In the Knowledge Package Climate Change Adaptation: Needs, Barriers and Limits we introduced why adaptation is needed and what the economic barriers as well as the limits to the adoption of adaptation are. In this article we want to further specify what can be done to adapt to climate change and what is done by the United Nations Framework Convention on Climate Change (UNFCCC).

1. Adaptation options

Adaptation addresses climate change impacts that are observed today and prepares us for impacts occurring in the future. It includes actions to both reduce adverse effects from climate change and to exploit opportunities that might provide socioeconomic benefits.

Adaptation processes can be **autonomous, planned** or **natural**[1]. While autonomous actions are mainly undertaken by private actors, triggered by climate change induced market or welfare changes, planned actions can be carried out by both private and public actors. These actions mainly include deliberate policy decisions based on the awareness that conditions have changed or are about to change and that action is required to return to, maintain, or achieve a desired state[2]. Natural actions appear within the ecosystem as a reaction to climate change[1]. A vast variety of adaptation measures is available. However, the measures presented to policy makers and the broad public consist mostly of planned adaptation measures.

Every major sector of the economy (water, agriculture, infrastructure/settlement, human health, tourism, transport, and energy) has specific options to adapt to climate change[3]. In the **water sector**, essential strategies to implement adaptation measures are the *storage of water, the expansion of rainwater harvesting*, as well as *the improvement of irrigation efficiency*. The *adjustment of planting dates and crop variety* is a core strategy in the **agricultural sector**. (For more options in the agriculture sector, look at the Knowledge Package: Agriculture and Climate Change in the EU: An Overview.) The **infrastructure sector** includes *relocation and the creation of wetlands as buffer against sea level rise and flooding*. To adapt in the **health sector**, *improved climate-sensitive disease surveillance and control* is needed. The **tourism sector** has to *diversify tourism attractions and revenues* or to *shift ski slopes to higher altitudes and glaciers* in order to adapt to climate change. Adaptation measures in the **transport sector** include *design standards and planning for roads, rail, and other infrastructure to cope with warming and drainage*. Finally, the **energy sector** needs to *reduce the dependence on single sources of energy*[3].

2. An insight into current adaptation mechanisms under the UNFCCC

The UNFCCC promotes action on adaptation in different ways with the goal of supporting decision and policy makers who are faced with issues concerning adaptation in general, and the selection and implementation of adaptation measures in particular.

2.1 From Nairobi to Paris

In 2005, at the COP11 the Nairobi work program (NWP) was established to support adaptation policies and practices through the development and dissemination of relevant information and knowledge[4]. The Subsidiary Body for Scientific and Technological Advice (SBSTA) is responsible for its coordination, and through the integration of also other stakeholders, such as Parties or NWP partner organizations, the NWP allows to respond to adaptation knowledge needs arising from the implementation of the various workstreams and identified by Parties[4]. Among others, one main goal of the NWP is to advance the understanding and assessment of impacts, vulnerability and adaptation of all Parties, but especially of developing countries, and to improve decision making in this context. Therefore, the development, dissemination, and use of knowledge from practical adaptation activities must be enforced along with fostering cooperation among Parties, relevant organisations, businesses, civil society organisations and decision makers to enhance the ability to manage climate change risks[5]. Fig.1 shows the modalities of the NWP.

