply chain                     | Supply chain management, e.g., provide organic pesticides or new pest resistant crop varieties (COOPAC, Rwanda)   | Index weather based insurance, e.g., agribusiness firms covering farmers' insurance premiums (Guy Carpenter LLC, Olam and SANAM, Mozambique)                 | Coordinating the underlying supply chains, e.g., fostering PPPs to the design of infrastructure (Rotterdam Climate Initiative: Water Square)        | Supply chain assessment, e.g., identify role of SMEs as part of a larger supply chain (ABBAS Products, India)  |
|               | Internal production (including employees) | Water management measures, e.g., investing in water efficient technologies (Coconut Bay Beach Resort and Spa, Saint Lucia)  | Strengthening the adaptive capacity of the business, e.g., new MFI loan products for technologies to increase income generating opportunities                | Optimising the energy performance of buildings and equipment, e.g., energy efficient equipment (Tokyo)  | Manufacturing and distribution, e.g., delivering vector-disease control products (A to Z Textiles Mills)   |
|               | Downstream market                         | New product or service, e.g., sale of new drought resistant agriculture inputs (DBL Group, Bangladesh)  | New early warning system technologies, e.g., providing mobile phone weather forecasts through seasonal subscriptions (Farmerline, Ghana)                     | Products and service innovation, e.g., landscape and urban design (Toronto Climate Change, Clean Air and Sustainable Energy Action Plan, 2007)      | Improved access to medical information, e.g., telecommunications for trained doctors to share knowledge to health officers (Tele Medicine)                 |
|               | <b>Infrastructure</b>                     |   |  |   |  |
|               | Public Infrastructure                     | Ecosystem-based adaptation options, e.g., Fog Catchers intercepting fog and collecting water droplets for irrigation (Microfinance for Ecosystems-based Adaptation) | Coastal development, e.g., developing new metropolitan coastal area with flood protection (NCICD, Jakarta, Indonesia)  | Improve spatial planning, e.g., greenification of streets, bike lanes; create parks and open water areas (Rotterdam Climate Initiative)             | Drug development based on socio-economic and public health benefits, e.g., research facility (GSK Tres Cantos Medicines Development Campus)                |
|               | Private Infrastructure                    | Constructing/strengthening infrastructure, e.g., construction of large water storage tank with rainwater harvesting (Coconut Bay Beach Resort and Spa, Saint Lucia) | Climate proofing private infrastructure, e.g., investing in facilities to protect against future flood risk (Terminal Martitimo Muelles El Bosque, Colombia) | Incorporate resilience in building design and construction, e.g., green roofs (Toronto Climate Change, Clean Air and Sustainable Energy plan, 2007) | Affordable health treatment facilities, e.g., running a viable mobile clinic as a standalone enterprise (Siemens Mobile Clinics; Telvent; Nokia; Ericsson) |

Source: Druce et al (2016)

### 5.1. Provision of finance and financial services (to be further developed)

30. Many reports provided evidence of increasing costs for the private and public sectors, attributable to climate change, as well as highlighting the role of the private sector in provision of adaptation financing and actions that are already being undertaken to respond (Atteridge, 2011; Bouwer et al., 2006). Many reports recognise the role of the private sector in provision of finance and innovative financial services to enable adaptation efforts, as well as the need for some types of private sector organisations in some sectors to receive investment to enable resilience to be built not just in the private sector, but in communities more systemically.

31. It is estimated that developing countries need USD 70 to USD 100 billion per year until 2050 to meet their current and future climate adaptation needs (World Bank, 2010). The highest costs for East Asia and the Pacific are in infrastructure and coastal zones; for Sub-Saharan Africa, water supply and flood protection and agriculture; for Latin America and the Caribbean, water supply and flood protection and coastal zones; and for South Asia, infrastructure and agriculture (World Bank, 2010). In 2012, economic damages from weather-related disasters climbed to near-record levels with over 800 major events worldwide causing an estimated USD 130 billion in losses; Munich Re reported that it was the third-costliest year on record behind 2011 and 2005 (C2ES, 2013).

32. While governments have important roles in protecting infrastructure, setting guidelines and providing social protection, it's widely recognised that governments will not be able to meet these costs alone, and that private sector financing is necessary for effective adaptation action (WRI and UNDP, 2015). The importance of access to financial services and financial literacy for adaptation were highlighted at the 2016 Adaptation Futures conference (Het Koninklijk Huis, 2016). Financial inclusion was recognized as vital in improving resilience both for individuals, households, communities and businesses, especially smallholder farmers and SMEs. Financial support for MSMEs can take the form of various policy and financial instruments that reduce risks, transfer risks, or compensate for risks (WRI and UNDP 2015).

33. In the context of international climate finance, adaptation can be financed through capital contributions into shareholder ownership (equity and other assets), creditor claims that need to be repaid with interest (debt, loans, bonds, etc.), and hybrid capital instruments (Pauw, 2015; Buchner et al., 2011). Investors include banks, and pension and private equity funds (Christiansen et al., 2012).

34. Philanthropy also contributes to adaptation action. It is estimated that the annual global adaptation-related philanthropy to be USD 210 million (Edwards, 2009; Buchner et al., 2011). Financial resources from philanthropy can be used more flexibly than commercial investment, because no profitable returns are required (Persson et al., 2009). Governments could incentivize philanthropy for adaptation, but it would remain a modest flow and incentives might divert resources away from urgent development needs (Pauw, 2015).

35. A 2015 study of the evidence base on private sector engagement in financing adaptation found that private sector adaptation finance by multilateral development banks (MDBs) in 2013–14 was USD 270 million, which made a total of USD 1.5 billion of MDB investment more climate-resilient (Donor Committee for Enterprise Development, 2016). This study concluded that MDBs can improve their effectiveness, for example by continuing to mainstream climate change across banking teams and monitor adaptation finance (Vivid Economics / EBRD, 2015).

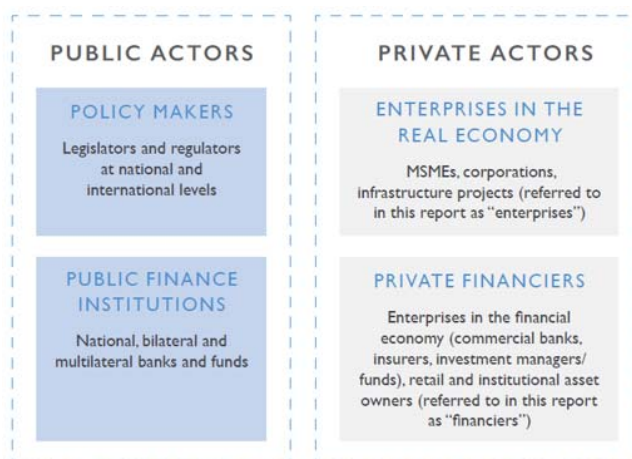
36. The NAP Global Network (2017) notes that financing is a major need for adaptation, including for the development and implementation of NAPs. It notes that while a range of financing sources exist, which countries can utilize (e.g., domestic government revenues, bilateral providers, multilateral providers), the private sector is a critical one because financing by the public sector alone will not be sufficient to meet existing financial needs. The document details the role that private enterprises and private financiers can play the realm of adaptation. Private enterprises (i.e., commercial companies) can build resilience for their own businesses by integrating climate risks into existing operations (e.g., supply chains, physical infrastructure). They can also support national and sectoral adaptation efforts by developing products and services. Such could be goods like seeds that are climate-resilient, infrastructure and technology-focused products (e.g., water-efficient irrigation), or service-oriented products (e.g., climate and weather modelling). Private financiers which include banks, microfinance institutions, insurance companies, investors, and foundations among others, can play a role by providing financing to governments and other actors implementing adaptation measures. The guidance

document details the range of financial mechanisms these groups can use (e.g., loans, microfinance, mezzanine finance, equity participation, guarantees) for the financing of adaptation initiatives.

37. Accountants and CFOs can influence private sector adaptation (Beal et al, 2016). Guidance, including from accountants, on the design of public policies and the spending public climate funds can facilitate the transformational change of an economy as it adapts to climate change (Druce et al, 2016). Investment is already being made by private enterprises in adaptation and resilience, often without the explicit acknowledgement that what is being done contributes to their adaptation, with climate change leading to the creation of new opportunities and investment in the development of new products or technologies (Druce et al, 2016). Private adaptation investments are typically financed using the same instruments as traditional business investments (Druce et al, 2016).

38. Druce et al (2016) provide an overview in figure 8 of relevant actors involved in private sector finance of adaptation, a construct of the dimensions of investment in private adaptation measures which help enterprises to reduce climate risk or realise new business opportunities, typically creating the demand for finance, also simultaneously providing new financing opportunities for the private financiers. The activities pursued help the enterprises to reduce climate risk or realise new business opportunities, typically creating the demand for (private adaptation) finance. This simultaneously provides new financing opportunities for the private financiers.

**Figure 8. Relevant actors involved in private sector finance of adaptation**



Source: Druce et al (2016)

39. Microfinance can facilitate adaptation, with microfinance institutions holding the knowledge and information networks necessary to track a large number of small transactions (OECD, 2010). Microfinance could offer an effective additional delivery channel for global funds to operationalize adaptation among the poor and the vulnerable. A closer linkage with international adaptation funding is important as start-up funding from governments and international donors is critical for microfinance (OECD, 2010).

40. Governments, international institutions, and businesses could effectively further collaborate to scale up investments in building climate-resilient communities, along with help from the international community to invest more in adaptation, including innovation and new technologies, and lower investment costs by providing support for adaptation projects by enabling knowledge-sharing, improving risk management, support for policy development (WRI 2013b).

41. The GCF and other international funding institutions can support this process through consistent, long-term engagement (WRI 2013b). For example, the GCF's Private Sector Facility (PSF) promotes the participation of private sector actors in developing countries, including SMEs and local financial intermediaries (GCF, 2017). The PSF also supports activities to enable private sector involvement in SIDS and the LDCs. As at 31 July 2017, of the 54 entities accredited to the GCF, 8 are accredited as private sector entities. However, many other entities accredited to the GCF, including national, regional and multilateral development banks, have brought forward private sector funding proposals to the GCF. In addition, it is possible for accredited entities to partner with private sector or other entities to bring forward private sector proposals. The Board has approved 43 projects so far, thereby committing USD 2.2 billion. Of the USD 2.2 billion approved, USD 1.2 billion (53 per cent) has come through the PSF and is expected to help mobilize USD 41 billion in on-ground investment. The Board has mandated actions to further promote the participation of private sector actors in developing countries and in the LDCs and SIDS in line with the Governing Instrument and guidance from the COP (see box 1).

**Box 1. GCF pilot programmes targeting the private sector (GCF, 2017)**

Through decision B.10/11, the Board established two pilot programmes targeting the private sector, including one to support MSMEs, allocated USD 200 million; and another to mobilize resources at scale in addressing adaptation and mitigation, allocated USD 500 million.

**Pilot programme to support micro-, small- and medium-sized enterprises**

The Board approved the MSME pilot RFP, deciding to limit GCF participation in the first tranche at USD 100 million (decision B.13/22). The Board has so far approved two funding proposals that were developed following the launch of the RFP, including USD 20 million for the "Business loan programme for GHG emissions reduction" proposal (FP028) submitted by XacBank to be implemented in Mongolia; and USD 12.2 million for the "SCF Capital Solutions" proposal (FP029) submitted through the Development Bank of Southern Africa, to be implemented in the South Africa. Further projects emerging from the MSME pilot are expected to be brought for consideration by the Board, as is approval of the launch of the RFP for the second USD 100 million tranche for the MSME pilot.

**Pilot programme to mobilize resources at scale**

Through decision B.16/03, the Board mandated the issuance of an RFP to solicit responses from accredited and potential non-accredited entities to establish and manage pilot programmes for mobilizing funds at scale. Funding proposals submitted in response to the RFP will be considered by the Board as part of the wider portfolio of the GCF, and through the same modalities as standard proposals.

42. There is scope for private sector organisations to further emphasise adaptation investment (World Economic Forum, 2014). A list of criteria is included in figure 9. There is evidence from the insurance sector that investments efforts have focussed on mobilizing public sector finances to avert the risk of future losses instead of creating a present day return on investment for private investors (World Economic Forum, 2014). There is also evidence that many infrastructure projects have not valued or costed their impact on climate resilience, as there is no recognized revenue stream associated with enhanced resilience (World Economic Forum, 2014).

**Figure 9. Essential and desirable criteria for adaptation funding mechanisms****Essential Criteria for Adaptation Financing Mechanisms**

| Criterion  | Description   |
|--|---|
| 1 Developed in an environment that is sufficiently certain | Policy direction, tools and instruments (i.e. the architecture supporting adaptation projects) need to be sufficiently certain, both in scope and time, to enable the private sector to invest with confidence.   |
| 2 Generate ROI   | The private sector will not invest unless there is an attractive risk-adjusted return on investment. Identifying a way to reduce risk sufficiently, to enable a predictable, low risk, single digit return over the long term, is one of the most important elements of creating a viable investment vehicle for the right type of private sector investment. |
| 3 Measurable   | A critical component of any financial vehicle will be to define and develop reliable metrics that speak directly to private sector concerns at the investment level.  |
| 4 Politically attainable                                   | In theory, the best private finance mechanism would not require any governmental action. In reality, addressing the climate adaptation challenge will require a coordinated, aligned and productive relationship between the private sector and governments.  |
| 5 Environmentally sound                                    | Privately financed climate adaptation funding will be counter-productive if it unacceptably exacerbates climate change.   |

**Desirable Criteria for Adaptation Financing Mechanisms**

| Criterion  | Description  |
|--|--|
| 1 Activities to be carried out in developing and least developed countries | Reaching those populations that are most vulnerable to climate change and least equipped to respond to such change is a critical objective, but is a challenge for private sector finance-based investing in the short term. |
| 2 Mechanism to be as open and simple as possible                           | While simplicity is important for general awareness, "buy-in", transparency and accountability, this challenge is inherently complex and may require complex solutions.  |

Source: World Economic Forum 2014

**Further material to review:**

- Campillo, G., M. Mullan and L. Vallejo (2017), "Climate Change Adaptation and Financial Protection: Synthesis of Key Findings from Colombia and Senegal", OECD Environment Working Papers, No. 120, OECD Publishing, Paris. <http://dx.doi.org/10.1787/0b3dc22a-en>
- UNEP Adaptation finance gap report
- Climate Change Support Team of the United Nations Secretary-General. 2015. Trends in Private Sector Climate Finance: Report Prepared by the Climate Change Support Team of the United Nations Secretary-General on the Progress Made Since the 2014 Climate Summit. Available at <http://www.un.org/climatechange/wp-content/uploads/2015/10/SG-TRENDS-PRIVATE-SECTOR-CLIMATE-FINANCE-AW-HI-RES-WEB1.pdf>.
- <http://www.climatefinancelandscape.org/>; <http://www.climatefinancelandscape.org/#/reading/article-9>
- The World Economic Forum. (2014)<sup>11</sup> (documents in Appendix B).
- <https://www.sei-international.org/publications?pid=2861>
- <https://www.sei-international.org/publications?pid=2867>
- <https://www.sei-international.org/publications?pid=3029>
- <https://www.sei-international.org/publications?pid=3054>
- <https://www.sei-international.org/-news-archive/2772-wisdom-from-whisky-magnus-benzie-on-learning-from-private-sector-adaptation-in-scotland>

<sup>11</sup> World Economic Forum. 2014. *Climate Adaptation: Seizing the Challenge*. Available at [http://www3.weforum.org/docs/GAC2014/WEF\\_GAC\\_ClimateChange\\_AdaptationSeizingChallenge\\_Report\\_2014.pdf](http://www3.weforum.org/docs/GAC2014/WEF_GAC_ClimateChange_AdaptationSeizingChallenge_Report_2014.pdf).

- *The report of the Standing Committee on Finance forum on Mobilizing finance for climate-resilient infrastructure, 6 to 7 September, Morocco*

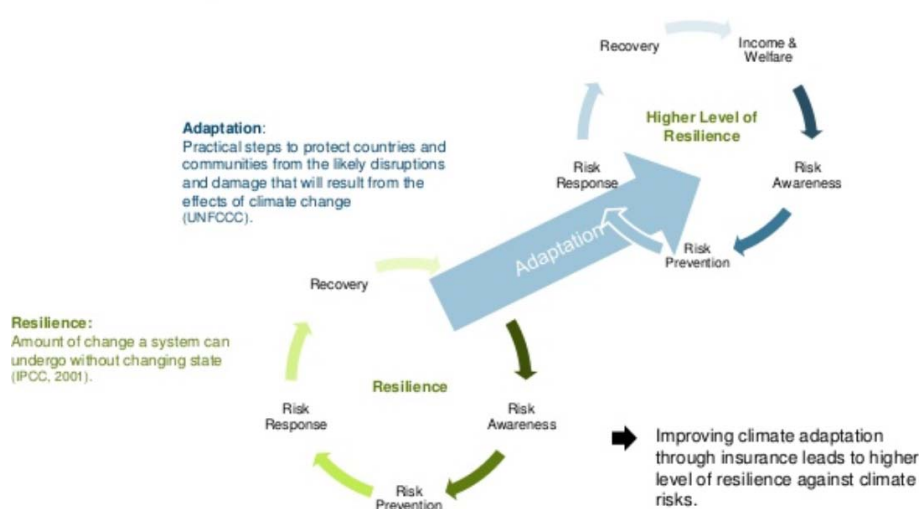
## 5.2. Provision of insurance (to be further developed)

43. As detailed in figure 10 and box 2 below, insurance can enable adaptation to the impacts of climate change (KfW, 2017).

