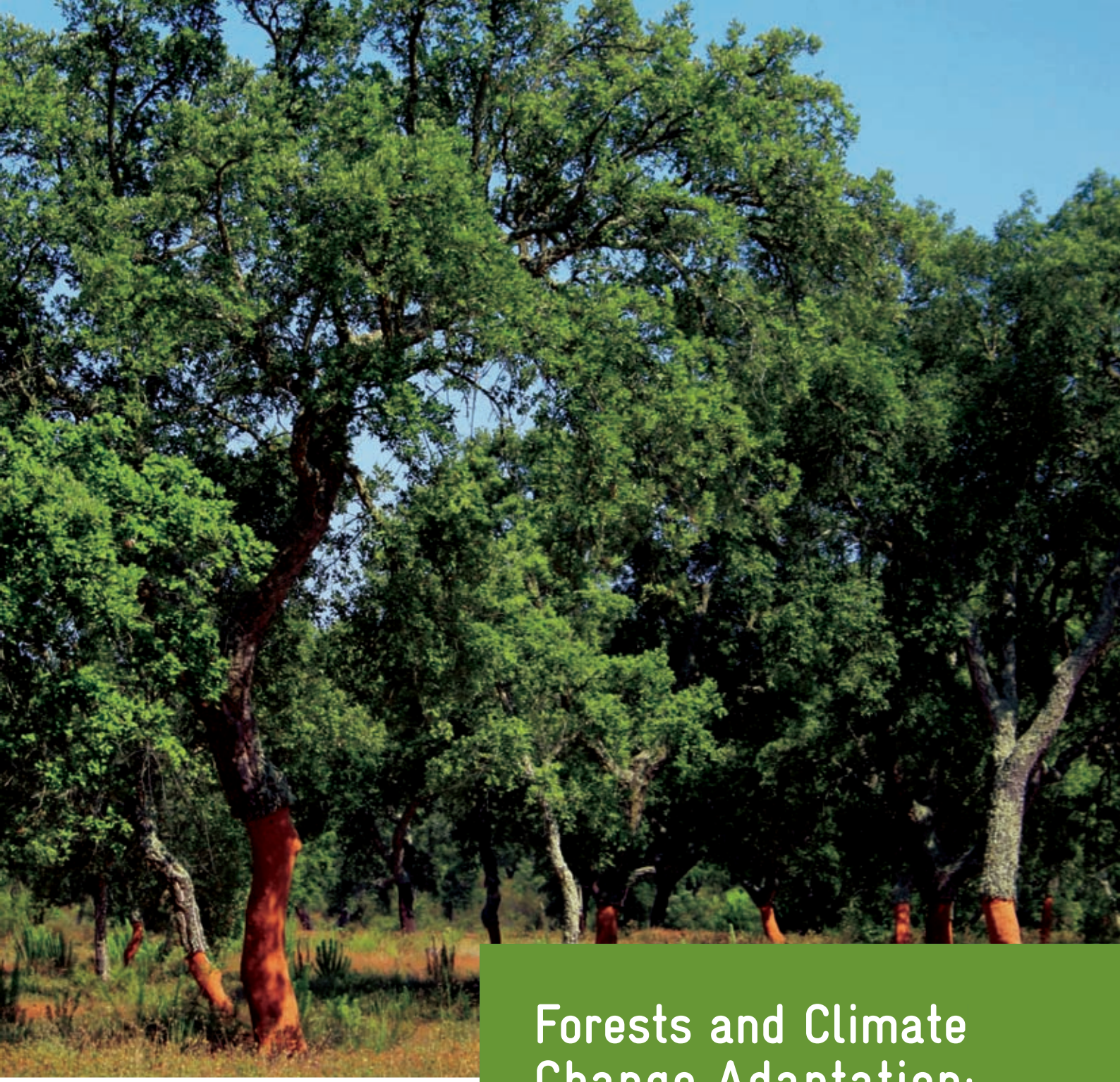

Forests and Climate Change Adaptation: a twofold approach

german cooperation
DEUTSCHE ZUSAMMENARBEIT

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

ECO Consult

FORESTS AND CLIMATE CHANGE ADAPTATION

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FORESTS AND CLIMATE CHANGE ADAPTATION

1. RATIONALE – WHY CONSIDERING FORESTS IN ADAPTATION

Forest provide a wide range of ecological, social and economic benefits, ranging from tangible economic values associated with forest products, to services and contributions to society that are much less easier to quantify[1]. In particular, forests provide many people with a source of income and are especially important for the large number of forest-dependent communities[2].