The Nairobi work programme provides information and knowledge on adaptation

The Nairobi work programme and its purpose, functioning and modalities

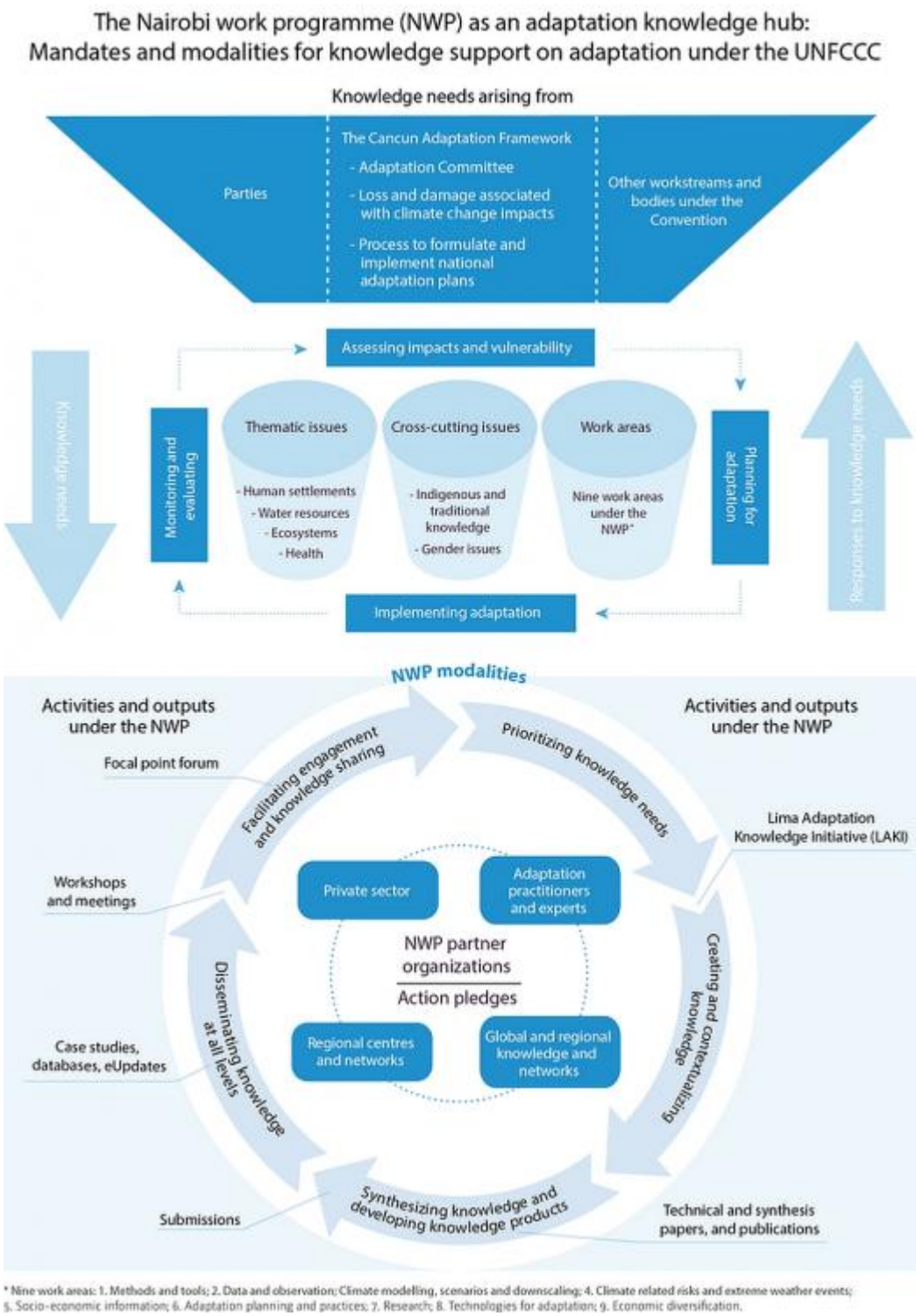

Figure 1: The NWP monitors arising adaptation needs, assesses impacts and vulnerability and helps implementing adaptation through various activities in coordination with partner organizations.

Source: http://unfccc.int/files/inc/graphics/image/png/nwp_infograph_final_1280.png

At the COP21 in Paris (2015), the SBSTA recognized the cooperation with the Adaptation Committee (AC) and the Least Developed Countries Expert Group (LEG). Reinforcing the linkages between the NWP, the Adaptation Committee and the Least Developed Countries Expert Group case studies on good practices and lessons learned in adaptation planning processes for connecting national to local adaptation planning have been constructed. The SBSTA further acknowledged the

exchange of information between Parties and partner organizations at the 9th NWP Focal Point Forum and intends to continue to collaborate with interested Parties and relevant partner organizations to develop effective and concrete ways to document and disseminate knowledge under the NWP in 2016 and beyond. The United Nations Environment Programme (UNEP) also committed to expand the implementation of the Lima Adaptation Knowledge Initiative to further subregions in 2016 through the Global Adaptation Network. Moreover, the launch of the Adaptation Knowledge Portal under the NWP was welcomed, highlighting its task to disseminate knowledge gathered under the NWP, the AC, the Mechanism on Loss and Damage and other partner organizations, regional centres and networks6.