**Figure 10. How can insurance improve adaptation and increase resilience?**

### »» 1. How can insurance improve adaptation and increase resilience?

The virtuous cycle of resilience



Source: KfW, 2017

44. AXA Group and UNEP FI's Principles for Sustainable Insurance Initiative (2015) conclude that the insurance industry has a major opportunity to advise SMEs on climate risk assessment, support them in the development of resilience plans and help drive behavioural change by incentivizing action in favour of resilience.

45. This review found that only a small portion of disasters' economic losses are covered by the insurance industry – most are absorbed by the public sector, which predominantly finances post-disaster losses, often by increasing public debt (WRI 2013b).

46. The insurance industry could help governments design risk-transfer solutions that aim to balance financial approaches by combining pre-event and post-event financing instruments, as well as partnering with governments to identify and quantify risks, design risk prevention and mitigation strategies, and absorb residual risk (WRI 2013b).

### Box 2. Examples of insurance enabling adaptation to climate impacts

The Philippine Crop Insurance Corporation (PCIC) provides farmers with insurance and provides farmers an opportunity to strengthen their resilience. As climate vulnerability increases, the PCIC is expanding its coverage by piloting new insurance techniques such as weather-based index insurance and area-yield crop insurance, to help protect farmers in the event that a flood or drought significantly decreases agricultural yields (WRI 2013b).



There is evidence of agricultural insurance helping to reduce exposure of farmers to crop failures and income losses in Vietnam, where an agricultural insurance scheme is being piloted Asia-Pacific Economic Cooperation (2013).

Kenya's Kilimo Salama ("Safe Farming" in Swahili) is an example of a micro-insurance program. This program offers farmers who plant as little as one acre insurance policies to shield them from financial losses when drought or excess rainfall are expected to harm their harvests. When weather stations detect a drought, farmers are given a payment straight to their mobile phones. Insured farmers are able to invest 20 per cent more in their farms and earn 16% more income than their uninsured neighbours.

*Further material to review:*

- Swiss Re, 2017. Natural catastrophes and man-made disasters in 2016: a year of widespread damages. Available at: [http://media.swissre.com/documents/sigma2\\_2017\\_en.pdf](http://media.swissre.com/documents/sigma2_2017_en.pdf)
- *Report of the Standing Committee on Finance forum on Mobilizing finance for climate-resilient infrastructure, 6 to 7 September, Morocco*
- *Material prepared and provided by the [Microinsurance Network](#), a multi-stakeholder platform for the world's micro insurance community of experts and institutions*
- *Material prepared and provided by the [UN Environment's Principles for Sustainable Insurance Initiative \(PSI\)](#)*

## 6. Private sector engagement in the process to formulate and implement national adaptation plans in developing countries

47. The national adaptation plan (NAP) Technical Guidelines (UNFCCC LEG, 2012) articulate that NAPs serve to assist relevant government agencies and ministries seeking to implement adaptation programmes, as well as provide guidance to other relevant stakeholders such as the private sector in facilitating adaptation strategies. They note that the process of developing NAPs should involve seeking feedback from a wide range of stakeholders, including the private sector. Seven developing countries have submitted their NAPs so far, with many consulting the private sector for input (Brazil, Kenya, Sri Lanka, and Sudan), as recommended by the NAP Technical Guidelines.

48. Several NAPs featured content on how engagement with the private sector to facilitate adaptations strategies could be strengthened, including through awareness-raising workshops on the impacts of climate change on the private sector, capacity-building training, and potentially utilizing corporate social responsibility (CSR) funding for adaptation projects.

49. For example, Brazil (Federative Republic of Brazil Ministry of Environment, 2016a and b) noted the goal of executing a capacity-building strategy for adaptation through which it would conduct awareness-building and mobilization activities for the private sector around climate change adaptation in their NAP, and also noted goals for developing policies that "facilitate adoption of adaptation measures by the private sector...". Burkina Faso (Burkina Faso Ministry of Environment and Fishery Resources 2015) discussed the need for greater involvement of the private sector for planning for and implementing adaptation strategies in its NAP. It specifically notes the need for private sector assistance in utilizing analytical tools as well as data related to climate change as the public sector works to implement its NAP. It notes that a potential solution to facilitating greater engagement would be awareness-raising workshops (sponsored by groups such as the Chamber of Commerce) focused on

informing the private sector audience about the impacts of climate change on the economy. The NAP also underscores the need for continuous dialogue between the public and private sectors, and for private sector stakeholders to be continuously engaged to accomplish the goals of “(i) expanding the human resources available to respond to the consequences of climate change... (ii) building the capacities of the main stakeholders and (iii) responding to the estimated costs of adaptations for vulnerable sectors in the medium and long term.”

50. Kenya (Republic of Kenya Ministry of Environment and Natural Resources 2016) noted that the implementation of adaptation actions outlined in their NAP will require the active participation of a range of stakeholders, including the private sector. In particular, it notes the significant role the private sector plays as the country aspires to achieve its overarching development goals, and the threats that climate change poses on the private sector (e.g., on supply chains). The NAP outlines short-, medium-, and long-term actions to help the private sector build resilience to climate change, including the development of “fiscal incentive measures to encourage businesses to undertake investment in adaptation and resilience building measures.” The NAP also emphasizes the role the private sector can play in helping implement adaptation measures through “investments, financial risk management, and the charitable provision of resources through foundations or corporate social responsibility.” (Republic of Kenya Ministry of Environment and Natural Resources 2016). In particular, the NAP discusses the aspirational development of “a pipeline of adaptation investment grade projects and programmes” which could position projects that require funding to be selectively financed by development partners and the private sector (Republic of Kenya Ministry of Environment and Natural Resources 2016).

51. Sri Lanka (Ministry of Mahaweli Development and Environment Sri Lanka, 2016) In its 2016 NAP, Sri Lanka noted that a potential source for financing climate adaptation activities is the private sector, particularly through Corporate Social Responsibility programmes. It sets the goal of “negotiating and establishing a state-private partnership trust fund for attracting and channelling corporate social responsibility (CSR) funding for climate adaptation projects with the support of the Finance Ministry and corporate sector members.”

52. As well as provision of finance for the development of NAPs, the potential role of the private sector in facilitating national adaptation goals through products, services, and financing mechanisms is clear (NAP Global Network, 2017). However, uncertainties still remain around how the public sector can “mobilize private finance for climate change adaptation in general, and thus also for NAP processes” (NAP Global Network, 2017). Greater insight on how various types of private sector actors operate, their own adaptation needs, and their existing efforts to address climate change can help, as an initial step toward facilitating private sector involvement in adaptation and identifying potential synergistic opportunities.

53. For governments seeking to facilitate greater private sector engagement can consider integrating private sector actors as stakeholders in the NAP development process so that they can provide perspective on adaptation priorities, as well as share feedback on perceived barriers; the public sector could raise greater awareness of the potential benefits of financing climate adaptation by demonstrating that they are not necessarily high-risk nor revenue-losing investments; to provide non-financial support such as climate data and decision-support tools for private sector actors to use in risk analyses or cost-benefit analyses; to provide economic incentives for adaptation efforts (e.g., tax breaks for adaptation actions, risk guarantees for new products); and for sectoral ministries to provide capacity building support as the private sector develops climate-resilient services and products (NAP Global Network, 2017).

## 7. Medium, small and micro enterprises

54. The literature highlights the case for, and benefits of, focussing support for adaptation action at the level of medium, small and micro enterprises (MSMEs), especially in developing countries (WRI and UNDP, 2015; Canevari, 2016).

55. Many people enjoy employment and livelihoods in medium, small and micro enterprises. In developing economies, MSMEs can employ up to 78 per cent of the population, accounting for up to 29 per cent of the national GDP (World Bank 2011; WRI, 2013a). Their market concentration and high level of employment means MSMEs are well placed to contribute to making vulnerable populations more climate resilient, resulting not just in higher resilience in the private sector, but also in wider communities as well (WRI, 2012b; WRI, 2013a; Frei-Oldenburg et al., 2016) (see box 3).

### Box 3. Examples of MSME activities that build climate resilience in local communities

- KarmSolar Solutions in Egypt, where water scarcity is an increasingly pressing issue, designs solar-powered desalination systems for households and small businesses.
- Waterlife produces clean, affordable drinking water for households in India that have problems with water contamination from flooding.
- In Singapore, Green Future Solutions consults MSMEs on climate change adaptation techniques.
- Entrepreneurs in the informal settlements of Dakar, Senegal are selling garbage and sand to households that want to heighten the base of their houses to adapt to frequent flooding.
- An entrepreneur in Brazil designs solar lights from water bottles, a low-cost, climate-friendly lighting option.

56. The presence of MSMEs in communities throughout the world allows them to get products and services to hard-to-reach populations. They can develop climate-resilient goods and services that are affordable to vulnerable populations. MSMEs are closely integrated into their communities, and as a result, have local knowledge of consumer demand and supply, enabling them to identify areas of need and responses. MSMEs can upgrade their current products and can adapt their products more rapidly to changes in the climate. MSMEs can also directly engage with community members to build adaptive practices, including educating households on actions they can take and items they can buy to increase their resilience to extreme weather and climate events (Surminski et al., 2016).

57. Many MSMEs worldwide are increasingly vulnerable to the impacts of climate change. Literature reviewed gives evidence that SMEs are aware of and concerned about the impact of climate change on their business, however, that they are poorly prepared for climate related risks (Zurich Insurance Group, 2016; AXA Group and UNEP FI Principles for Sustainable Insurance Initiative, 2015). Some reports found that SMEs have very low adaptive capacity, identifying issues such as few measures undertaken to mitigate the risk of severe weather; lack of business continuity plans for extreme weather conditions; a perceived lack of support from utility companies, local government, central government agencies; and low use of information sources about climate impacts (Surminski et al, 2016).

58. Although the need for and benefits of focussing support for adaptation action at the level of MSMEs was clearly highlighted, there is also evidence of the many challenges faced by MSMEs in adaption and making operations more climate-resilient, due to lack of resources and less in-house experts on climate change and sustainability, with SMEs in developing countries usually having limited

access to affordable financial products such as loans and insurance, credit, or grants needed to develop new products and expand operations, as well as low human resource capabilities, low technological capabilities, and insufficient access to electricity (WRI, 2013a; Surminski et al., 2016) (see figure 11).

59. Many reports point to approaches to help MSMEs to adapt. Developing country governments could more actively engage with multinational corporations, financial institutions, and investors to ensure that a variety of financial instruments are available to MSMEs to help them to invest in risk reduction and management initiatives. Many reports pointed to the valuable role that governments can play in influencing and working with non-governmental organizations (NGOs), financial institutions, and international organizations to cooperate in helping MSMEs to develop risk management options, including provision of business-relevant climate information and risk analysis; technical assistance and training; policy development that enables investments in adaptation; market and business development; encouragement of partnerships and cooperatives; and deployment of financial instruments (WRI and UNDP 2015). The public sector could also encourage MSMEs to adapt through creating an enabling environment to build climate resilience, and to catalyse investment in risk management and resilience, and become a direct means of supporting vulnerable communities as they adapt to climate impacts (WRI and UNDP 2015). Climate resilience in SMEs could be advanced through increased collaboration including regionally, with other MSMEs and SMEs and large corporations to integrate across regional and value and supply chains; and provision of targeted information and one-stop-shops for companies to access climate information and improve access to climate finance and collaboration opportunities (Canevari, 2016).

**Figure 11. Overview of drivers, barriers and interventions to catalyze MSE investment in resilience**



Source: WRI and UNDP 2015

60. Other actors can support climate resilience in MSMEs as well. The literature points to climate funds, such as the GCF, in ensuring that projects and programs that create the enabling conditions for MSMEs are supported, so that MSMEs can make investments in building up resilience to climate impacts, and those that promote products and services that support, facilitate, or advance adaptation at scale (WRI and UNDP 2015).

61. Multilateral and bilateral partners can also support MSEs to adapt by providing financial and technical support for national activities (WRI and UNDP 2015). This can include removing policy

barriers, transferring risk, and/or compensating for risks using a variety of financial instruments. Donor institutions can facilitate the transfer of information about successful business practices, initiatives, and pilots act as matchmaker and clearinghouse for private sector adaptation ideas. Equally, bilateral partners can also support the process of catalysing engagement in adaptation by ensuring market access for products developed by MSMEs in developing countries (WRI and UNDP 2015).

62. Large private sector actors (multinationals that are reliant on supply chains involving multiple MSMEs) can also help build resilient MSEs in developing countries, and also benefit from a more resilient supply chain (WRI and UNDP 2015). Companies and investors can support MSEs by providing finance and technical assistance, or by forming partnerships (WRI and UNDP 2015).

## 8. Public-private collaboration and partnerships

63. Many reports highlighted the central role of the public sector to play in helping society, including the private sector to adapt to the effects of climate change, while promoting economic development (Cimato and Mullan 2010). The literature reviewed underlined the importance of understanding the private sector's role in adaptation alongside the public sector, considering that countries' success at adaptation will depend on the success of the private sector and other private actors in responding to climate change impacts and risks (OECD, 2011).

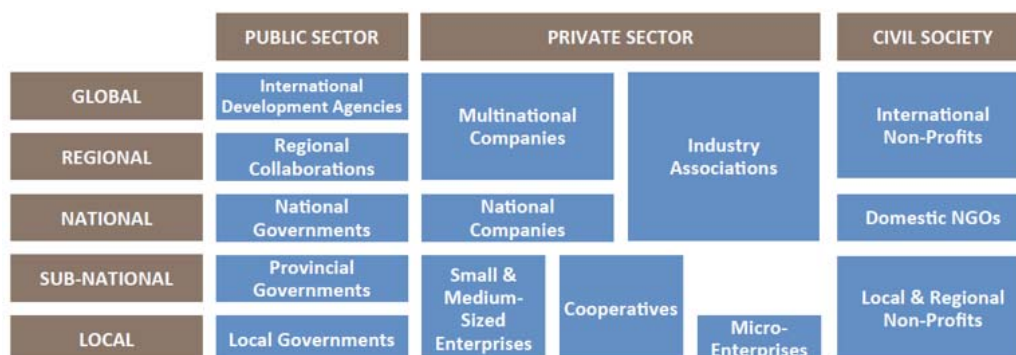
64. Reports discussed the need for understanding and more clearly articulating the roles of government, private and other sectors in advancing private sector engagement on adaptation, as well as adaptation planning action in general, with the support of national and local governments seen as a necessity for private sector adaptation efforts, in particular in least developed countries (C2ES, 2013; Pauw et al., 2013). There is a clear need for co-ordinated action by regulators, governments and institutional investors in order to address the long-term, systemic risks (Economist Intelligence Unit, 2015).

65. In many instances, the private sector is responsible for provision of critical goods and services such as food, water, electricity, and medical care that are vital to society. Therefore, it can be seen that governments have a responsibility in fostering private sector adaptation to climate change with relevant private sector organisations and considering where and how to catalyse public-private action on adaptation, whether in national planning, risk management, financing or delivering innovative technologies and services (Schneider, 2014; PWC, 2010).

66. Governments may be able to encourage adaptation by creating an enabling environment for private sector adaptation efforts, including through regulation and defining adaptation reporting requirements (OECD, 2011; UK [Department for Environment, Food and Rural Affairs](#), 2013). It can be advantageous for regulatory entities be forward-looking and open to companies making the case for their increased spending on resilience, particularly in such regulated sectors as insurance, water provision, and electric utilities (WRI and UNDP, 2015). Governments can also stimulate markets through incentives for innovation (for example, in the fields of climate resilient technology research and commercialization) and provision of financial support (WRI and UNDP, 2015). A 2013 review of projects from the PPCR and found that less than 9.2 per cent of all PPCR financing involved private sector actors (Bretton Woods Project and Catholic Agency for Overseas Development, 2013). Integration of private sector projects into national planning processes and strategies can help, with country and community ownership of the project design process seen as an important aspect of this process, as well as accountability mechanisms that allow stakeholders to have oversight, to enhance the efficiency and effectiveness of resource allocation (Bretton Woods Project and Catholic Agency for Overseas Development, 2013).