However, forests are under threat by various **human-induced pressures** – including land use change, landscape fragmentation, degradation of habitats and overextraction of resources. Climate change is expected to exacerbate these pressures in the future[3]. This implies important consequences for the climate system, as forest ecosystem degradation and deforestation, especially in the tropics, lead to the release of substantial amounts of carbon dioxide into the atmosphere. Consequently, forests form an essential **part of any global effort to address climate change (CC)**.

In the past, however, forests have been mostly considered solely in the framework of climate change mitigation through reforestation, afforestation, and more recently, avoided deforestation and forest degradation. Only recently has the crucial role forests can play in adaptation gained significant momentum[4].

2. ENTRY POINTS

The links between forests and climate change adaptation are **twofold**.

1) **Forests are vulnerable to climate change**, those managing or conserving them will have to adapt their strategies and management.
2) **Forests deliver ecosystem services** that are vital for people worldwide. Those ecosystem services can contribute to reducing the vulnerability of society to climate change[4], a concept being referred to as **ecosystem based adaptation (EbA)**.

It is important to note that adaptation efforts in the forest sector (and elsewhere) can overlap almost completely with **traditional management practices** (e.g. diversification of forest products for rural livelihoods). What distinguishes adaptation from business-as-usual are not the specific activities or measures taken, but the **entire process of "climate-proofing"**. Conventional development activities can obviously bring co-benefits for adaptation but without systematic integration of potential impacts from climate change, they could as well lead to **mal-adaptation**, i.e. increasing the vulnerability of certain systems to climate change instead of reducing it. So-called **planned adaptation** to climate change involves the use of information about past, present and expected future climate conditions in the project appraisal, i.e. **vulnerability assessments** which, in the context of (forest) ecosystem based adaptation, answer questions such as:

- How is the (forest) ecosystem affected by CC directly (and indirectly as adjacent sector may be affected and spill-over effects hit the forest)?
- How is the supply of (forest) ecosystem services vulnerable to CC and how does that impact socio-ecological systems?
- How are the people concerned vulnerable to CC?
- How is climate change projected to affect their use of (forest) ecosystem goods and services?
- How is the socio-ecological system as a whole vulnerable to CC?[5]

3. HOW DOES CLIMATE CHANGE IMPACT FORESTS?

Climate is generally accepted as a major determinant of forest ecosystems as it influences the type and characteristics (e.g. structure, productivity) of vegetation. Climatic conditions determine and affect ecological processes such as tree regeneration and growth, soil respiration, nutrient cycling, etc. Forest growth in Mediterranean environments for example is mostly water limited because of the warm, dry summers. The analysis of tree-ring chronologies showed that tree productivity is strongly limited by early summer precipitation[6].