2.2 Enhanced Action on Adaption at the national levels

In contrast to mitigation, that provides global benefits, adaptation benefits are rather perceived on a lower level, which is regional or local, and therefore measures are mostly implemented by local actors. Climate mitigation has a strong global public good characteristic, which incentivizes free riding. The ability of countries to free ride on other's mitigation efforts is one of the major problems for reaching a stringent and self-enforcing international mitigation agreement7. Contrarily, benefits of adaptation actions primarily accrue to those who undertake the measures. Thus, the incentives to carry out adaptation are better aligned with individual goals than in the case of mitigation.

On the national level, the UNFCCC pursues two workstreams. These are the National Adaptation Programmes of Action (NAPAs), and the support of National Adaptation Plans (NAPs).

In 2001, the COP7 established the NAPA as part of the Least Developed Countries (LDC) work programme to support LDCs to tackle the challenge of climate change taking into account their specific vulnerability8. NAPAs help the LDCs to identify urgent adaptation needs, delaying which could increase vulnerability or lead to increased costs of adaptation at a later stage8. LDCs particularly require support with this process due to their lack of adaptive capacity. (For more information on vulnerability in developing countries, see Knowledge Package: Climate Change Adaptation: Needs, Limits and Barriers.) Additionally, the COP 7 (2001) founded a Least Developed Countries Fund (LDCF) to financially support the preparation and implementation of NAPAs, and an LDC Expert Group to provide technical support and advice to these countries8.

At the COP16 in Cancun (2010), Parties adopted the Cancun Adaptation Framework confirming their intention to attach the same level of importance to adaptation as to mitigation (by decision 1/CP16). Also within this framework, the National Adaptation Plan (NAP) process was established. It assists Parties in formulating and implementing NAPs to identify medium- and long-term adaptation needs and to further develop and implement strategies and programmes to take care of those needs9.

2.3 Inadequate and insufficient action on adaptation causing loss and damage

When the adaptation measures taken are not sufficient, systems are forced to deal with residual impacts that are referred to as loss and damage induced by extreme events and slow onset events. Therefore, in 2013 at the COP19 in Warsaw, the UNFCCC established the International Mechanism for Loss and Damage10. The main target of this workstream is to improve knowledge and understanding of methods to address loss and damage, to build up discussions, coordination and consistency among stakeholders and to enhance action and support to address loss and damage11. The focus lies on developing countries that are specifically vulnerable to climate change.

Warner and van der Geest identified four pathways that lead to loss and damage12:

1. "existing coping/adaptation to biophysical impact is not enough;
2. measures have costs (including non-economic) that cannot be regained;
3. despite short-term merits, measures have negative effects in the longer term; or
4. no measures are adopted –or possible– at all." 12

Fig. 2 shows how different factors in the economy and in natural and political environment, as well as in human and social capital influence the creation of loss and damage.

Current household strategies fail to sufficiently cope with extreme events and to adapt to climatic changes

A household's potential to incur loss and damage defined by its specific vulnerability and other factors of the environment