67. As many areas of adaptation, including the need for technology development and transfer, finance and capacity building, will be implemented by or with the involvement of the private sector, many reports highlighted the need for collaboration and partnership between governments and the private sector, including through public-private-partnerships (PPPs), and acknowledged that different actors can work together synergistically in different roles, with private sector efforts complimenting public sector efforts (Pauw 2015; PWC, 2010; OECD, 2009). An overview of actors involved is provided in figure 12.

**Figure 12. Actors involved in PPPs**

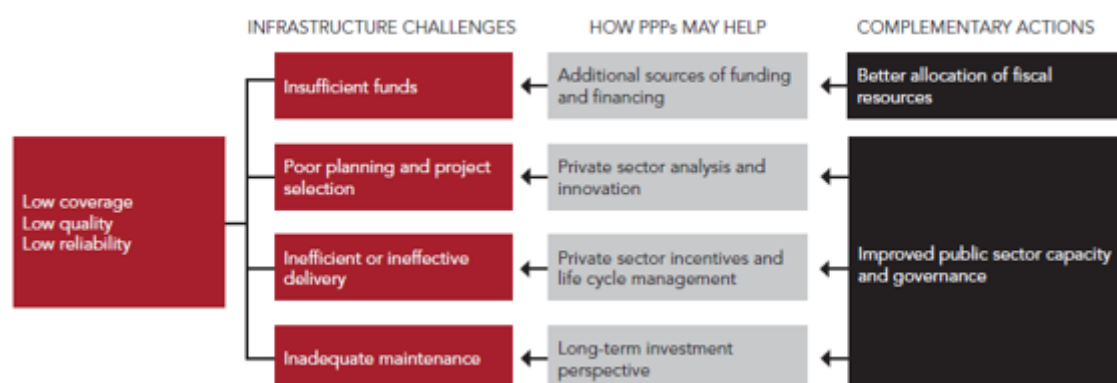


Source: Meister Consultants Group, 2013

68. Recent G20 and OECD agreements are examples highlighting countries' consideration of the need for public-private collaboration on adaptation (G20, 2017; OECD, 2015). Private sector responses may also provide lessons and examples of innovative approaches of interest to the public sector (OECD, 2011).

69. PPPs may help in particular with building resilience into infrastructure (World Bank 2017). Creating models for PPPs can help to develop trusted information sharing networks that help identify where disruptions to critical infrastructure and supply chains could lead to knock-on effects across borders, and cascading effects, and taking advantage of private sector capability and expertise to develop new technologies, build resilient infrastructure and deliver financial mechanisms (OECD, 2015).

70. Climate resilience may not yet be considered enough in PPP policy frameworks for infrastructure, even given evidence that resilience-building adaptation for infrastructure will likely be less costly if incorporated early in the project lifecycle, with research demonstrating average incremental costs of 1 and 2 per cent for infrastructure projects. (World Bank, 2016) (see figure 13). The value of mainstreaming climate resilience into PPP frameworks in the context of multi-sector investment planning and implementation in developing countries was highlighted in the literature (World Bank, 2016).

**Figure 13. The challenges with infrastructure and how PPPs can help**

Source: World Bank (2017)

71. The literature review reveals several factors for successful PPPs based on multiple case studies (see box 4) (Asia-Pacific Economic Cooperation 2013; DIE 2017; Johannessen et al. 2014; Meister Consultants Group Inc. 2013; WEF 2015; World Bank 2016). Success factors may however vary according to geographical or other contextual factors. Among the most common factors were the following:

- a) Long-term support and institutional frameworks from governments;
- b) Creation of economic incentives and communication of the business opportunities;
- c) Governmental investments in adaptation;
- d) Securing financing mechanisms;
- e) Effective knowledge-sharing through different levels;
- f) Building PPPs on a foundation of local engagement and trust;
- g) Taking a broad view of adaptation and resilience from the community's perspective

#### **Box 4. Case studies of PPPs and lessons learned**

**DIE** (2017) reviewed cases in sub-Saharan African countries and found that smallholders had established farmer-owned liability companies to run commercial businesses in all successful PPP's, through entering into contracts with private sector companies for irrigation management, service provision and market access. Farmers were represented on the management boards of their companies. The study pointed to the need for long-term support from the governments in PPPs, as well as the need for investment to be embedded in a comprehensive support packages including, access to extension services, input supply, on-farm development, access to stable markets for the products, as well as to a variety of financial products.

**Asia-Pacific Economic Cooperation** (2013) looked at best practice examples of PPPs from across APEC and found evidence of the need for and success of multistakeholder approaches to disaster resilience, including engaging the private sector at every stage in the disaster risk mitigation, preparation, response, and recovery process. The study found that in most cases, successful PPPs were driven by innovative thinking and leadership of committed individuals, singular authorities, organizations or businesses.

To encourage more successful PPPs for adaptation, the study recommends that governments should play an active role in building business understanding of a resilience-based approach to disaster management, communicate business opportunities of collaborative efforts for disaster resilience and organize multi-sector fora that enable regular dialogue and to establish strategic approaches and frameworks for public-private collaboration.

**Johannessen et al** (2014) found that in successful PPPs to build resilience of water, sanitation and hygiene (WASH) systems, the following are important:

- Broad investments across the entire socio-economic system;
- Social learning, which enables knowledge-sharing between many levels and across different sectors;
- Creating an institutional culture for private sector investment based on accountability, facilitated by quality assurance approaches and methods;
- Creating enabling policy for new segment of private entrepreneurs, and a supporting practice in building trust, capacity and dialog;
- Developing micro-insurance mechanisms in dialog with vulnerable communities to help them cope with financial risks;
- Building (micro) financial opportunities which can enable vulnerable people to make a transition into new livelihoods and reduce poverty.

**Meister Consultants Group, Inc.** (2013) highlighted outstanding public-private collaborations (PPCs) in developing countries, including cases from North Africa, Middle East, Sub-Saharan Africa and Asia. They found that agriculture, ICT, financial services and water sectors are the main hotspots for resilience PPCs. The study identified several success factors for PPS:

- Building on a foundation of local engagement and trust;
- Starting small and local, but position for scale and replicability;
- Integrating skill building to maximize community ownership;
- Building adaptive capacity by strengthening businesses and livelihoods;
- Creating partnerships along—or across—value chains;
- Finding innovative alternatives to traditional infrastructure.

In addition the study highlighted the following lessons learned:

- Leveraging core competencies can result in mutual benefits for partners involved and long-term partnerships;
- A partnership can maximise its impact when each partner focuses on what it does the best;
- Choose locations where synergistic relationships between micro-enterprises can be created;
- Follow-up training is important for preparedness;
- Take a broad view of adaptation and addressing community needs as they arise;
- Strong local partner participation has resulted in community ownership;
- Provide information and build trust before rolling out technical interventions;
- Evolve training programmes as micro-enterprises mature and new needs emerge;
- Partnering with a geographically distributed network of financing institutions made the implementation of projects in rural areas more effective;
- Adding additional revenue streams can help businesses move on a path toward financial sustainability.

**World Economic Forum** (2015) found that after the earthquakes in Nepal in 2015, in the successful resilience-building PPPs the following points were important:



- Efforts to “build back better” must incorporate support for political transition as a foundation for resilience;
- Strengthening pre-established partnerships between the public and private sectors can improve responses to and reduce the impacts of future emergencies;
- Crucial economic sectors, such as tourism and construction, can benefit from public-private cooperation for recovery and reconstruction. Implementing and enforcing building codes and focusing on making schools safe should be a high priority in reconstruction efforts, for which the private sector can offer unique expertise;
- Innovative financing arrangements can be crucial parts of reconstruction and building resilience.

**World Bank (2016)** found that international development partners should:

- Foster political will to incorporate climate resilience in multisector policy frameworks in client countries;
- Bolster technical assistance to governments on integration of climate resilience into PPP policy development and infrastructure design standards;
- Encourage governments to add specific emphasis of climate risk and adaptation in public investment management frameworks as early action on adaptation is cost-effective;
- Help to build capacity of government counterparts, investors and PPP experts on how to make robust decisions in the face of climate uncertainties;
- Leverage climate finance and financial risk mitigation instruments to support PPP adaptation investments.

According to the study, governments should:

- Incorporate climate resilience in project preparation and transaction structures and introduce flexibility into existing PPP policy frameworks;
- Level the playing field by requiring inclusion of climate risk and resilience in PPP procurement;
- Harness private sector adaptation expertise;
- Review the language of PPP contracts to build flexibility into contract management and to differentiate ‘Acts of God’ from climate change;
- Develop and implement climate resilience measures throughout the project lifecycle.

72. Likewise, PPPs may be important tools to help coordinate activities among actors. An example of this is discussed in Box 5, where the business community in Morocco recognized a role for themselves in adaptation activities

#### **Box 5. The Confederation of Business Communities of Morocco Capacity Building Initiative**

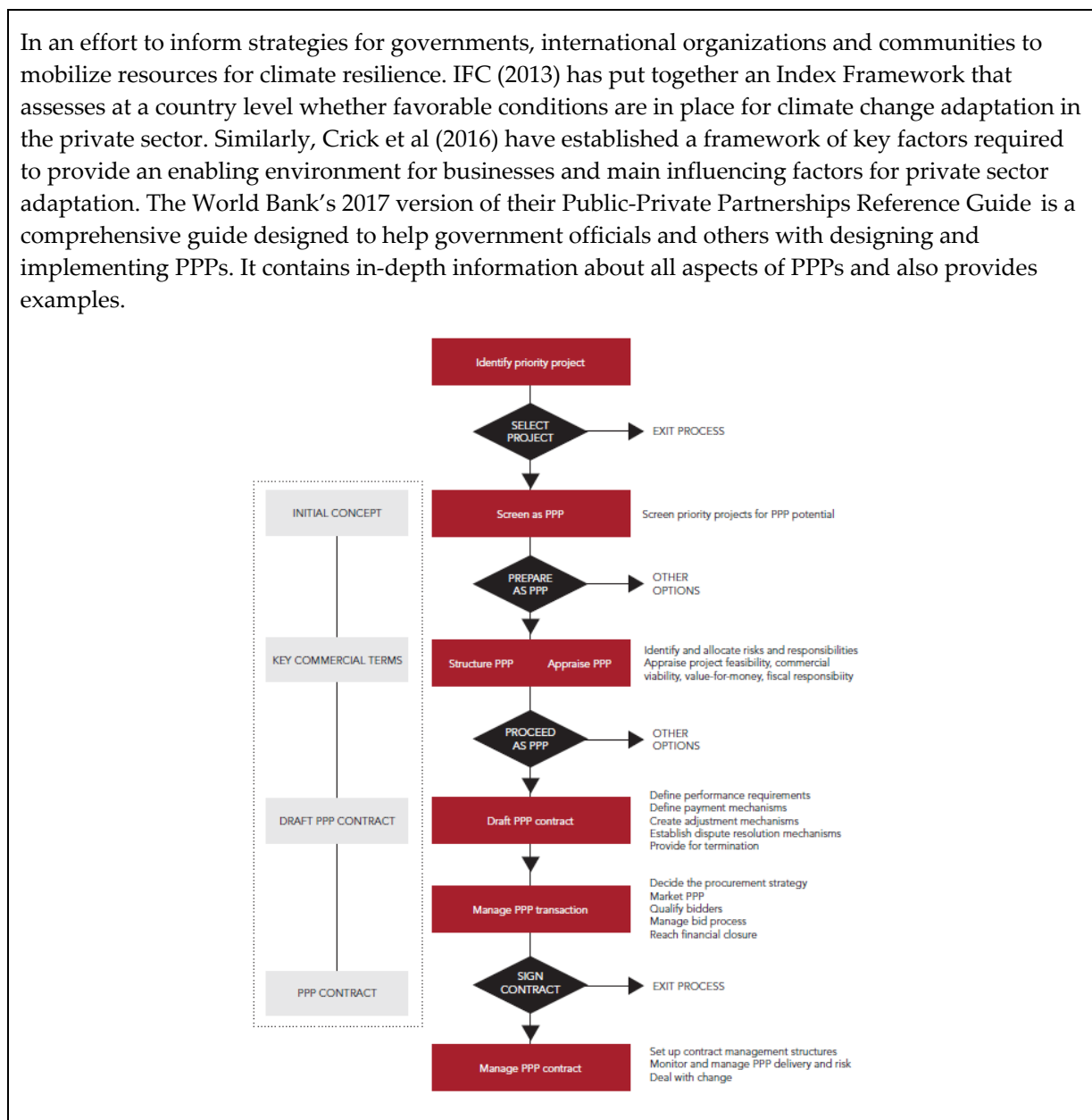
The Confederation of Business Communities of Morocco CBCM developed a capacity building initiative to make clear the link between economic risks within business and climate change risks more broadly. While this program has been successful to date, business owners are interested in pursuing closer partnerships with government actors, where the public sector may provide a roadmap for action, and private actors can participate accordingly. A public-private partnership of this sort would capitalize on the convening power of government-led initiatives, while benefitting from the expertise and efficiency brought by private companies.

*Note:* Based on an intervention during Session 2 of the TEMs on 16 May 2017, available online at <tep-a.org/sessions/session-2-break-group-iii>.

73. Working closely with private actors may remove some of the institutional barriers associated with government-coordinate action, and allow well-resourced companies and investors to apply their capabilities for both profit and public benefit. Box 6 provides an overview of frameworks and guides for building PPPs

### Box 6. Frameworks and guides for building PPPs

In an effort to inform strategies for governments, international organizations and communities to mobilize resources for climate resilience. IFC (2013) has put together an Index Framework that assesses at a country level whether favorable conditions are in place for climate change adaptation in the private sector. Similarly, Crick et al (2016) have established a framework of key factors required to provide an enabling environment for businesses and main influencing factors for private sector adaptation. The World Bank's 2017 version of their Public-Private Partnerships Reference Guide is a comprehensive guide designed to help government officials and others with designing and implementing PPPs. It contains in-depth information about all aspects of PPPs and also provides examples.



## 9. Needs, remaining barriers and opportunities

74. While the private sector is increasingly undertaking adaptation action and providing services, including through public-private partnerships and in the context of NAPs, many reports highlight remaining needs and barriers constraining the private sector in further engaging in adaptation. At the same time, many reports identified specific opportunities for overcoming barriers and enhancing private sector adaptation action, as well as provision of adaptation services.

## 9.1. Needs

75. Needs related to adaptation approaches include:
- a) Looking at “total climate risk” when considering adaptation investment and finance, i.e. taking into account existing risk, future risk due to development and additional risk due to climate change (WEF, 2014);
  - b) Highlighting the value of private sector expertise in developing options for using risk management approaches and insurance for adaptation and building resilience (PWC, 2010);
  - c) Capacity building for companies on adaptation and risk management approaches (Gutierrez, 2016);
  - d) Sector-specific approaches, for example, policies and investment strategies, and international knowledge platform to share best practices and reliable climate information; and targeted training in climate-smart agriculture and sustainable certification and centralized information sources to provide a single go-to place for reliable, up-to-date data and analytical tools in order to help companies reduce their uncertainty and support their efforts to enhance their resilience would be useful for private sector companies (C2ES, 2013; ITC, 2015).
76. Research, knowledge and information needs identified include:
- a) Creating and providing research, modelling, and tools that are critical to supporting business decisions, including tailored information by public and academic sources to help the private sector adapt and further support countries’ adaptation efforts, including for exporters (OECD 2011; WRI, 2013a; ITC, 2015), in particular governments could provide technical and knowledge-related support for the private sector on operational risk management practices, such as providing training on reducing water in operations or making information on climate trends and patterns available to the public (WRI, 2013b);
  - b) Further research on whether companies’ responses to current climate variability help or hinder their responses to future climate change (OECD, 2011);
  - c) Information campaigns to provide accurate information and knowledge on climate impacts, as well as to showcase promising adaptation strategies (Druce et al, 2016).
77. Data and metrics needs include:
- a) More and better national data, and availability of data, particularly in developing countries, is required to inform private sector adaptation efforts (SBI and UNEP FI 2011; WEF, 2014);
  - b) More user-friendly, more readily accessible, and finer-grained information and tools on future climate risks for the private sector (WRI, 2013b);
  - c) Advancing methodologies, metrics and indicators for the private sector to assess vulnerability, prioritize adaptation measures and allocate investment most effectively, including in relation to current and future vulnerabilities, risks and opportunities and major global trends like urbanization, population shifts and economic development (WEF, 2014);
  - d) Advancing indices to inform decision-makers on where climate adaptation is most necessary, and how best to allocate adaptation investments, including for prioritizing pre-disaster efforts, especially for companies in Sub-Saharan African nations (WEF, 2014).
78. Collaborating, learning and sharing needs include:

- 
- a) Government-lead creation of enabling environments, including provision of regulatory environments that stimulate private sector engagement by encouraging or requiring adaptation and a larger private sector role in their development (Donor Committee for Enterprise Development 2016). Governments can support and coordinate efforts around climate change research, enhance the resilience to weather extremes of critical public infrastructure, and advance and approve resilience planning in regulated sectors such as water, electricity, and insurance (C2ES, 2013).
  - b) Creation of more opportunities for all stakeholders, including government and private sector to network and collaborate on data collection, vulnerability and risk assessment, adaptation strategies and actions (ITC, 2015; OECD, 2011; PWC, 2010) including through public-private collaboration, alongside scientific organisations and academia (C2ES, 2013; ITC, 2015; OECD 2011; PWC, 2010; WRI, 2013b; West Midlands Climate Change Adaptation Partnership, 2010) and collaboration between private sector and finance sector practitioners and decision makers with the Global Framework for Climate Services (GFCS) and Global Climate Observing System (GCOS) to better link science-based regional climate forecasts and information (C2ES, 2013);
  - c) Creation of more opportunities for sharing experiences and best practice within the private sector and within governments and other organizations on how to support the private sector. Examples of such fora include (but are not limited to) the DCED Green Growth Working Group, Green Growth Knowledge Platform, the Adaptation Futures Conferences, and the AdaptationCommunity.net community of practice (Donor Committee for Enterprise Development, 2016);
  - d) Awareness-raising by governments on climate risks and the need for private sector engagement in adaptation, including long-term planning (ITC, 2015, WEF, 2014);
  - e) Opportunities for better representation of the private sector at the international level and within the UNFCCC process (PWC, 2010);
  - f) Opportunities for showcasing successful technology diffusion to build confidence (PWC, 2010);
  - g) Opportunities for company-to-company learning about ways and examples of companies that are reaching out to universities or government experts, working with their insurance companies, or consultants to more fully understand their vulnerabilities and undertake comprehensive climate vulnerability assessments (C2ES, 2013; Sustainable Business Institute and UNEP FI 2011);
  - h) A centralized information clearinghouse to provide a single go-to place for reliable, up-to-date data and analytical tools in order to help companies reduce their uncertainty and support their efforts to enhance their resilience (C2ES, 2013);
  - i) Government support for training, research, provision of guidance and tools, dialogues and linkages between research centers and government experts, and knowledge networks between the private sector and academia to support companies' implementation of adaptation (ITC, 2015; OECD, 2011).
79. Finance and investment needs include:
- a) Better coordination between private and public sectors to scale up investment in adaptation activities, for instance through government provision of investment frameworks that making

- investment attractive (WEF, 2014), in consideration of the need for private sector funding for adaptation (PWC, 2010);
- b) Provision of guidance in consideration of linkages across water, food and energy systems and sectors when investing in adaptation so that another part of the nexus is not compromised and in taking a multi-stakeholder approach to guide investment in a coordinated and holistic way (WEF, 2014);
  - c) Better analysis and understanding of the economic case for adaptation, including whether observed adaptation levels match the efficient level, and the costs and benefits of early versus delayed responses (OECD, 2011);
  - d) Awareness raising among the private sector on investment opportunities associated with adaptation (PWC, 2010);
  - e) More and better coordination at the international level between UNFCCC process, multilateral banks and funds and the private sector, including on public-private engagement through the GCF (PWC, 2010);
  - f) Provision of financial incentives by governments, including loans or grants to create a more enabling environment for business to act (WRI, 2013b);
  - g) Provision of financial support by governments for developing products, technologies, and processes that build climate resilience (ITC, 2015; WRI, 2013b);
  - h) Mainstreamed of adaptation investment through climate-proofing broader private sector development programmes, for instance, through evaluating programme climate vulnerabilities and integrating climate risk analyses into project design and selection processes (Donor Committee for Enterprise Development, 2016);
  - i) Supporting private sector capacity in new and existing adaptation-relevant markets, such as adaptation consultancy work and weather / climate forecasting and communication (Donor Committee for Enterprise Development, 2016);
  - j) Building knowledge and raising awareness of the need for adaptation in sectors carrying out infrastructure work, such as engineering, construction and water management (Donor Committee for Enterprise Development, 2016; ITC, 2015);
  - k) Encouraging investment in adaptation, in consideration of the estimate that up to 65% of the increase in the projected losses due to climate change could be averted through adaptation investments (WEF, 2014);
  - l) Establishing indicative criteria that a private sector adaptation finance mechanism will need to satisfy in order to be replicable and scalable. As adaptation covers a diverse range of actors and sectors, "one size fits all" criteria are not viable (WEF, 2014);
  - m) Identifying metrics associated with the incremental costs of building enhanced climate resilience, taking into consideration regional variations both in terms of climate change and its impact (WEF, 2014);
  - n) Developing conceptual "straw man" proposals for additional adaptation investment mechanisms for the private sector (WEF, 2014);

- o) More clarification on the private sector's role in financing adaptation, noting that the financial sector has little experience in identifying and targeting climate adaptation (Pauw 2015, Buchner et al., 2013; Persson et al. 2009);
- p) Focus on addressing market imperfections, which cause barriers to adaptation financing, such as positive externalities, imperfect capital markets, and incomplete or asymmetric information (Druce et al. 2016);
- q) Development and use of financial instruments, such as taxes or subsidies that capture the value of the positive externality and provide reimbursement to the investor (Druce et al. 2016);
- r) Ensuring adequate supply of finance for adaptation and resilience investments (Druce et al. 2016).

## 9.2. Challenges and barriers to action

80. Barriers for action can be divided into four main categories (PWC, 2010; WRI 2013a; the International Business Leaders Forum 2012; OECD 2011 and C2ES, 2013) including:

- a) Information and technology;
- b) Economics;
- c) Policy-making;
- d) Social dimensions.

81. These categories are not mutually exclusive, but can overlap, for example, barriers related to policy-making are often manifested in information- or economic-related barriers. Moreover, the importance of different barriers seems to vary depending on the size of the company, whether referring to multi-national companies or SMEs in developing countries. Barriers differ also depending on the location and sector of the business (WRI and UNDP 2015).

82. For major multi-national companies, the timing and severity of climate impacts often inhibits investment in resilience beyond business as usual, but that the majority of companies recognize risks from extreme weather and climate change, and many see these risks in the present or near term, uncertainty about the precise nature (C2ES 2013). A few leading companies are taking steps to address climate risks where they see significant opportunities to become more efficient, reduce costs, or provide greater value to customers, where there is a clear business case to do so (C2ES 2013). This review found that in many cases the business response is largely a continuation of existing practices based on a historical picture of past risks, and often fails to adequately consider changing climate and weather conditions (C2ES 2013).

83. Among the most pressing barriers is a lack of adequate information (GEF 2012). Companies may find it hard to find the information, interpret information and research, or they might regard it too uncertain (WRI 2013b; PWC 2010; GEF 2012; C2ES 2013). The majority of companies recognize the near-term risks, while the gradual long term impacts are more difficult to comprehend (C2ES, 2013). The business response can be a continuation of existing practices based on past risks, and often fails to adequately consider changing climate and weather conditions of the future. Thus, the most common strategy for addressing climate-related risks may leave companies without the adequate resilience (C2ES, 2013). For proactive private sector involvement, short to medium-term projections of localized climate impacts are necessary (GEF, 2012). But even when the information is available, companies may not have the required expertise to evaluate the risks based on the data (C2ES, 2013).

84. Companies are likely to face trade-offs between short-term profitability and high upfront investments for adaptation – consequently or not, they frequently experience problems to finance their adaptation measures (C2ES, 2013; GEF 2012; Meister Consultants Group Inc. 2013). Furthermore, companies face troubles quantifying the risk that climate change poses to them, and thus are unable to make educated cost-benefit calculations (WRI, 2013a; UN Global Compact, UNEP, Oxfam and WRI, 2011; C2ES, 2013).
85. Lack of clear policy signals towards resilience building is identified as a barrier for action. Companies rely on the critical infrastructure provided by the governmental authorities and in the absence of political will to build resilience in that infrastructure, a signal of wait-and-see protocol is sent to the private sector (C2ES, 2013).
86. The social context can pose a significant barrier for example to adoption of new technologies and production methods. According to the literature, culture affects risk perception and risk management, which may produce a barrier adapting to climate change (WRI and UNDP, 2015).
87. Even though the barriers for SMEs are the same as presented above, due to their limited capacity to assess risks, adapt and take advantage of opportunities associated with climate change, SMEs especially in the developing countries face even more pressing challenges. Smaller businesses are likely to rely on short-term profits, which makes investing in adapting to long-term climate change seem far less attractive (WRI and UNDP, 2015.) Most of the financing commitments made by financial institutions can be seen to target developed country markets, and the extent of insurance cover for weather-related losses is five times higher in developed countries compared to developing countries (Frankfurt School and UNEP, 2011). Furthermore, for the developing countries, markets tend to be limited and the institutional barriers for private sector engagement tend to be significant (GEF, 2012). As a consequence, high upfront investments are even more difficult to realize for the SMEs (Meister Consultants Group Inc., 2013). SMEs with small budgets or enterprises in remote rural areas, are also unlikely to have access to external expertise, since the markets for adaptation and disaster risk management consultancy services are still developing (Donor Committee for Enterprise Development, 2016).
88. Challenges are likely more difficult in many developing countries, because national and local government institutions tend to struggle with formulating and implementing policies for climate change adaptation (WRI and UNDP, 2015).
89. The literature points to the high importance of the finance sector in enhancing adaptation action. Results of a study looking at sixty financial service providers showed that only one-third of the respondents felt sufficiently informed on climate change (Sustainable Business Institute and UNEP FI, 2011). One of the key challenges in financing adaptation is that the investors do not have a track record of asset performance that could help inform investor decision making. This can be a barrier to the provision of debt capital in particular (Connell et al. 2016).
90. Barriers can also be seen as market failures which suppress levels of investment in adaptation below the required amount. These barriers may be positive externalities, which means that private investments in adaptation create positive consequences, which are not however captured as financial returns and thus do not reflect the value of adaptation action. The externalities can also be described as imperfect capital markets, when for example short-term credits are unable to allocate capital for long-term climate impacts. One of the market failures is related to incomplete or asymmetric information, the issue that is evident throughout the literature. According to literature, describing barriers in this way can help to inform public finance interventions in order to eliminate the barriers or compensate the private actors for the effects on the risk/return profile (Connell et al. 2016).

91. To better understand barriers to climate change adaptation for the private sector, in particular for funding, methodologies for barrier-analysis have been developed (Connell et al., 2016). The six most frequently discussed typological groupings of barriers in the literature are: financial barriers, information barriers, institutional barriers, political and regulatory barriers, technological barriers, and socio-cultural barriers, as outlined in the figure 14 below.

**Figure 14. Six most frequently discussed typological groupings of barriers**

| Adaptation Barriers    | Description   | CPI 2015 <sup>64</sup>                      | Islam 2014 <sup>65</sup>  | Antwi-Agyei <sup>66</sup>   | Barnett <sup>67</sup>                                       | Jones <sup>68</sup>                               | Vivid Economics <sup>69</sup>  | PCIR 2012 <sup>70</sup>   | Stenek 2013 <sup>71</sup>                           |
|------------------------|---|---|---|---|---|---|--|---|---|
| Financial              | Lack of financial resource, budget constraints or lack of access to credit  | Funding, revenue and risk coverage gap      | Budget constraints; limited access to formal credit                           | Lack of resources; limited availability of formal, market-rate loans to smallholders and micro-SMEs |   |   | Lack of donor co-financing; lack of long-term debt   | Provision of public goods, split incentives   | Lack of economic incentives                         |
| Information            | Informational and knowledge gaps pertaining to future climate developments; lack of, or limited access to, tools to assess risks and opportunities related to the implementation of adaptation projects | Knowledge gaps                              |   | Lack of climate data; lack of awareness of climate change and climate risks                         |   | Human and informational barriers                  | Lack of awareness and capacity; asymmetric information   | Imperfect information   | Lack of data and information                        |
| Institutional          | General shortcomings in institutional arrangements and governance, in the public and/ or private space  |   | Lack of access to markets   | Lack of institutional capacity  | Path dependency and inertia (lack of willingness to change) |   | Shortcomings in institutional and regulatory environment, e.g. institutional competition, layered bureaucracy and entrenched rules | Shortcomings in governance and institutional arrangements, e.g. accountability and transparency, coordination and community involvement | Path dependency in/for institutional arrangements   |
| Political & Regulatory | Adverse effects of policy & regulation on the business motivations for adaptation investing   | Policy gap; policy distorting price signals | Lack of legal and regulatory enforcement                                      | Top-down government approach not effective locally  |   |   |  | Lack policy and regulatory barriers   | lack of policies (standards, codes, zoning permits) |
| Technological          | Lacking availability of, or access to, advanced technologies, tools and structures  |   | Technological limitations in modelling accurate weather and climate forecasts | Top-down government approach not effective locally  |   |   |  |   | Lack of policies (standards, codes, zoning permits) |
| Social & Cultural      | Social and cultural processes that govern how people and other stakeholders react to climate variability and change   |   | Lack of education/ skills; ethics and coercion                                | Technology not applicable to local context  |   | Cognitive; normative; institutional <sup>72</sup> |  | Behavioural barriers  |   |

Source: Connell et al. (2016)

### 9.3. Opportunities

92. According to the literature (GEF, 2012; IFC, 2013; C2ES, 2013; Meister Consultants Group Inc., 2013.), and as outlined in the section on the business case for adaptation, there are two main drivers for private sector adaptation action:

- a) Revenue losses that companies are experiencing due to climate change;
- b) The market possibilities that adaptation needs create.

93. The following are identified as opportunities in the literature to address the needs and overcome the barriers with a view to enhancing private sector engagement in adaptation:

94. Information:

- a) Easy access to accurate and easily interpretable climate projections, observations and risk scenarios (IFC, 2013; Connell et al. 2016; GEF, 2012; C2ES, 2013);
- b) Information on the costs and benefits of adaptation actions (IFC, 2013);



- c) Available training on technical and knowledge-related operations (WRI, 2013b; WRI and UNDP, 2015).
95. Policy-making:
- a) Clear signals that enhance the importance of adaptation (C2ES, 2013);
  - b) Coordinating agencies made of government, private sector, civil society, NGOs and/or academia with activities focused on climate risk and adaptation, including funding for climate change adaptation in the private sector (IFC, 2013);
  - c) Governmental support on security and stability of the investments, which is especially important for the SMEs in developing countries (DIE, 2017).
96. Economics:
- a) Public and/or private financing instruments (e.g. loans, equity or guarantees) in support of climate change adaptation uptake in the private sector, including purchase of technologies, implementation of adaptation actions and/or R&D (e.g. loans for water efficiency investments) (IFC, 2013; WRI 2013b);
  - b) Insurance or financial risk management products that transfer climate-related risks, while incentivizing risk reduction actions, and combine pre-event and post-event financing instruments (IFC 2013; WRI 2013b; IFC 2013);
  - c) Tax incentives, interest rate subsidies, credit enhancement, and dedicated financial institutions for green financing (Connell et al. 2016; WRI and UNDP 2015);
  - d) Supporting investor engagement and risk management by creating platforms for cross-collaboration and developing public-private partnerships to decrease private investment risk (WRI, 2013b).
97. Social dimension:
- a) Some of literature stresses the idea that adaptation measures are efficient, when there is a mutually shared sense of responsibility across the public and private sector (Asia-Pacific Economic Cooperation 2013). Companies can gain competitive advantage for showing willingness for adaptation in markets where sustainability or social responsibility of companies is highly valued (Meister Consultants Group Inc. 2013).

## **10. Tools, guides, frameworks and approaches for private sector adaptation**

98. This review revealed that many organisations, networks and numerous reports provide and suggest approaches, tools, guides and frameworks for private sector organisations to use to enable them to adapt. This section presents an overview of materials available, organised by focus area, including:
- a) Climate information services;
  - b) Risk assessment;
  - c) Approaches for planning and implementing adaptation;
  - d) Evaluation and monitoring.

99. Some of the tools are designed for specific focus areas, whereas some are more comprehensive and can cover multiple areas. In this section, a short introduction to the type of tools is given as well as some examples. An overview of the tools reviewed is presented in table 1. The review on tools and frameworks is not exhaustive, but contains mere examples.