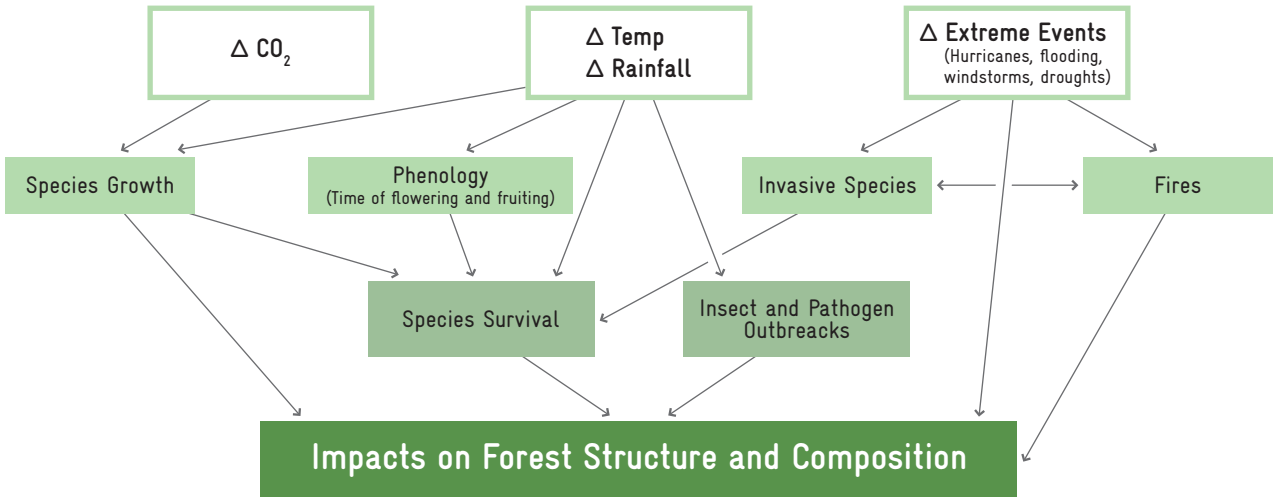

Figure 1: Potential impacts of climate change on forest ecosystems: a complex set of linked factors (CIFOR, World Agroforestry Centre and USAID (2009)

Currently available information does frequently not permit a quantitative assessment of the ecological, social and economic consequences of forest responses to recent climate change. However, there is evidence that climate change has already affected many aspects of forest ecosystems over the last decades, including tree growth and dieback, presence of invasive and distribution of indigenous species, forest fire problems, species distribution and migration, seasonal patterns in ecosystem processes, population dynamics and even specie's extinctions[7]. For example, evidence from the northern fringe of the Congo Basin shows increased vulnerability of forests to fire as a result of longer dry seasons combined with other disturbances[8]. In addition, more and more efforts aim at evaluating forest vulnerability to projected changes in climate.
A recent study from Tunisia assesses the economic losses incurred by the impact of climate change on Tunisian ecosystems, with a special focus on cork oak forests. According to this analysis, cork oak forests might be severely impacted by 2050 (degradation, partial to complete disappearance of stands), depending on the site and scenario employed, which can lead to significant economic losses[9].

Scientists argue that climate change, manifesting through associated changes in temperature or rainfall patterns, changes in the frequency and magnitude of extreme weather events and changes in atmospheric CO_2 concentration, will increasingly affect forest ecosystem's structure, composition and functions in the future[7] as depicted in Figure 1. Current projections suggest for example, that the highest forest zones of the conifer and mixed relic forests in the upper forest belt of the MENA region's high mountain ranges will be seriously affected by an increase of the annual mean temperature of about 3°C that leads to a shift of the altitudinal life-zones of approximately 545 m[10].
Whether changes turn out to be positive or negative will depend critically on

1) the nature of climate change in a given region and on the vulnerability of the respective forest ecosystems.
2) on the development/management objective related to the respective forest area.

At any rate, it has to be considered, that the present and future impacts of climate change are not an isolated challenge for forest ecosystems. Stress factors attributed to climate change rather **exacerbate already existing anthropogenic pressures that lead to forest degradation and deforestation**, such as expansion of cropped land and pasture, illegal logging, overexploitation, road construction, forest conversion for settlements, forest fires etc.[11]. At the bottom of those human induced pressures are frequently insufficient legal frameworks and policies that result in participation, access and tenure issues[12], as illustrated in the figure below.