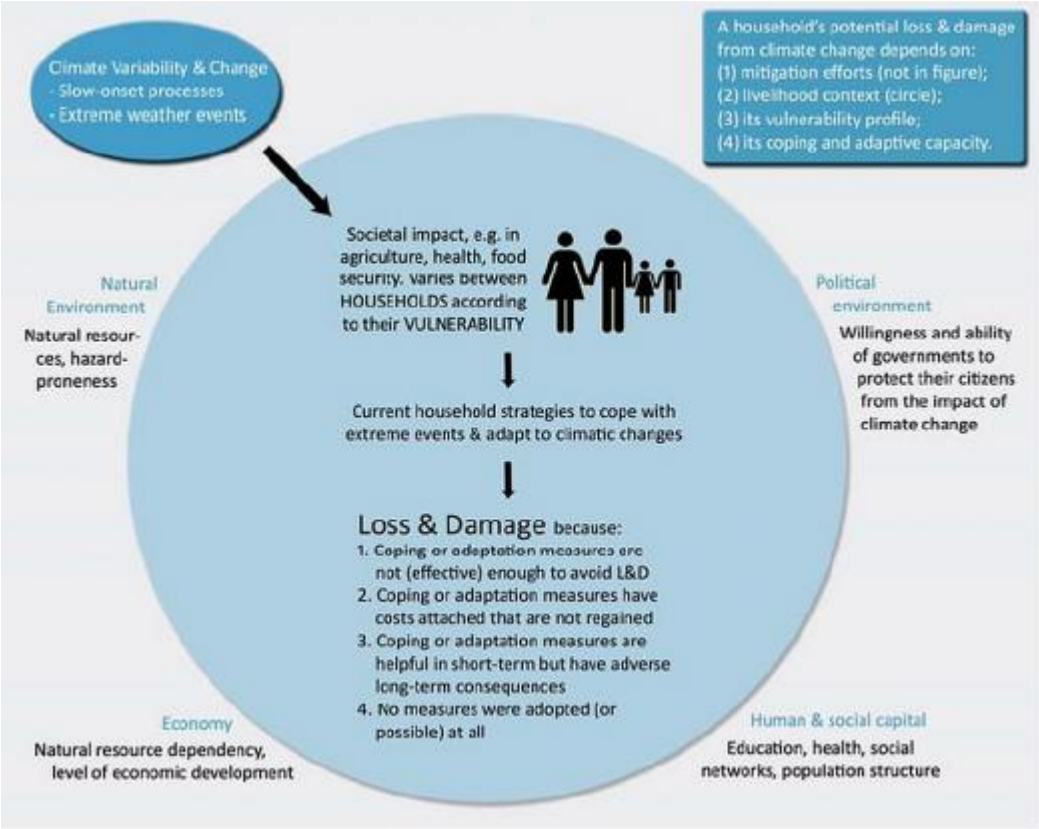

Figure 2: Loss and damage occur when adaptation measures are inadequate, have costs that are not regained, are erosive and make people more vulnerable or when constraints and limits impede the implementation of adaptation measures.

Source: Koko Warner and Kees van der Geest, "Loss and damage from climate change: local-level evidence from nine vulnerable countries", International Journal on Global Warming 5(4) (2013), pp.367–386. Online available at: http://www.lossanddamage.net/download/7237.pdf (p.376)

According to Kreft et al.13, greater delays in mitigation and adaptation efforts increase both losses and damages from climate change: impacts will be more severe and irreversible and at the same time there will be fewer opportunities to reduce impacts that are in theory reversible. Approaches to address impacts that are either not avoided or unavoidable include risk transfer tools and insurance and risk retention measures such as social safety nets and contingency funds11. However, the better the results of mitigation and adaptation strategies, the less loss and damage will be experienced.

3. Future outlook on adaptation under the UNFCCC

The Adaptation Committee (AC) started a discussion on its future workplan already at its 6th meeting to avoid having a gap between the workplan 2013-2015 and the new one for the period 2016-201814. At its 8th meeting, the AC then agreed on the three-year workplan after establishing a working group to advance the development of the plan and including experts to provide additional input. In order to stay flexible to accept new and emerging tasks resulting from later agreements and decisions, the AC assigns concrete activities primarily to the first year14.

The objectives of the new workplan separate into three workstreams (A, B and C) plus an overarching coherence[14]:

The general strategic outcome should ensure that adaptation initiatives are delivered effectively and efficiently. Workstream A has the goal to technically support and guide Parties on adaptation actions. In particular, this foresees the provision of guidance on adaptation planning and implementation at the national level. Objectives of workstream B focus on the implementation of adaptation measures to ensure that Parties have the financial, technological and capacity-building means to implement adaptation actions. Finally, workstream C aims at the timely and adequate reaction to climate change threats and therefore concentrates on awareness-raising, outreach and the sharing of information[14].

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