**Table 1. Overview of tools and frameworks found in the literature**

| <b>Tool</b>            | <b>Provider</b>  | <b>Focus</b>   | <b>Method</b>  | <b>Available</b>  |
|------------------------|--|--|--|---|
| Climate Expert website | Global Programme Private Sector Adaptation/<br>Deutsche Gesellschaft für Internationale Zusammenarbeit | Toolset<br>Risk/opportunity assessment<br>Building adaptation strategies   | 4-step approach and working materials<br>Online course<br>Case studies                   | <a href="http://www.climate-expert.org/en/home/">http://www.climate-expert.org/en/home/</a>   |
| ADAPT                  | PREP (Partnership for Resilience and Environmental Preparedness)                                       | Guide<br>Risk/opportunity assessment<br>Building adaptation strategies   | Step-by-step guidance<br>Case studies  | <a href="https://www.bsr.org/reports/PREP-Value-Chain-Climate-Resilience_copy.pdf">https://www.bsr.org/reports/PREP-Value-Chain-Climate-Resilience_copy.pdf</a> |
| Adaptation Wizard      | UKCIP  | Toolset<br>Climate projections<br>Vulnerability assessment<br>Identification of adaptation options<br>Implementation of an adaptation strategy | 5-step process<br>Projections & scenarios<br>Case studies<br>BACLIAT<br>LCLIP<br>AdaptME | <a href="http://www.ukcip.org.uk/wizard/">http://www.ukcip.org.uk/wizard/</a>   |
| BACLIAT                | UKCIP  | Vulnerability assessment   |  | <a href="http://www.ukcip.org.uk/wizard/future-climate-vulnerability/bacليات/">http://www.ukcip.org.uk/wizard/future-climate-vulnerability/bacليات/</a>         |
| <a href="#">LCLIP</a>  | UKCIP  | Vulnerability assessment   |  | <a href="http://www.ukcip.org.uk/wizard/current-climate-vulnerability/lclip/">http://www.ukcip.org.uk/wizard/current-climate-vulnerability/lclip/</a>           |

|   |                     |  |   |  |
|---|---------------------|--|---|--|
| Copernicus                                  | EU                  | Climate information services   | Satellite and on-ground climate data gathered temperature Climate indicators, maps and charts | <a href="http://www.copernicus.eu/main/overview">http://www.copernicus.eu/main/overview</a><br><a href="http://copernicus.eu/main/climate-change">http://copernicus.eu/main/climate-change</a> |
| SECTEUR                                     | EU                  | Climate information services<br>Vulnerability assessment<br>Identification of adaptation options | Satellite and on-ground climate data gathered temperature Analyses & Recommendations          | <a href="https://climate.copernicus.eu/sectoral-information-system">https://climate.copernicus.eu/sectoral-information-system</a>  |
| PRECIS                                      | Climate Services UK | Climate information services   | Regional climate modelling system   | <a href="http://www.metoffice.gov.uk/services/international-development/climate-consultancy">http://www.metoffice.gov.uk/services/international-development/climate-consultancy</a>            |
| AdaptME                                     | UKCIP               | Evaluation & monitoring  | Evaluate adaptation actions   | <a href="http://www.ukcip.org.uk/wp-content/PDFs/UKCIP-AdaptME.pdf">http://www.ukcip.org.uk/wp-content/PDFs/UKCIP-AdaptME.pdf</a>  |
| Public-Private Partnerships Reference Guide | World Bank          | General Guide on PPPs  | Not focused on climate adaptation, but provides general knowledge on PPPs.                    | <a href="https://library.pppknowledgelab.org/documents/4699/download">https://library.pppknowledgelab.org/documents/4699/download</a>  |

### 10.1. Climate information services

100. As presented earlier on the review, this literature review highlights the need for information on climate change for the private sector, as a key barrier to advancing private sector adaptation efforts, with accurate, easily interpretable climate information needed (WRI, 2013a; PWC, 2010; GEF, 2012; C2ES, 2013; IFC 2013; Connell et al., 2016). Multiple public and private services do provide climate information services, which could, for example, be further tailored to private sector needs. Examples include services, such as Copernicus, PRECIS and the UK Climate Projections website.

101. Copernicus is a European Union Programme, which offers free of use, near-real-time information services based on satellite Earth Observation and data gathered in the ground. A beta-version of Copernicus Climate Change Service presents several climate indicators, such as sea-level rise and temperature increase, and monthly maps & charts for free (Alós et al., 2017).

102. The Climate Service UK's PRECIS, the regional climate modelling system can be applied to any area of the globe to generate detailed climate change information. PRECIS, has been used by over 70

developing countries to conduct their own climate simulations to help them with their climate change adaptation decisions. PRECIS is used in a UNESCO and UNEP -funded project in the Nile to ascertain changes in the water balance. It creates an ensemble of projections made by running slightly different versions of the same model, which will help to assess future climate change by estimating prediction uncertainty.

## 10.2. Risk assessment

103. Comprehensive climate information is a base for risk assessment, but alone it is not sufficient to provide private sector the support companies need for better risk assessments. As shown in the literature, companies are more prepared to assess short-term risks than gradual long-term risks related to the climate change (C2ES, 2013). However, the in-house capacity of the businesses may be insufficient to make such assessments (OECD, 2011).

104. In order to meet the user needs in private sector and other organizations, the EU-funded Copernicus created a program called SECTEUR Sector Engagement for the Copernicus Climate Change Service: Translating European User Requirements. It engages directly with end-users and analyses their requirements; identify gaps; deliver recommendations on future adaptation needs based on a throughout risk assessment. It covers sectors such as agriculture and forestry, coastal areas, health, infrastructure and insurance.

105. BACLIAT (UKCIP 2017) is another example of a vulnerability assessment tool for businesses. It offers companies a free workshop-based tool that can be downloaded from the UKCIP website. The BACLIAT tool can be used as a part of UKCIP's broader Adaptation Wizard, which includes also LCLIP, a Local Climate Impacts Profile tool that provides a picture of the vulnerability of a business to recent or current local weather events (UKCIP 2017).

106. The Task Force for Climate-Related Financial Disclosure (TCFD, 2017) provides a framework for the private sector to assess types of climate risks, in consideration of various climate change scenarios, as well as guidelines for large companies to disclose their climate risk. Disclosing climate risk may not only help large companies to adapt and drive the preparation of adaptation strategies, but all types of companies.

107. Various other organisations and authors have developed frameworks for understanding and addressing climate risks from the private sector's perspective, and for the private sector to use (C2ES, 2013; PREP, 2012; IBLF, 2012).

## 10.3. Approaches to planning and implementing adaptation

108. Many reports gave an overview of general methods and approaches for the private sector to adapt, including those used by leading companies to build greater resilience into their operations, supply chains, preparedness policies, and risk management plans (C2ES, 2013). In general, these focused on:

- a) Build Awareness. Companies are beginning now to build a common base of understanding of the risks associated with extreme weather and impacts of climate change, and of their potential effects on operations, facilities, supply chains, employees, customers, and communities;
- b) Assess Vulnerabilities. Companies are building on existing business risk assessment activities to identify how changes in the likelihood or magnitude of extreme weather events may affect their business;

- c) **Manage Risks and Pursue Opportunities.** Companies are prioritizing options and measures to take, and integrating them into enterprise-wide risk management systems. It is important that companies work across their value chain, and with local governments and stakeholders, to ensure that actions taken will build in an appropriate level of resilience;
- d) **Assessment and Review.** Leading companies, by incorporating the risks of physical impacts into ongoing risk management activities, are periodically updating their understanding of the risks and their responses as new information becomes available, and are laying the groundwork for learning and developing resilience strategies and capacities over time.

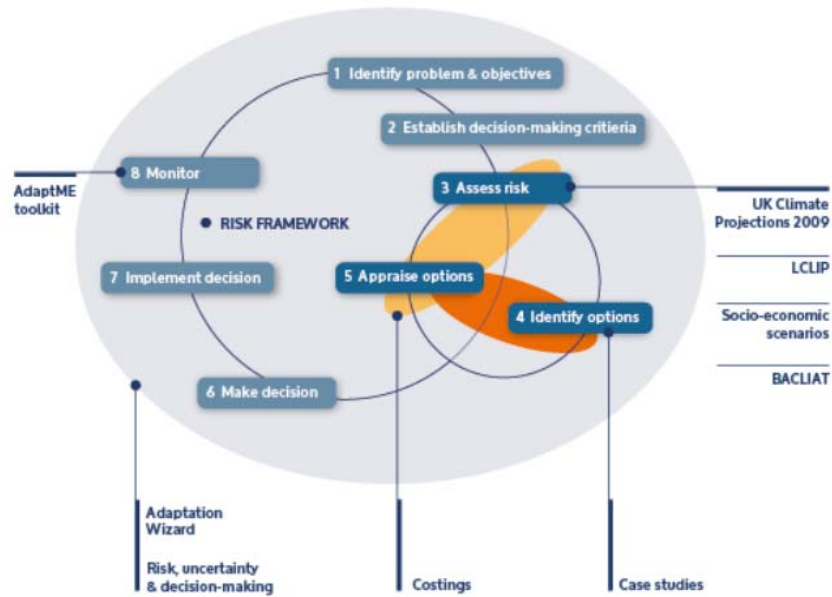
109. The literature shows that gaps still remain between risk assessment and risk managing actions (OECD 2011). In order to close this gap, there are implementation tools available for businesses willing to enhance their adaptation action. The literature review reveals a body of guides and frameworks designed for businesses to incorporate adaptation actions into their business plans. These frameworks make suggestions for businesses on how to begin to approach the adaptation task, and offer toolsets for implementation.

110. Frameworks may be built on a cost-benefit approach, as in for example a framework presented by the Center for Climate and Energy Solutions (2013). However, many of these frameworks advice businesses to adopt adaptation as a part of their value-chain. As an example, The Partnership for Resilience and Environmental Preparedness (PREP) (2012) has developed a guide offering companies a set of tools to consider climate resilience in the perspective of their value chain combined with the community's needs. Community's risks are viewed as company's risks. According to the guide value chain approach presents opportunities for lifecycle thinking and collaborations beyond national borders. According to the guide, this approach will also help the financial services and insurance sectors understand how to engage with the companies they invest in or insure to manage future risk. The guide introduces the Business ADAPT (analyse, develop, assess, prioritize, and tackle) tool. The tool follows a step-by-step climate resilience framework inspired by existing good practice risk management models. Similar approach is presented by International Business Leader Forum, which make the case of companies' social responsibility and possibilities for public advocacy (International Business Leaders Forum 2012).

111. Examples of toolsets that offer both the framework and the tools were also discovered. These include, for example, Climate Expert website (2017) and Adaptation Wizard. The Climate Expert website provides materials, tools and guidance for SMEs aimed at raising awareness and building practical skills to prepare for the impacts of climate change, including an online learning programme "Becoming a Climate Expert" and a Toolbox with materials and further information. The project has identified, tested, assessed and disseminated adaptation concepts in various sectors for SMEs in Rwanda, Bangladesh, Morocco and Costa Rica. Findings, case studies, tools and materials can be found at: <[www.climate-expert.org](http://www.climate-expert.org)>. It is a result of a project called The Global Programme Private Sector Adaptation (2014-17), which aims at sensitization and capacity building on climate change adaptation in the private sector targeting SMEs in developing countries.

112. The Adaptation Wizard is a five-step process to help businesses assess their vulnerability, identify adaptation action options, and develop and implement a climate change adaptation strategy. It includes tools already presented, such as BACLIAT and LCLIP (UKCIP 2017).

**Figure 15. Overview of the Adaptation Wizard tool set**



Source: UKCIP (2017)

#### 10.4. Evaluation and monitoring

113. In a process of adaptation, evaluation is identified as a key to ensure that adaptation actions stay on track. Most of the presented toolsets include also tools for evaluating and monitoring. For example, the Adaptation Wizard (UKCIP) provides its users with an evaluation and monitoring tool called AdaptME, which is a toolkit that helps businesses to evaluate their adaptation action's efficiency, effectiveness, accountability and outcomes.

## Annex: Overview of literature reviewed, including focus and scope

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| <p>Alós AL, Bergeron C, Dee D, Raoult B and Thépaut J. 2017. <i>Climate Service Develops User-friendly Data Store</i>. ECMWF Newsletter No. 151. Available at <a href="https://www.ecmwf.int/sites/default/files/elibrary/2017/17181-newsletter-no-151-spring-2017.pdf">https://www.ecmwf.int/sites/default/files/elibrary/2017/17181-newsletter-no-151-spring-2017.pdf</a>.</p>   | <p><b>Tools and frameworks</b></p> <p>This article presents the Copernicus' work on a climate data store, which will offer geophysical information to analyse climate change indicators. The data store will provide a catalogue of all available data and products, including for example: in-situ observations and metadata, output from global &amp; regional analyses, climate models, climate data records etc.</p>   |
| <p>Asia-Pacific Economic Cooperation. 2013. <i>New Approaches on Public Private Partnerships for Disaster Resilience</i>. Available at <a href="http://www.apec-epwg.org/public/uploadfile/act/13_epwg1_003.pdf">http://www.apec-epwg.org/public/uploadfile/act/13_epwg1_003.pdf</a>.</p>  | <p><b>Public-private collaboration and partnerships</b></p> <p>This report gathers best practice examples of PPPs from across APEC. It emphasizes the importance of a multistakeholder approach to disaster resilience. Best practice examples are grouped under six categories: Resilience efforts at the economy level, partnerships for improved community resilience, business contributions to reducing risks through recovery, collaborative efforts to enhance business &amp; infrastructure resilience and partnerships for pre-disaster risk financing through agricultural insurance. The paper also gives public sector some recommendations on how to encourage greater private sector engagement.</p> |
| <p>Atteridge A. 2011. <i>Will private finance support climate change adaptation in developing countries? Historical patterns as a window on future private-sector climate finance</i>. Working Paper No. 2011–05. Stockholm Environment Institute. Available at <a href="https://www.sei-international.org/mediamanager/documents/Publications/SEI-WorkingPaper-Atteridge-WillPrivateFinanceSupportClimateChangeAdaptationInDevelopingCountries-2011.pdf">https://www.sei-international.org/mediamanager/documents/Publications/SEI-WorkingPaper-Atteridge-WillPrivateFinanceSupportClimateChangeAdaptationInDevelopingCountries-2011.pdf</a>.</p> | <p><b>Finance</b></p> <p>This paper explores historical patterns of investment and what these reveal about the potential for the private sector to play a significant role in climate finance, specifically in the context of the adaptation needs of developing countries. It finds that private-sector finance is not evenly distributed among countries and sectors, and often does not match the most pressing needs of developing countries.</p>  |
| <p>AXA Group and UNEP FI (United Nations Environment Programme Financial Initiative) Principles for Sustainable Insurance Initiative. 2015. <i>Business Unusual: Why the climate is changing the rules</i></p>   | <p><b>Small, medium and micro enterprises; Finance; Insurance</b></p> <p>The paper is based in a survey including 1,104 online interviews with senior decision makers at SMEs in 11 key markets, as well as 41 interviews with Urban Leaders across 18 markets. The study's goal is to capture the views of city leaders and SMEs on climate</p>   |

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| <p>for our cities and SMEs. Available at <a href="http://www.unepfi.org/fileadmin/documents/busines_unusual.pdf">http://www.unepfi.org/fileadmin/documents/busines_unusual.pdf</a>.</p>   | <p>change and SMEs resilience. It concludes that SMEs are currently poorly equipped to answer to the challenge of adaptation, but the insurance industry has a major opportunity to advise SMEs on climate risk assessment, support them in the development of resilience plans and help drive behavioral change by incentivizing action in favor of resilience.</p>  |
| <p>Beal G, Atkinson E and Birt J. 2016. <i>The Emerging Role of Accountants in Enabling Organisational Adaptation and Resilience to a Changing Climate</i>. Available at <a href="http://edepot.wur.nl/381404">http://edepot.wur.nl/381404</a>.</p>   | <p><b>Finance</b><br/>This presentation showcases a new strategic initiative, aiming to pinpoint the role that accountants can play in helping organizations adapt to a changing climate.</p>   |
| <p>Bouwer L and Aerts J. 2006. Financing climate change adaptation. <i>Disasters</i>. 30(1): pp.49–63.</p>  | <p><b>Finance</b><br/>This article provides an overview of the role of the private sector in climate finance. The article analyses the potential of private-sector engagement in adaptation and adaptation financing in developing countries by conceptualizing the private sector's roles and motivation therein. For further inquiry interviews were conducted with key stakeholders for adaptation of Zambia's agricultural sector, including on ways in which the government can incentivize private-sector engagement in adaptation. The paper concludes that concludes that the domestic private sector in particular can contribute substantially to adaptation in direct and indirect ways. However, international private financing of adaptation is more limited.</p> |
| <p>Bretton Woods Project and Catholic Agency For Overseas Development. 2013. <i>The Private Sector and Climate Change Adaptation. International Finance Corporation Investments Under the Pilot Program for Climate Resilience</i>. Available at <a href="http://www.brettonwoodsproject.org/wp-content/uploads/2013/12/PPCR_PS_briefing_web.pdf">http://www.brettonwoodsproject.org/wp-content/uploads/2013/12/PPCR_PS_briefing_web.pdf</a>.</p> | <p><b>Finance</b><br/>This paper focuses on The Pilot Program for Climate Resilience (PPCR) projects implemented under the World Bank's private sector lending arm, the International Finance Corporation (IFC). The objectives of the study were to map current PPCR projects involving private sector actors and to assess them in relation to: (a) criticisms about their failure to take a transformative approach, and (b) three issues identified as crucial by existing analysis on the use of private sector actors to finance or deliver development projects: rationale/additionality; developmental and environmental integrity impact; and country and citizen ownership.</p>   |
| <p>BSR (The Business of a Better World). 2015. <i>Climate Resilience and the Role of the Private Sector in Thailand. Case Studies on Building Resilience and Adaptive</i></p>   | <p><b>Tools and frameworks</b><br/>This report examines climate risks and strategies for resilience in Thailand businesses. It provides four examples of how organizations are tackling this issue and present</p>  |