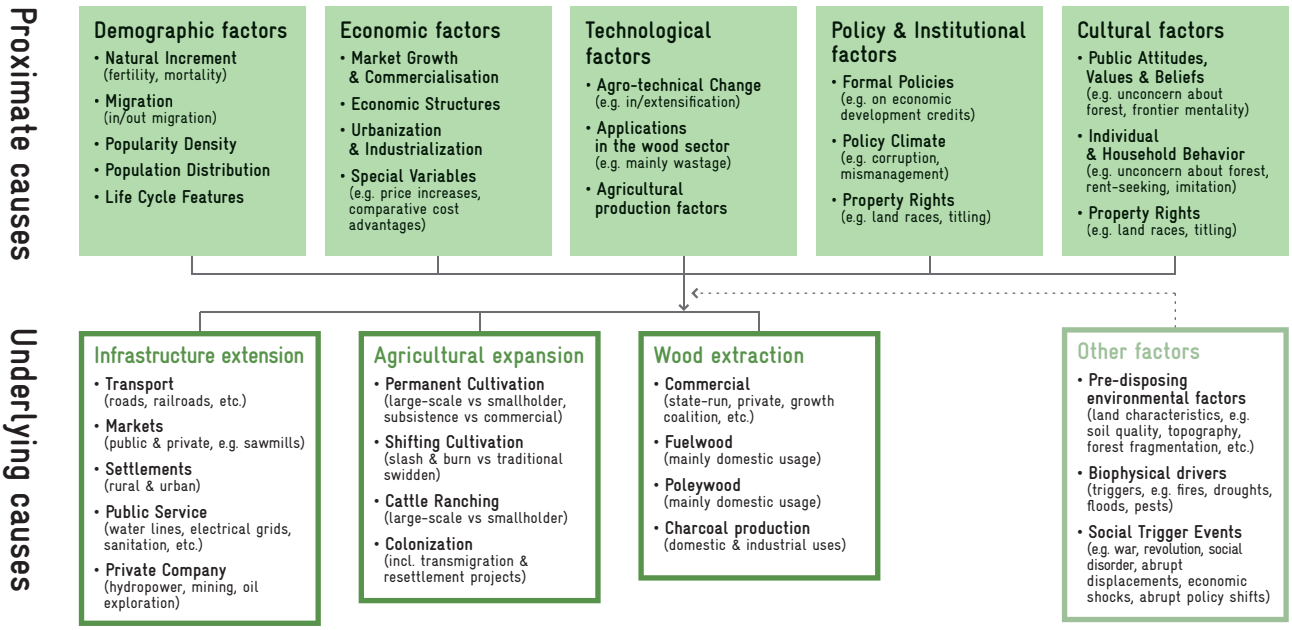

Figure 2: The causes of forest decline (Geist and Lambin, 2001)

4. CLIMATE CHANGE: WILL IT CHANGE HOW WE MANAGE FORESTS?

Looking on the bright side…

Forests are characterized by a certain level of **resistance to environmental change**. This phenomenon, called **resilience**, means that they are often able to recover virtually all of their original properties after a perturbation unless environmental conditions have been changed markedly. Resilience, which can be observed after e.g. harvesting operations, forest fires or blowdowns, is determined by several characteristics, including genetic diversity, species redundancy, species and ecosystem adaptability, and landscape distribution. Biodiversity and functional diversity at multiple scales play a key role for long-term ecosystem persistence, in particular as well in the context of climate change, as they enable ecosystems to adapt autonomously in some degree to changing conditions. **This is why insufficient attention to biodiversity can result in loss in resilience**[13, 14] **and thus increase vulnerability to climate change impacts**[15].

Mediterranean forests are considered globally outstanding from the biodiversity point of view. In addition, the current tree flora is made up of very resilient old taxa (species, families, geographic populations etc.) that have experienced many abrupt and intense climate changes in the past[16]. In general, under a climate change scenario, the **great stability and genetic diversity of the many relic tree species of the Near East may play a significant role in climate change adaptation**.

Selling old wine in new skins?

By nature, forest management equals making **long-term decisions** related to specific management objectives. Forest managers are challenged to choose management options for maintaining and enhancing the **supporting, provisioning, regulating and cultural services** of forests (priorities according to management objectives) while having to deal with **uncertain trends of future conditions, including climate**.

There is still a lack of understanding of what « adapting forest management to meet the challenges of climate change » means, in particular because of the complexity of forest ecosystems and the exceptionally large variety of services they offer to society. The need to develop responsive management systems and to improve ecosystem resilience is widely recognized. Authors generally advocate measures such as forest monitoring, effective fire management, reduced impact logging etc.[17] and argue that there is a need to apply adaptive and flexible management and institutional measures and to take advantage of opportunities as they arise[7].

This being said, most authors agree that the practices and policies needed to enhance the mitigation and adaptation potential of forests are largely encapsulated within the concept of **sustainable forest management** (SFM). They are justified regardless of climate change (so called no regret options). The concept of SFM covers a wide range of objectives – from intensive use to conservation – and various types of forests, e.g. natural forests, plantations, agro-forests and trees outside forests. The emphasis lies on multiple uses of the forest, and the production of both forest ecosystem goods and services to meet present-day needs while at the same time securing their continued availability and contribution to long-term development[17].**With adaptation as a main topic for receiving financing, the challenge of managing forests under climate change can serve as a catalyst for SFM**[18].

Climate change adaptation means going one step further!

Beyond securing good practice in forest management as a first step, projections on climate change and associated impacts may require management decisions differing from ongoing practices and the respective forest management objectives may need to be reviewed.

While sustainable forest management always is a planning exercise, planning for climate change adaptation involves anticipating much greater uncertainty, novel risks and systematic risk reduction[19]. Potential approaches towards reducing the vulnerability of forest ecosystems to climatic changes

include[3]:

- **reducing their exposure** to climate change (e.g. through prescribed burning, early warning systems and precaution measures),
- **decreasing their sensitivity** to climate change (e.g. by planting hardier species and thinning overstocked stands to help avoid water stress in drought conditions),
- **maintaining or increasing their adaptive capacity** (e.g. by promoting corridors, in-/ex-situ conservation).

A conceptual overview of forest adaptation measures is shown below.

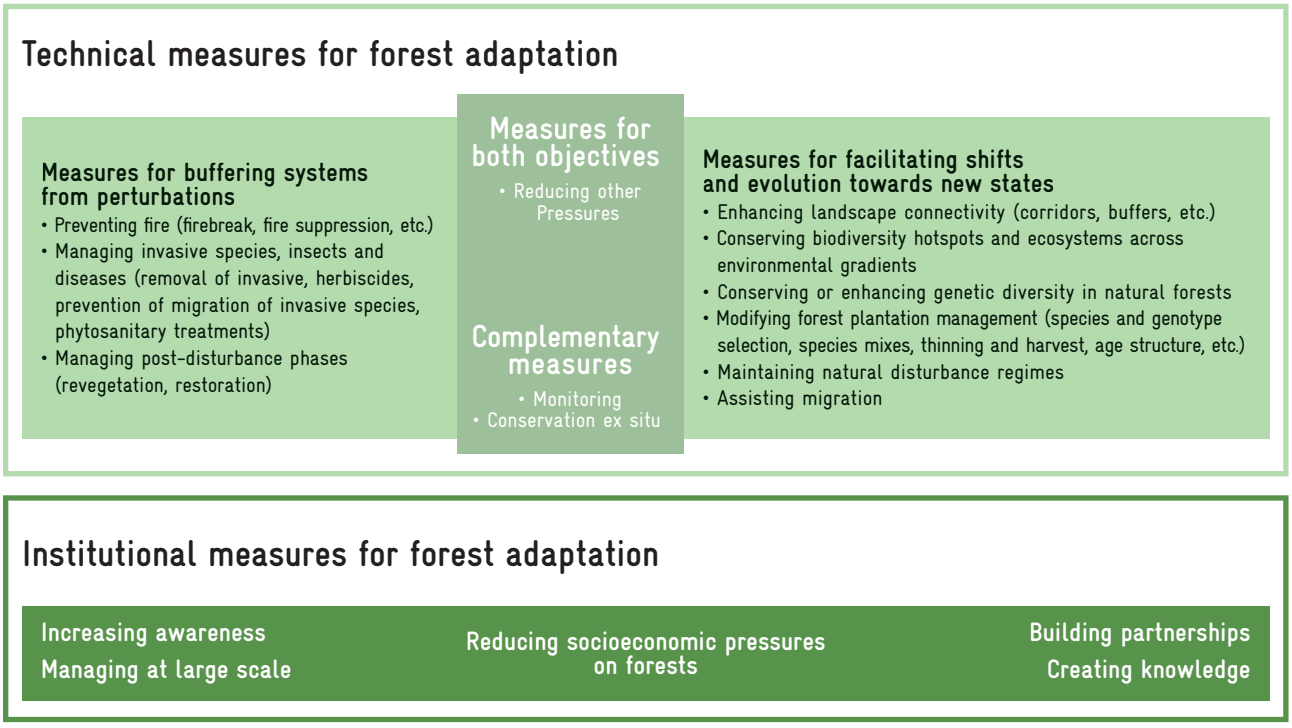

Figure 3: Examples of measures for forest adaptation (Source: Locatelli et al. 2008)

What can be done?

A key element of adaptation planning is adequate **monitoring** aiming at documenting changes in forest species, processes and ecosystems, and enabling the evaluation of the effectiveness of adaptation strategies[20].

In the Mediterranean context of increasing water scarcity and evapotranspiration caused by climate change, forest managers might for example introduce thinning operations to help reduce water competition and improve water balance or extent rotation periods in order to compensate for growth rate reduction due to water constraints. Furthermore, researchers and practitioners recommend the incorporation of indigenous, drought resistant tree species, and the support of natural regeneration. As far as non-timber forest products (NTFPs) are concerned, adapted management decisions might involve a shift in harvesting periods, as is the case of cork stripping, in order to prevent excessive evapotranspiration in the stripped cork oak trees that may cause tree mortality[12].