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| <p><i>Capacity</i>. Available at <a href="https://assets.rockefellerfoundation.org/app/uploads/20151009123211/Climate-Resilience-Role-Private-Sector-Thailand.pdf">https://assets.rockefellerfoundation.org/app/uploads/20151009123211/Climate-Resilience-Role-Private-Sector-Thailand.pdf</a>.</p>   | <p>opportunities for future action by the business community. These examples are set in the Thailand’s context, but they include elements that can be applied by companies working in other countries facing similar challenges.</p>  |
| <p>Buchner B, Falconer A, Hervé-Mignucci M, Trabacchi C and Brinkman M. 2011. <i>The landscape of climate finance</i>. Climate Policy Initiative. Available at <a href="http://climatepolicyinitiative.org/wp-content/uploads/2011/10/The-Landscape-of-Climate-Finance-120120.pdf">http://climatepolicyinitiative.org/wp-content/uploads/2011/10/The-Landscape-of-Climate-Finance-120120.pdf</a>.</p>   | <p><b>Finance</b></p> <p>This paper explores the current status of the climate finance landscape, mapping its magnitude and nature along the life cycle of finance flows. The research combines data from international organizations like the OECD, to private sector sources like Bloomberg NEF, as well as NGOs like the ODI. The paper explores existing databases, tracking initiatives, and studies compiled by various organizations, as well as third-party expertise. The paper offers recommendations to improve future data-gathering efforts in order to fill the gaps.</p> |
| <p>Buchner B, Herve-Mignucci M, Trabacchi C, Wilkinson J, Stadelmann M, Boyd R, Mazza F, Falconer A and Micale V. 2013. <i>The Global Landscape of Climate Finance 2013</i>. Climate Policy Initiative. Available at <a href="https://climatepolicyinitiative.org/wp-content/uploads/2013/10/The-Global-Landscape-of-Climate-Finance-2013.pdf">https://climatepolicyinitiative.org/wp-content/uploads/2013/10/The-Global-Landscape-of-Climate-Finance-2013.pdf</a>.</p> | <p><b>Finance</b></p> <p>This paper offers an overview of the current climate finance landscape. The paper finds that global climate finance flows have plateaued at USD 359 billion, or around USD 1 billion per day – far below even the most conservative estimates of investment needs, and makes recommendations on how the policymakers can fill in the incentive gaps identified.</p>  |
| <p>Burkina Faso Ministry of Environment and Fishery Resources. 2015. <i>Burkina Faso National Climate Change Adaptation Plan (NAP)</i>. Available at <a href="http://www4.unfccc.int/nap/Documents/Parties/PNA_Version_version%20finale[Transmission].pdf">http://www4.unfccc.int/nap/Documents/Parties/PNA_Version_version%20finale[Transmission].pdf</a>.</p>   | <p><b>National adaptation planning</b></p> <p>The National Climate Change Adaptation Plan of Burkina Faso.</p>  |
| <p>Canevari L. 2016. <i>Climate Resilience in Small and Medium Enterprises</i>. Available at <a href="http://edepot.wur.nl/381342">http://edepot.wur.nl/381342</a>.</p>   | <p><b>Small, medium and micro enterprises</b></p> <p>This presentation addresses the need for adaptation in SMEs. The presentation explores the requirements of the strategies to support the adaptation efforts of the SMEs. The paper points to building climate resilience in SMEs through collaboration including regionally, with other MSMEs and SMEs and large corporations to integrate across regional and value and supply chains; and provision of targeted information and one-stop-shops for</p>   |

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|   | companies to access climate information and improve access to climate finance and collaboration opportunities.   |
| C2ES (Center for Climate and Energy Solutions). 2008. <i>Adapting to climate Change: A Business Approach</i> . Available at <a href="https://www.c2es.org/docUploads/Business-Adaptation.pdf">https://www.c2es.org/docUploads/Business-Adaptation.pdf</a> .   | <b>Exposure, risk and business case for adaptation</b><br>This paper focuses on assessing climate impacts to businesses and the need for adaptation. The paper develops a screening process to assess whether a business is likely to be vulnerable to the physical risks associated with climate change, and whether a more detailed risk assessment is warranted.<br>The study also presents case studies of three companies that have begun to look at climate risks.   |
| C2ES (Center for Climate and Energy Solutions). 2013. <i>Weathering the Storm: Building Business Resilience to Climate Change</i> . Available at <a href="https://www.c2es.org/publications/weathering-storm-building-business-resilience-climate-change">https://www.c2es.org/publications/weathering-storm-building-business-resilience-climate-change</a> .        | <b>Exposure, risk and business case for adaptation</b><br>The report provides insight on how multinational companies with strategic roles in the global economy are beginning to assess and address the risks of extreme weather and other climate change impacts. It was found that a few leading companies are taking steps to address climate risks where there is a clear business case to do so.<br>The report is based on a review of the perspectives and activities of companies listed in the Standard and Poor's (S&P) Global 100 Index, based on their reporting to the Carbon Disclosure Project and in their corporate sustainability reports and annual financial filings. The study also includes in-depth case studies of the practices and experiences of six companies in diverse sectors: American Water, Bayer, The Hartford Group, National Grid, Rio Tinto and Weyerhaeuser. |
| Christiansen L, Ray AD, Smith JB and Haites E. 2012. <i>Assessing international funding for climate change adaptation</i> . UNEP Risø Centre on Energy, Climate and Sustainable Development. Available at <a href="http://orbit.dtu.dk/files/20803387/Adaptation_Financing_Guidebook.pdf">http://orbit.dtu.dk/files/20803387/Adaptation_Financing_Guidebook.pdf</a> . | <b>Finance</b><br>This guidebook offers developing countries means to access international funding for climate change adaptation. It offers an overview of the available financing options and lessons learned from the previous cases.  |
| Cimato F and Mullan M. 2010. <i>Adapting to Climate Change: Analysing the Role of Government</i> . Defra Evidence and Analysis Series. Available at <a href="https://www.gov.uk/government/uploads/system/u">https://www.gov.uk/government/uploads/system/u</a>   | <b>Public-private collaboration and partnerships</b><br>This paper contributes to the existing literature by describing the economic theory underpinning adaptation and considering the role of government in supporting adaptation within that economic framework. The framework has been applied to four   |

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| <p><a href="http://www.un.org/climatechange/wp-content/uploads/2015/10/pb13341-analysing-role-government-100122.pdf">ploads/attachment_data/file/69194/pb13341-analysing-role-government-100122.pdf</a>.</p>  | <p>areas (insurance, built private assets, public infrastructure and the natural environment) to identify existing market and regulatory failures preventing autonomous actions from being undertaken at the appropriate level. The paper focuses on UK and it concludes that there is still need for an assessment on whether enough adaptation actions are taking place, and based on the analysis, some proposals for policy design are made.</p> |
| <p>Climate Change Support Team of the United Nations Secretary-General. 2015. <i>Trends in Private Sector Climate Finance: Report Prepared by the Climate Change Support Team of the United Nations Secretary-General on the Progress Made Since the 2014 Climate Summit</i>. Available at <a href="http://www.un.org/climatechange/wp-content/uploads/2015/10/SG-TRENDS-PRIVATE-SECTOR-CLIMATE-FINANCE-AW-HI-RES-WE1.pdf">http://www.un.org/climatechange/wp-content/uploads/2015/10/SG-TRENDS-PRIVATE-SECTOR-CLIMATE-FINANCE-AW-HI-RES-WE1.pdf</a>.</p> | <p><b>Finance</b><br/> <i>The report takes on the question how the finance community is recognizing the commercial possibilities that climate change provides. The report identifies 5 “inflection points”, which can be seen as early indicators of a deep change across the financing sector.</i></p>  |
| <p>Climate Expert. Accessed 2017. <i>Business and adaptation</i>. Available at <a href="http://www.climate-expert.org/en/home/business-adaptation/introduction-to-adaptation/">http://www.climate-expert.org/en/home/business-adaptation/introduction-to-adaptation/</a>.</p>   | <p><b>Tools and frameworks</b><br/> The Climate Expert website provides materials, tools and guidance for SMEs aimed at raising awareness and building practical skills to prepare for the impacts of climate change, including an online learning programme "Becoming a Climate Expert" and a Toolbox with materials and further information.</p>   |
| <p>Climate Service UK. Accessed 2017. Available at: <a href="http://www.metoffice.gov.uk/services/international-development/climate-consultancy">http://www.metoffice.gov.uk/services/international-development/climate-consultancy</a>.</p>  | <p><b>Tools and frameworks</b><br/> Climate Service UK provides the support and advice for public and private sectors to manage climate-related risks and opportunities.<br/> Services offered include Climate information, Value-added services &amp; Capacity development.</p>   |
| <p>Connell R, Druce L, Grüning C, Moslener U and Pauw P. 2016. <i>Demystifying Adaptation Finance for the Private Sector</i>. Available at <a href="http://fs-unep-centre.org/publications/demystifying-adaptation-finance-private-sector">http://fs-unep-centre.org/publications/demystifying-adaptation-finance-private-sector</a>.</p>   | <p><b>Finance</b><br/> This study aims to provide guidance on the design of public policies and the spending public climate funds so as to facilitate the transformational change of an economy as it adapts to climate change. The report applies a method of barrier-analysis to a sample of</p>   |

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|  | 28 case studies on adaptation to climate change by private sector actors. The analysis identifies barriers, tools to address them, and makes recommendations for policy makers.  |
| <i>Copernicus</i> . Accessed 2017. Available at <a href="http://copernicus.eu/main/climate-change">http://copernicus.eu/main/climate-change</a> .  | <b>Tools and frameworks</b><br>The Copernicus Climate Change Service (C3S) provides information to help society and business sectors improve planning regarding climate mitigation and adaptation. C3S is based on a combination of science, data and an understanding of the market needs.  |
| Crick F, Diop M, Sow M, Diouf B, Diouf B, Muhwanga J and Dajani M. 2016. Enabling private sector adaptation in developing countries and their semi-arid regions - case studies of Senegal and Kenya. <i>Centre for Climate Change Economics and Policy Working Paper</i> . No. 291. Available at <a href="http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2016/12/Working-Paper-258-Crick-et-al.pdf">http://www.lse.ac.uk/GranthamInstitute/wp-content/uploads/2016/12/Working-Paper-258-Crick-et-al.pdf</a> . | <b>Tools and frameworks; Small, medium and micro enterprises</b><br>The paper reviews the key factors required to provide an enabling environment for the private sector, with a focus on adaptation by small and medium enterprises (SMEs) in the semi-arid regions (SARs) of Kenya and Senegal. Insights are drawn from larger, yet generally separate, literature on enabling environments for private sector development. The framework provided by the paper consists of the key factors required to provide an enabling environment for businesses as well as the main influencing factors (barriers and drivers) for private sector adaptation. |
| DIE (Deutsches Institut für Entwicklungspolitik). 2017. <i>Unlocking the Irrigation Potential in Sub-Saharan Africa: Are Public-Private Partnerships the Way Forward?</i> Available at <a href="https://www.die-gdi.de/uploads/media/BP_7.2017.pdf">https://www.die-gdi.de/uploads/media/BP_7.2017.pdf</a> .   | <b>Public-private collaboration and partnerships; Small, medium and micro enterprises</b><br>This paper focuses on irrigation management through PPPs by reviewing cases in several sub-Saharan African countries. The paper explores cases where smallholders have established farmer-owned liability companies, and have then entered into contracts with private sector companies for irrigation management, service provision and market access. The paper draws conclusions on how the governments should support these kind of PPPs.   |
| Donor Committee for Enterprise Development. 2016. <i>Private Sector Adaptation to Climate Change and Development Agency Support</i> . Available at <a href="http://www.enterprise-development.org/wp-content/uploads/Private-Sector-Adaptation-Synthesis.pdf">http://www.enterprise-development.org/wp-content/uploads/Private-Sector-Adaptation-Synthesis.pdf</a> .   | <b>Public-private collaboration and partnerships</b><br>This paper explores the role of the private sector in adaptation, and how development agencies are providing support. It identifies some of the challenges that private sector is facing and makes some recommendations on how to address those challenges.  |
| Economist Intelligence Unit. 2015. <i>The Cost of Inaction: Recognising the Value at Risk from Climate</i>   | <b>Exposure, risk and business case for adaptation</b>   |

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| <p>Change. Available at <a href="https://www.eiuperspectives.economist.com/sites/default/files/The%20cost%20of%20inaction_0.pdf">https://www.eiuperspectives.economist.com/sites/default/files/The%20cost%20of%20inaction_0.pdf</a>.</p>  | <p>This report evaluates the risk and potential losses that are likely to occur in the asset management industry due to climate change. It provides estimated value at risk to manageable assets, tail risks and expected value losses from the public-sector perspective. The paper also makes recommendations for governments and investors in order to address the risk.</p>  |
| <p>Edwards M. 2009. Why ‘philanthrocapitalism’ is not the answer: Private initiatives and international development. In Kremer M, Lieshout PV and Went R (Eds.), <i>Doing good or doing better: Development policies in a globalizing world</i>. Amsterdam: Amsterdam University Press. Pp. 237–249.</p>                                    | <p><b>Finance</b><br/>This book chapter discusses the possibilities of philanthrocapitalism providing additional resources and ideas for international development, and providing development assistance among ngos and foundations. The author concludes however, that these possibilities have been overestimated.</p>   |
| <p>Federative Republic of Brazil Ministry of Environment. 2016a. <i>National Adaptation Plan to Climate Change General Strategy Volume I</i>. Available at <a href="http://www4.unfccc.int/nap/Documents%20NAP/English_Brazil%20NAP%20Part%201.pdf">http://www4.unfccc.int/nap/Documents%20NAP/English_Brazil%20NAP%20Part%201.pdf</a>.</p> | <p><b>National adaptation planning</b><br/>The national adaptation plan of Federative Republic of Brazil.</p>  |
| <p>Federative Republic of Brazil Ministry of Environment. 2016b. <i>National Adaptation Plan to Climate Change Sectoral and Thematic Strategies Volume II</i>. Available at <a href="http://www4.unfccc.int/nap/Documents%20NAP/English_PNA_Part2%20v4.pdf">http://www4.unfccc.int/nap/Documents%20NAP/English_PNA_Part2%20v4.pdf</a>.</p>  | <p><b>National adaptation planning</b><br/>The national adaptation plan of Federative Republic of Brazil.</p>  |
| <p>Frei-Oldenburg A and Stahr C. 2016. <i>10.1 Climate Change Adaptation and SMEs. Case Studies From Several Parts of the World and Different Sectors</i>. Available at <a href="http://edepot.wur.nl/381396">http://edepot.wur.nl/381396</a>.</p>  | <p><b>Small, medium and micro enterprises</b><br/>This paper is part of a project which embraces the approach to identify, test, assess and disseminate adaptation concepts in various sectors for SMEs in Rwanda, Bangladesh, Morocco and Costa Rica.<br/>The project aims at sensitization and capacity building on climate change adaptation in the private sector targeting SMEs in developing countries, associations, consultants, financial sector and policy-makers. Project produces awareness &amp; training materials, information on finance mechanisms, does methodology testing for SME climate risk</p> |

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|  | management, implements workshops and trainings, publishes case studies, provides individual assessment & consultancy and provides analysis and promotion of project results, including recommendations development for financing options.  |
| G20. 2017. <i>G20 Hamburg Climate and Energy Action Plan for Growth</i> . Available at <a href="http://www.g20.utoronto.ca/2017/2017-g20-climate-and-energy-en.pdf">http://www.g20.utoronto.ca/2017/2017-g20-climate-and-energy-en.pdf</a> .   | <b>Public-private collaboration and partnerships</b><br>This plan states the views of G20 group on climate, energy and growth. It outlines actions on enhancing climate resilience and adaptation efforts, including inviting the private sector to engage with efforts.   |
| GEF (Global Environment Facility). 2012. <i>Private Sector Engagement in Climate Change Adaptation: Prepared by the GEF Secretariat in Collaboration with the International Finance Corporation</i> . Available at <a href="https://www.thegef.org/sites/default/files/council-meeting-documents/Note_on_Private_Sector_4.pdf">https://www.thegef.org/sites/default/files/council-meeting-documents/Note_on_Private_Sector_4.pdf</a> .   | <b>Finance</b><br>The paper focuses on the opportunities for the private sector playing a greater role in projects and programs under the LDCF and the SCCF (adaptation). It concludes that further research is needed in order to identify additional approaches and mechanisms for enhanced private sector engagement.   |
| GCF (Green Climate Fund). 2017. <i>Sixth Report of the Green Climate Fund to the Conference of the Parties to the United Nations Framework Convention on Climate Change</i> . Available at <a href="https://www.greenclimate.fund/documents/20182/751020/GCF_B.17_02_-_Sixth_Report_of_the_Green_Climate_Fund_to_the_Conference_of_the_Parties_to_the_United_Nations_Framework_Convention_on_Climate_Change.pdf/e630bc2c-d397-4431-b742-3b2508de64ac">https://www.greenclimate.fund/documents/20182/751020/GCF_B.17_02_-_Sixth_Report_of_the_Green_Climate_Fund_to_the_Conference_of_the_Parties_to_the_United_Nations_Framework_Convention_on_Climate_Change.pdf/e630bc2c-d397-4431-b742-3b2508de64ac</a> . | <b>Finance</b><br>This sixth report of the Green Climate Fund, reviews accessing to Green Climate Fund resources, incl. support for adaptation, Capacity-building and support and means to maximize the engagement with the private sector, among others.  |
| Gutierrez MJ. 2016. <i>Climate Change Adaptation by the Private Sector. Experiences in Central America</i> . Available at <a href="http://www.climate-expert.org/fileadmin/user_upload/Gutierrez2016_Adaptation_by_the_private_sector.pdf">http://www.climate-expert.org/fileadmin/user_upload/Gutierrez2016_Adaptation_by_the_private_sector.pdf</a> .  | <b>Tools and frameworks</b><br>This presentation shows the key findings from a project called <i>Climate Change Adaptation Business Strategies in Central America</i> . Project's goal is to improve the analysis and management capacity of the private sector in Central America for incorporating the business risks and opportunities arising from climate change into their corporate plans and strategies. |
| Het Koninklijk Huis. 2016. <i>Toespraak van Koningin Máxima Tijdens de Internationale Klimaatconferentie</i>   | <b>Finance</b>   |

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| <p>'Adaptation Futures 2016' in Rotterdam. Available at <a href="https://www.koninklijkhuis.nl/documenten/toespraak/2016/05/11/toespraak-van-koningin-maxima-tijdens-de-internationale-klimaatconferentie-adaptation-futures-2016-in-rotterdam">https://www.koninklijkhuis.nl/documenten/toespraak/2016/05/11/toespraak-van-koningin-maxima-tijdens-de-internationale-klimaatconferentie-adaptation-futures-2016-in-rotterdam</a>.</p>  | <p>This is a keynote speech from the Queen of the Netherlands at the Adaptation Futures Conference. In her speech, the Queen talked about climate change and access to financial services, and in particular the urgency of opening up financial services to those who have thus far been denied access to it.</p>  |
| <p>Intellectap. 2010. <i>Opportunities for private sector engagement in urban climate change resilience building</i>. Available at <a href="http://www.intellectap.com/sites/default/files/publications/private_sector_engagement_in_uccrb.pdf">http://www.intellectap.com/sites/default/files/publications/private_sector_engagement_in_uccrb.pdf</a>.</p>   | <p><b>Exposure, risk and business case for adaptation</b></p> <p>This report explores the current state of private sector engagement in resilience building and future opportunities through primary and secondary research, to showcase potentially viable business models and to understand challenges to private sector engagement in this space. As case studies it explores four cities participating in the Asian Cities Climate Change Resilience Network (ACCCRN) program1 -- Gorakhpur and Surat in India, Semarang in Indonesia and Chiang Rai in Thailand.</p> |
| <p>International Business Leaders Forum. 2012. <i>The Business of Adapting to Climate Change: A Call to Action</i>. Available at <a href="http://www.acclimatise.uk.com/login/uploaded/resources/Climate-Change-Adaptation-May2012.pdf">http://www.acclimatise.uk.com/login/uploaded/resources/Climate-Change-Adaptation-May2012.pdf</a>.</p>   | <p><b>Exposure, risk and business case for adaptation</b></p> <p>This report focuses on how leading companies are beginning to meet the adaptation challenge. It notes how businesses are changing their core operations to account for issues such as energy and food insecurity, water scarcity and extreme weather events. It also identifies early examples of integrating climate change adaptation into community engagement and public policy initiatives.</p>   |
| <p>IFC (International Finance Corporation). 2013. <i>Enabling Environment for Private Sector Adaptation: An Index Assessment Framework</i>. Available at <a href="http://www.ifc.org/wps/wcm/connect/6060670042bd92b6b297be0dc33b630b/Enabling+Environment+for+Private+Sector+Adaptation+-+Stenek,+Amado,+Greenall.pdf?MOD=AJPERES">http://www.ifc.org/wps/wcm/connect/6060670042bd92b6b297be0dc33b630b/Enabling+Environment+for+Private+Sector+Adaptation+-+Stenek,+Amado,+Greenall.pdf?MOD=AJPERES</a>.</p> | <p><b>Tools and frameworks</b></p> <p>This report presents an Index Framework that assesses at a country level whether favorable conditions are in place for climate change adaptation in the private sector. The conclusions are arrived based on a review of existing literature of climate change adaptation drivers and barriers, together with IFC's field observations of private sector needs and motivations. The report offers sixteen indicators and measures which can produce drivers or barriers to adaptation.</p>  |
| <p>ITC (International Trade Centre). 2015. <i>Climate Change and the Agri-Food Trade: Perceptions of Exporters in Peru and Uganda</i>. Available at <a href="http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/climatechangeEN.pdf">http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/climatechangeEN.pdf</a>.</p>  | <p><b>Exposure, risk and business case for adaptation</b></p> <p><i>This report</i> presents the results of research on the perceptions of agri-food exporters of climate change in Uganda and in Peru. The research aimed to find out how climate change is perceived to impact on exporters, what are the key determinants of agri-food exporters' vulnerability, and how to improve their resilience. The research was conducted</p>   |

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|  | by interviewing the exporters in Uganda and Peru. The surveys were supplemented with stakeholder discussions, regional focus groups and a workshop.   |
| Intergovernmental Panel on Climate Change (IPCC). 2007. <i>Working Group II report. Impacts, adaptation and vulnerability. Fourth assessment report of the Intergovernmental Panel on Climate Change.</i> IPCC, Geneva, Switzerland.   | <b>Exposure, risk and business case for adaptation</b>  |
| Johannessen Å, Rosemarin A, Thomalla F, Swartling ÅG, Stenström TA and Vulturius G. 2014. Strategies for building resilience to hazards in water, sanitation and hygiene (WASH) systems: The role of public private partnerships. <i>International Journal of Disaster Risk Reduction</i> . 10: pp.102-115.  | <b>Public-private collaboration and partnerships; Finance</b><br>This paper identifies strategies for investments by public and private partnerships (PPPs) based on enhanced understanding of how the resilience of water, sanitation and hygiene (WASH) systems to hazards can be improved. The conclusions are derived from a literature review and analysis. To acknowledge the multi levelled nature of resilience and risk at the relevant levels, regional/river basin, urban area, and individual levels are taken into account. The authors identify strategies that could help to linking investments in PPPs with DRR (Disaster risk reduction) and building resilience in WASH systems. |
| KfW. 2017. <i>The role of insurance in climate adaptation. Slides of presentation at side event at SB46.</i> Available at: <a href="https://www.slideshare.net/cgiarclimate/annette-detken-the-role-of-insurance-in-climate-adaptation">https://www.slideshare.net/cgiarclimate/annette-detken-the-role-of-insurance-in-climate-adaptation</a>   | <b>Insurance</b><br>Powerpoint providing an overview of the role of insurance in enabling adaptation to the impacts of climate change, and when and how it can be applied.  |
| McKinsey & Company. 2015. <i>How Companies Can Adapt to Climate Change.</i> Available at <a href="http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/how-companies-can-adapt-to-climate-change">http://www.mckinsey.com/business-functions/sustainability-and-resource-productivity/our-insights/how-companies-can-adapt-to-climate-change</a> . | <b>Exposure, risk and business case for adaptation</b><br>This article explores two kinds of risks that climate change poses to businesses: 1) value-change risks and 2) external-stakeholder risks. Drawing from the business perspective, the article also demonstrates some examples of adaptation strategies.   |
| Meister Consultants Group Inc. 2013. <i>Resilience in Action: Lessons from Public-Private Collaborations Around the World.</i> Available at <a href="https://cdkn.org/wp-content/uploads/2013/08/MCG_ResilienceinActionReportweb.pdf">https://cdkn.org/wp-content/uploads/2013/08/MCG_ResilienceinActionReportweb.pdf</a> .  | <b>Public-private collaboration and partnerships</b><br>The report discusses nine outstanding cases of collaborations that build resilience, selected from an analysis of over 100 examples of PPPs in developing countries. In the analysis is included cases from North Africa, Middle East, Sub-Saharan Africa and Asia. Research targeted 11 economic sectors and industries and as a result four high-activity sectors stood out as “hotspots” for resilience PPCs: Agriculture, ICT, Financial Services &   |



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|  | Water. The paper identifies six success factors for policy-makers to consider in order to foster PPPs.   |
| Ministry of Mahaweli Development and Environment Sri Lanka. 2016. <i>National Adaptation Plan for Climate Change Impacts in Sri Lanka 2016 - 2025</i> . Available at <a href="http://www4.unfccc.int/nap/Documents%20NAP/National%20Reports/National%20Adaptation%20Plan%20of%20Sri%20Lanka.pdf">http://www4.unfccc.int/nap/Documents%20NAP/National%20Reports/National%20Adaptation%20Plan%20of%20Sri%20Lanka.pdf</a> .         | <b>National adaptation planning</b><br>The national adaptation plan of Sri Lanka.  |
| NAP Global Network. 2017. <i>Financing National Adaptation Plan (NAP) Processes: Contributing to the achievement of nationally determined contribution (NDC) adaptation goals Guidance Note</i> . Available at <a href="http://napglobalnetwork.org/wp-content/uploads/2017/08/napgn-en-2017-financing-nap-processes.pdf">http://napglobalnetwork.org/wp-content/uploads/2017/08/napgn-en-2017-financing-nap-processes.pdf</a> . | <b>Finance</b><br>This guidance note aims to assist countries with the development of strategies for securing this funding. The paper provides tools for understanding of the NAP process from a financing perspective and presents the potential sources of finance and identifies which sources may be more appropriate for different phases of the NAP process. |
| OECD (Organisation for Economic Co-operation and Development). 2009. <i>Integrating Climate Change Adaption into Development Co-operation: Policy Guidance</i> . Available at <a href="http://www.oecd.org/dac/43652123.pdf">http://www.oecd.org/dac/43652123.pdf</a> .  | <b>Tools and frameworks</b><br>This guidance focuses on how to mainstream climate change into development. The policy guidance advances applying an analytical tool referred as climate lens to examine a strategy, policy, plan, programme or regulation. The paper also introduces the following 4-step generic approach to assessing adaptation actions.        |
| OECD. 2010. <i>Assessing the Role of Microfinance in Fostering Adaptation to Climate Change</i> . Available at <a href="http://www.oecd-ilibrary.org/environment/assessing-the-role-of-microfinance-in-fostering-adaptation-to-climate-change_5kmlcz34fg9v-en">http://www.oecd-ilibrary.org/environment/assessing-the-role-of-microfinance-in-fostering-adaptation-to-climate-change_5kmlcz34fg9v-en</a> .                       | <b>Finance</b><br>This paper consists of empirical assessment of the linkages between microfinance supported activities and adaptation to climate change. The research is done by analyzing the lending portfolios of the 22 leading MFIs in two climate vulnerable countries: Bangladesh and Nepal.   |
| OECD. 2011. <i>Private Sector Engagement in Adaptation to Climate Change</i> . Available at <a href="http://www.oecd-ilibrary.org/environment/private-sector-">http://www.oecd-ilibrary.org/environment/private-sector-</a>  | <b>Exposure, risk and business case for adaptation; Public-private collaboration and partnerships</b>  |

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| <p><a href="#">engagement-in-adaptation-to-climate-change-approaches-to-managing-climate-risks_5kg221jkf1g7-en.</a></p>   | <p>This report examines the private sector’s progress in adapting to climate change by considering information from sixteen case studies, drawn from a range of industries across the private sector. This is complemented by an analysis of broader private sector adaptation based on responses to the 2009 Carbon Disclosure Project questionnaire.</p> <p>The paper aims to provide insight into companies’ awareness of potential climate risks, their progress and motivations in assessing specific impacts on their businesses and possible ways to respond to them. The paper provides common factors which can affect companies’ capacities to adapt and their incentives for action. The report also assesses potential public sector roles for eliminating barriers to action, encouraging engagement and incentivising private sector investment in adaptation.</p> |
| <p>OECD. 2014. <i>Recommendation of the Council on the Governance of Critical Risks</i>. Available at <a href="https://www.oecd.org/mcm/C-MIN(2014)8-ENG.pdf">https://www.oecd.org/mcm/C-MIN(2014)8-ENG.pdf</a>.</p>  | <p><b>Finance</b></p> <p>This note from Meeting of the OECD Council at Ministerial Level offers several recommendations for members of the OECD on how to address the risks that climate change (among others) is posing.</p>  |
| <p>Oxfam. 2009. <i>The new adaptation marketplace: Climate change and opportunities for green economic growth</i>. Available at: <a href="https://www.oxfamamerica.org/static/media/files/the-new-adaptation-marketplace.pdf">https://www.oxfamamerica.org/static/media/files/the-new-adaptation-marketplace.pdf</a>.</p>   | <p><b>Exposure, risk and business case for adaptation</b></p> <p>This briefing paper takes the perspective of seeing adaptation as a market opportunity. The paper emphasizes the role of the private sector in building resilience through investments in adaptation (capitalizing on the “adaptation marketplace”), which can incentivize new and expanded economic activity.</p> <p>The paper identifies 7 sectors, where the growth of market possibilities could be most likely and gives examples of successful companies in those areas.</p>  |
| <p>Partnership for Resilience and Environmental Preparedness (PREP). 2012. <i>Value Chain Climate Resilience: A Guide to Managing Climate Impacts in Companies and Communities</i>. Available at <a href="https://www.bsr.org/reports/PREP-Value-Chain-Climate-Resilience_copy.pdf">https://www.bsr.org/reports/PREP-Value-Chain-Climate-Resilience_copy.pdf</a>.</p> | <p><b>Tools and frameworks</b></p> <p>This guide has been developed by companies and organizations engaged with PREP. It offers companies a set of tools to consider climate resilience in the perspective of their value chain combined with the community’s needs. The guide introduces the Business ADAPT (analyze, develop, assess, prioritize, and tackle) tool. The tool follows a step-by-step climate resilience framework inspired by existing good practice risk management models.</p>  |

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| <p>Pauw WP. 2015. Not a Panacea: Private-sector Engagement in Adaptation and Adaptation Finance in Developing Countries. <i>Climate Policy</i>. 15(5): pp.583-603.</p>  | <p><b>Public-private collaboration and partnerships; Finance</b></p> <p>This article analyses the potential of private-sector engagement in adaptation and adaptation financing in developing countries by conceptualizing the private sector's roles and motivation. The article presents the results of interviews conducted with key stakeholders for adaptation of Zambia's agricultural sector. Based on these interviews, article also sheds light on the ways in which the government can incentivize private-sector engagement in adaptation.</p>   |
| <p>Pauw WP. and Pegels A. 2013. Private Sector Engagement in Climate Change Adaptation in the Least Developed Countries: An Exploration. <i>Climate and Development</i>, 5(4), 257–267.</p>   | <p><b>Public-private collaboration and partnerships</b></p> <p>The article conceptualizes private sector engagement in adaptation by analyzing different roles of the private sector in adaptation in developing countries and the way governments can create an enabling environment to increase private sector engagement. The paper analyses how 47 least developed countries (LDCs) envisage the role of the private sector in their National Adaptation Programmes of Action (NAPAs). This article argues that private sector engagement in adaptation is often inevitable and potentially significant, however it receives little attention in NAPAs.</p> |
| <p>Persson Å, Klein R, Kehler S, Atteridge A, Müller B, Hoffmaister J, Lazarus M, and Takama T. 2009. <i>Adaptation Finance under a Copenhagen Agreed Outcome</i>. Stockholm Environment Institute. Available at <a href="https://www.sei-international.org/mediamanager/documents/Publications/SEI-ResearchReport-PerssonA-AdaptationFinanceUnderACopenhagenAgreedOutcome-2009.pdf">https://www.sei-international.org/mediamanager/documents/Publications/SEI-ResearchReport-PerssonA-AdaptationFinanceUnderACopenhagenAgreedOutcome-2009.pdf</a>.</p> | <p><b>Finance</b></p> <p>This report from Stockholm Environmental Institute provides a comprehensive reporting and analysis of the issues and principles in adaptation financing, as well as the most current options on adaptation financing available to Parties. The report aims to present options for overcoming obstacles and reaching an agreement on adaptation financing as part of a Copenhagen Agreed Outcome at COP15.</p>  |
| <p>PWC (PricewaterhouseCoopers LLP). 2010. <i>Business Leadership on Climate Change Adaptation Encouraging Engagement and Action</i>. Available at <a href="http://pwc.blogs.com/files/encouraging-engagement-and-action-full-report-publication.pdf">http://pwc.blogs.com/files/encouraging-engagement-and-action-full-report-publication.pdf</a>.</p>   | <p><b>Public-private collaboration and partnerships; Exposure, risk and business case for adaptation</b></p> <p>Based on cased studies of private sector adaptation action captured by the private sector initiative of the UNFCCC Nairobi work programme, this report presents an analysis of private sector adaptation action. This report provides knowledge on where and how to catalyse public-private action on adaptation. Via interviews and survey the report</p>  |