It goes without saying that the choice of (adapted) management options depends on the management objectives of the respective forest including ecological, social and economic goals[20]. Potential strategic- and operational-level climate change adaptation options might require reassessing and rebalancing forest management objectives such as maintaining (or increasing/enhancing) forest area, conserving biological diversity, the health, vitality and productive capacity of forest ecosystems, long-term multiple tangible socioeconomic benefits, soil and water resources, forest contributions to global carbon cycles etc. with the projected climatic changes and their effects.

5. FORESTS FOR ADAPTATION: USING FORESTS TO REDUCE THE EFFECTS OF CLIMATE CHANGE

Ecosystem based-Adaptation (EbA): concept and benefits

EbA can be defined as "the use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people to adapt to the adverse effects of CC"[21]. The idea behind the concept is that ecosystem services have the potential to **reduce the vulnerability of society to CC across sectors and scales**[22]. Ecosystems are not only to a certain extent resilient, they can also provide proven and cost-effective protection against some of the threats that result from climate change. Ecosystem-based approaches can complement, or substitute for, more expensive infrastructure investments, as in the case of mangrove restoration to protect coastal settlements[23].

Some powerful arguments for EbA include that EbA can

- be comparatively **cost-effective and accessible** to poor communities[24],
- serve **multiple objectives** (e.g. CCA, sustainable development, biodiv. conservation),
- be widely applicable and,
- have extensive economic, social, environmental and cultural **co-benefits**.

Among the challenges of ecosystem-based approaches are, however,

- their functional limitations, as some circumstances may require more engineered or technical solutions,
- the length of time for implementation which can be comparatively long,
- a certain lack of scientific and technical information about the effects of different management options,
- limited practical guidance on how to build resilience and how to incorporate ecosystem-based approaches in adaptation strategies[25],
- lack of institutional capacities to deal with the complex challenges of EbA,
- monitoring over long time frames.

It has to be considered that the challenges of natural resource management in general – in terms of anthropogenic pressures on natural resources – apply just as well to the context of EbA. Consequently, building on EbA options while neglecting the proximate and underlying causes of e.g. forest decline (Figure 2) cannot be effective. Thus, EbA should never be implemented in an isolated manner but rather be complemented by other measures such as policy development and capacity building. In addition, the needs and interests of local communities require specific attention: only if the local population judges EbA options as beneficial will they support their implementation. In other words, successful EbA approaches integrate local people's livelihood strategies.

GIZ has recently developed a stepwise approach towards integrating ecosystem services into development planning, based on the TEEB approach that provides guidance to GIZ programs and partners on how to integrate ecosystem services into the design and review of development plans, sector-specific and spatial planning, environmental and climate assessments, as well as into project development and proposal formulation[26].

What can forests offer?

Forest ecosystem goods and services may offer adaptation options, leading to reduced sensitivity or increased adaptive capacity of society and ecosystems to climate change, e.g.:

- **provisioning services** (ecosystem goods): e.g. food, fuel wood, fodder, building material, medicine, timber etc. that are necessary for human well-being,
- **regulating services**: e.g. water cycle, micro-climate, erosion control,
- **cultural services**: recreational, spiritual or religious services,
- **supporting services**: necessary for the production of other services; for example, primary production, nutrient cycling and soil formation, habitat[18].

The figure below illustrates the relationship between forest ecosystem services and the different components of vulnerability to climate change.