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|  | presents the views of a range of businesses. Based on these observations, the paper introduces a set of recommendations for governments to foster PPPs.   |
| Republic of Kenya Ministry of Environment and Natural Resources. 2016. <i>Kenya National Adaptation Plan 2015-2030 Enhanced climate resilience towards the attainment of Vision 2030 and beyond</i> . Available at <a href="http://www4.unfccc.int/nap/Documents%20NAP/Kenya_NAP_Final.pdf">http://www4.unfccc.int/nap/Documents%20NAP/Kenya_NAP_Final.pdf</a> . | <b>National adaptation planning</b><br>The national adaptation plan of Republic of Kenya.   |
| Schneider T. 2014. Responsibility for private sector adaptation to climate change. <i>Ecology and Society</i> . 19(2). Available at <a href="https://www.ecologyandsociety.org/vol19/iss2/art8/">https://www.ecologyandsociety.org/vol19/iss2/art8/</a> .  | <b>Public-private collaboration and partnerships</b><br>This article aims to answer the question of whose responsibility is to take upon adaptation measures in critical infrastructure in private sector. The article explores the literature on business management, complemented by a review of specialized literature on public management.<br>Germany is used as a case study to demonstrate how private-sector critical infrastructure providers can plan and implement climate change adaptation in practice, through the regulatory modes of “negotiations” and “enforced self-regulation.” |
| Surminski S and Bingunath I. 2016. <i>SMEs and Climate Risk – Perception, Experiences and Responses</i> . Available at <a href="http://edepot.wur.nl/381657">http://edepot.wur.nl/381657</a> .   | <b>Small, medium and micro enterprises; Exposure, risk and business case for adaptation</b><br>This research focuses on a question whether a business continuity planning could serve as an entry indicator to climate adaptation. The authors draw their results from two studies: Federation of Small Businesses 2015: Severe Weather: A More Resilient Small Business Community – Survey of 1,199 SMEs across the UK In-depth case studies in Braunton, and UK – interviews with 7 SMEs affected by flooding, utilizing a SME resilience toolkit developed by CREW project.                      |
| SBI and UNEP FI (Sustainable Business Institute and United Nations Environment Programme Finance Initiative). 2011. <i>Advancing Adaptation Through Climate Information Services: Results of a Global Survey on the Information Requirements of the Financial Sector</i> . Available at  | <b>Finance</b><br>The study reports the results of a global survey from sixty financial service providers. The study aimed to find out what types of information input are that financial institutions require to put their risk management expertise at the service of broader adaptation and to provide a first assessment of the current provision to the sector with such information.  |

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| <a href="http://www.unepfi.org/fileadmin/documents/advancing_adaptation.pdf">http://www.unepfi.org/fileadmin/documents/advancing_adaptation.pdf</a>   |   |
| Task Force on Climate-related Financial Disclosures. 2017a. <i>Final Report: Recommendations of the Task Force on Climate-related Financial Disclosures</i> . Available at <a href="https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-TCFD-Report-062817.pdf">https://www.fsb-tcfd.org/wp-content/uploads/2017/06/FINAL-TCFD-Report-062817.pdf</a> .                | <b>Finance</b><br>The study develops four recommendations on climate-related financial disclosures applicable to organizations across financial-sector organizations to help them assess and price climate-related risks and opportunities. The paper structures its recommendations around four thematic areas that represent core elements of how organizations operate: governance, strategy, risk management, and metrics and targets.  |
| Task Force on Climate-Related Financial Disclosures. 2017b. <i>Task Force on Climate-Related Financial Disclosures Overview of Recommendations</i> . Available at <a href="https://www.fsb-tcfd.org/wp-content/uploads/2017/06/TCFD-Recommendations-Overview-062717.pdf">https://www.fsb-tcfd.org/wp-content/uploads/2017/06/TCFD-Recommendations-Overview-062717.pdf</a> . | <b>Finance</b><br>This presentation offers an overview of the recommendations on climate-related financial disclosures applicable to organizations across financial-sector organizations to help them assess and price climate-related risks and opportunities.   |
| UKCIP. 2010. <i>A Changing Climate for Business</i> . Available at <a href="http://www.ukcip.org.uk/wp-content/PDFs/UKCIP_Business.pdf">http://www.ukcip.org.uk/wp-content/PDFs/UKCIP_Business.pdf</a> .  | <b>Tools and frameworks</b><br>This report presents an overview of climate change impacts and adaptation for business. It is aimed at businesses and organisations to enhance their adaptation efforts by providing climate change projections and a summary of impacts on businesses as well as advices for companies on how to adapt.   |
| <i>UK Climate Projections</i> . Accessed 2017. Available at: <a href="http://ukclimateprojections.metoffice.gov.uk/21684">http://ukclimateprojections.metoffice.gov.uk/21684</a> .  | <i>UK Climate Projections</i> (UKCP09) website provides users access to information on plausible changes in 21 <sup>st</sup> century climate for the United Kingdom. The website includes future climate projections for land and marine regions as well as observed climate data for the UK. The UKCP09 offers maps, graphs and key findings, Reports and Guidance. Users can also customize maps, graphs and charts, as well as the raw climate projection data by using the UKCP09 User Interface. |
| UK <a href="#">Department for Environment, Food &amp; Rural Affairs</a> . 2013. <i>Adapting to climate change: 2013 strategy for exercising the adaptation reporting power</i> . Available at <a href="https://www.gov.uk/government/uploads/system/u">https://www.gov.uk/government/uploads/system/u</a>   | <b>Public-private collaboration and partnerships</b><br>This strategy provides the guidelines on how UK is making use of its Adaptation Reporting Power; how has the policy worked so far, and what should be done in the future.   |

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| <a href="#">ploads/attachment_data/file/209875/pb13945-arp-climate-change-20130701.pdf.</a>   |  |
| UKCIP. Accessed 2017. Available at <a href="http://www.ukcip.org.uk/wizard/">http://www.ukcip.org.uk/wizard/</a> .  | <b>Tools and frameworks</b><br>The Adaptation Wizard (UKCIP 2017) is a 5-step process to help businesses assess their vulnerability, identify adaptation action options, and develop and implement a climate change adaptation strategy.   |
| UN Global Compact, UNEP (UN Environment Programme), Oxfam and WRI (World Resources Institute). 2011. <i>Adapting for a Green Economy: Companies, Communities and Climate Change: A Caring for Climate Report</i> . Available at <a href="https://www.unglobalcompact.org/docs/issues_doc/Environment/climate/C4C_Report_Adapting_for_Green_Economy.pdf">https://www.unglobalcompact.org/docs/issues_doc/Environment/climate/C4C_Report_Adapting_for_Green_Economy.pdf</a> . | <b>Exposure, risk and business case for adaptation</b><br>This report is a resource for companies with a national, regional or global reach that are interested in increasing their strategic focus on adaptation in developing countries where they have operations, supply chains, employees and current or potential customers. The report makes use of a survey conducted within the private sector actors and case studies. It offers practical measures to companies and policymakers for enhancing the private sector engagement in adaptation. |
| UNFCCC LDC Expert Group. 2012. <i>National Adaptation Plans Technical Guidelines for the National Adaptation Plan Process</i> . Available at <a href="https://unfccc.int/files/adaptation/cancun_adaptation_framework/application/pdf/naptechguidelines_eng_high_res.pdf">https://unfccc.int/files/adaptation/cancun_adaptation_framework/application/pdf/naptechguidelines_eng_high_res.pdf</a>  | <b>National adaptation planning</b><br>This paper offers technical guidelines for the NAP process. Among the other guidelines, it makes the notion that NAPs should serve to assist relevant government agencies and ministries seeking to implement adaptation programmes, as well as provide guidance to other relevant stakeholders such as the private sector in facilitating adaptation strategies.   |
| United Nations. 2015. <i>Transforming Our World - The 2030 Agenda for Sustainable Development</i> . Available at <a href="https://sustainabledevelopment.un.org/post2015/transformingourworld">https://sustainabledevelopment.un.org/post2015/transformingourworld</a> .  | <b>Exposure, risk and business case for adaptation</b><br>This agenda presents the sustainable development goals adopted at UN Summit in 2015.   |
| Vivid Economics/EBRD. 2015. <i>Building an Evidence Base on Private Sector Engagement in Financing Climate Change Adaptation</i> . Vivid Economics. Available at <a href="http://www.vivideconomics.com/publications/build">http://www.vivideconomics.com/publications/build</a>  | <b>Finance</b><br>This <a href="#">report</a> documents and draws lessons from multilateral development bank (MDB) activity on private sector adaptation to strengthen the evidence base on adaptation investment.   |

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| <a href="#">ing-an-evidence-base-on-private-sector-engagement-in-financing-climate-change-adaptation.</a>   |   |
| <p>Warren R, Watkiss P, Wilby RL, Humphrey K, Ranger N, Betts R, Lowe J and Watts G. 2016. <i>UK Climate Change Risk Assessment Evidence Report</i>. Available at <a href="https://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-climate-change-risk-assessment-2017/">https://www.theccc.org.uk/tackling-climate-change/preparing-for-climate-change/uk-climate-change-risk-assessment-2017/</a>.</p>  | <p><b>Exposure, risk and business case for adaptation; Public-private collaboration and partnerships</b></p> <p>The UK Climate Change Risk Assessment Evidence Report sets out the priority climate change risks and opportunities for the UK.</p>  |
| <p>West Midlands Climate Change Adaptation Partnership. <i>Climate Change Adaptation &amp; Resilience Study Summary Report</i>. 2010. Available at <a href="http://www.bebirmingham.org.uk/uploads/WMCC AP Summary Final%20Report%20300710.pdf?phpMyAdmin=b5998cc58dff68a4b03a480ef59038da">http://www.bebirmingham.org.uk/uploads/WMCC AP Summary Final%20Report%20300710.pdf?phpMyAdmin=b5998cc58dff68a4b03a480ef59038da</a>.</p> | <p><b>Exposure, risk and business case for adaptation</b></p> <p>This paper focuses on the loss of economic value in the West Midland’s (UK) businesses due to climate change related risk of flooding. Using a case study approach for individual business parks the flood risk mapping exercise provides an evidence base for local businesses to help highlight the importance of implementing climate change adaptation measures.</p>   |
| <p>World Bank. 2010. <i>The Cost to Developing Countries of Adapting to Climate Change: New Methods and Estimates</i>. Available at <a href="http://documents.worldbank.org/curated/en/667701468177537886/pdf/557260WP0EACC0Box0349464B01PUBLIC1.pdf">http://documents.worldbank.org/curated/en/667701468177537886/pdf/557260WP0EACC0Box0349464B01PUBLIC1.pdf</a>.</p>  | <p><b>Finance</b></p> <p>This consultation draft provides new methods and estimates on the adaptation costs for developing countries to be used in further research.</p>  |
| <p>World Bank. 2016. <i>Emerging Trends in Mainstreaming Climate Resilience in Large Scale, Multi-sector Infrastructure PPPs</i>. Available at <a href="https://library.pppknowledgelab.org/PPIAF/documents/2874/download">https://library.pppknowledgelab.org/PPIAF/documents/2874/download</a>.</p>   | <p><b>Public-private collaboration and partnerships</b></p> <p>This report examines how to mainstream climate resilience into PPP frameworks in the context of multi-sector investment planning and implementation in developing countries. The research is based on a literature review on mainstreaming climate resilience into infrastructure planning at the sector, multi-sector and regional scale. Countries included in the analysis include low and middle-income countries, as well as some higher-income countries across the world. The paper suggests several actions for international development partners, governments and private sector actors to support mainstreaming</p> |

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|  | adaptation. It also identifies 6 success factors for policy-makers seeking to drive greater resilience through public-private collaborations.   |
| World Bank. 2017. <i>Version 3. Public-Private Partnerships Reference Guide</i> . Available at <a href="https://library.pppknowledgelab.org/documents/4699/download">https://library.pppknowledgelab.org/documents/4699/download</a> .   | <b>Tools and frameworks; Public-private collaboration and partnerships</b><br>This <i>Reference Guide</i> is designed for government officials or other parties who wish to improve their knowledge of PPPs. It is a part synthesis and part bibliography. The guide offers an outlook on what PPPs are, how they are established, used and promoted, what their benefits and pitfalls are. It also provides a list of references for further reading.  |
| WEF (World Economic Forum). 2014. <i>Climate Adaptation: Seizing the Challenge</i> . Available at <a href="http://www3.weforum.org/docs/GAC/2014/WEF_GAC_ClimateChange_AdaptationSeizingChallenge_Report_2014.pdf">http://www3.weforum.org/docs/GAC/2014/WEF_GAC_ClimateChange_AdaptationSeizingChallenge_Report_2014.pdf</a> .  | <b>Finance</b><br>This publication is provided by selected experts from the Global Agenda Council on Climate Change, and it provides decision makers in both public and private sectors insight on adaptation and financing. The paper concludes that up to 65% of the increase in the projected losses due to climate change could be averted cost effectively through adaptation investment and private sector investment is necessary to address the risks.  |
| WEF. 2015. <i>Building Resilience in Nepal through Public-Private Partnerships</i> . Available at <a href="http://www3.weforum.org/docs/GAC15_Building_Resilience_in_Nepal_report_1510.pdf">http://www3.weforum.org/docs/GAC15_Building_Resilience_in_Nepal_report_1510.pdf</a> .  | <b>Public-private collaboration and partnerships</b><br>This report offers observations on resilience building through PPPs based on the analysis of the aftermath of the earthquakes that struck Nepal in 2015. The study provides learned lessons that could be useful for future resilience building efforts through public-private partnerships.  |
| WRI and UNDP (World Resources Institute and United Nations Development Programme). 2015. <i>Adapting From the Ground Up: Enabling Small Businesses in Developing Countries to Adapt to Climate Change</i> . Available at <a href="https://www.wri.org/sites/default/files/Adapting_From_The_Ground_Up.pdf">https://www.wri.org/sites/default/files/Adapting_From_The_Ground_Up.pdf</a> . | <b>Small, medium and micro enterprises</b><br>This report identifies drivers of and barriers to SME adaptation action. It makes use of literature review as well as case studies. The report seeks to enhance private sector engagement in adaptation by outlining a set of interventions that public actors can adapt to create an enabling environment for adaptation measures taken by SMEs. The report shares examples from case studies of interventions, which successfully catalyzed SME investment in climate adaptation measures especially in the agriculture sector. |
| WRI (World Resources Institute). 2012a. <i>Micro, Small, and Medium Enterprises: Key Players in Climate Adaptation</i> . Available at <a href="http://www.wri.org/blog/2013/12/micro-small-and-">http://www.wri.org/blog/2013/12/micro-small-and-</a>  | <b>Small, medium and micro enterprises</b><br>This blog text offers an overview of the climate challenge and possibilities that <a href="#">micro, small, and medium enterprises</a> (MSMEs) are facing in the developing countries.  |



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| <a href="#">medium-enterprises-key-players-climate-adaptation</a> . Accessed 16.8.2017.  |   |
| WRI (World Resources Institute). 2012b. <i>Voices of the Entrepreneurs. New Venture</i> . Available at <a href="http://www.wri.org/publication/new-ventures">http://www.wri.org/publication/new-ventures</a> .   | <b>Exposure, risk and business case for adaptation; Small, medium and micro enterprises</b><br>This report offers an overview of the entrepreneurs involved with WRI's initiative New Ventures. The paper highlights the power of entrepreneurs and the small and medium-sized enterprises (SMEs) to stimulate growth of the local private sector engagement in environmental issues in developing countries. |
| WRI (World Resources Institute). 2013a. <i>Adapting to climate change: the private sector's role</i> . Available at: <a href="http://www.wri.org/blog/2013/11/adapting-climate-change-private-sector%E2%80%99s-role">http://www.wri.org/blog/2013/11/adapting-climate-change-private-sector%E2%80%99s-role</a> . | <b>Public-private collaboration and partnerships; Exposure, risk and business case for adaptation</b><br>This blog post offers an overview of the private sector's role in adaptation efforts, as well as the challenges that there lies.   |
| WRI (World Resources Institute). 2013b. <i>The business case for building climate resilience</i> . Available at: < <a href="http://www.wri.org/blog/2013/12/business-case-building-climate-resilience">http://www.wri.org/blog/2013/12/business-case-building-climate-resilience</a> >                           | <b>Exposure, risk and business case for adaptation</b><br>This blog post explores the current state of the business case for adaptation in the private sector. It highlights the difficulties that the private sector faces in adaptation and underlines the importance of individual behavior and the possibilities of insurance sector.   |