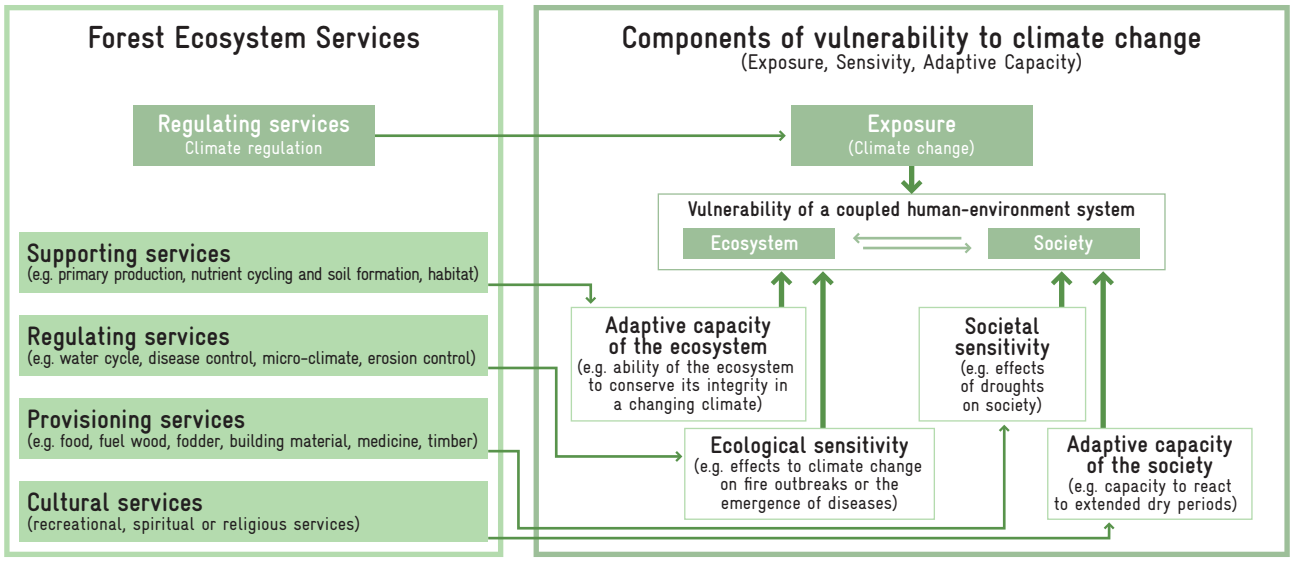

Figure 4: Relationship between forest ecosystem services and the different components of vulnerability to climate change (Adapted from: CIFOR, World Agroforestry Centre and USAID (2009))

Forests have the potential to play an important role in climate change adaptation. The following questions indicate some key issues to be considered when integrating forestry aspects in adaptation planning:

- Which **other sectors** benefit from or rely on forest ecosystem services – and how?
- Which **forest ecosystem goods and services** can be enhanced, deliberately chosen as options for climate change adaptation in other sectors?
- Does climate change and associated impacts on forest ecosystems increase **other sector's vulnerability**? Which changes in forest management are thus required?

Forest Ecosystem-based Adaptation (FEbA) put into practice

Prominent examples of forest ecosystem based disaster risk reduction implemented throughout the world, provide valuable incitation for FEbA, including for example the management of forests and reforestation activities to protect coastal areas and watersheds against erosion, landslides and storms where forests are used to lessen the effects of climate change. The Green Coast Project in South East Asia for instance aimed to restore and manage damaged coastal ecosystems to restore livelihoods and increase resilience to the impacts of climate change[27]. In the European Alps, the Swiss government recognized that over-exploitation of trees increased the risk of serious avalanches, landslides and flooding and introduced a rigorous system of conserving and restoring so-called "protection forests"[28].

The planting of Maya Nut trees in Central America and Mexico has helped ensuring food security during periods of change, including drought and after extreme events such as hurricanes[29]. The reforestation of erosion-prone areas in the vicinity of Rio de Janeiro (Brazil), whose vulnerability is expected to increase in the sight of climate change, aimed at controlling erosion and reducing the associated risk of land slides and floods[30].

As far as the MENA region is concerned, WWF's "Green Belt" Programme aims to set up a sustainable network of forest reserves, surrounded by large buffer zones where land-use planning takes into account the need to preserve habitats and threatened wildlife. Each "Green Belt" includes core protected areas, as well as larger portions of surrounding territory, where conservation and development needs are integrated, so that local people get a clear economic advantage from their natural heritage. In this respect, the program explicitly aims at strengthening the resilience of protected areas and local people[31].

Towards an integrated approach

As stated earlier, it can be argued that climate objectives are achieved in the most effective and sustainable manner if they are embedded in a multiple use forest management approach, acknowledging the tradeoffs between, for instance, timber production, food provision for local livelihoods, carbon storage and biodiversity conservation[17].

Even if it is possible to manage forests specifically for adaptation and/or mitigation, these objectives should be integrated into forest management planning that aims at maintaining forest health and vitality, reducing risk, preventing forest degradation and maximizing productivity.

In this context, aligning forest management with adaptation and/or mitigation without adequate recognition of the major challenges for SFM will create unrealistic expectations of the forestry sector.

Intersectoral cooperation is a prerequisite for forest ecosystem-based adaptation (FEbA). The following graph (Figure 5) shows how other sectors benefit from services provided by forest ecosystems and thereby illustrates how important it is to consider and integrate other sectors in forest adaptation planning, as well as to integrate forests into development planning in the context of climate change.

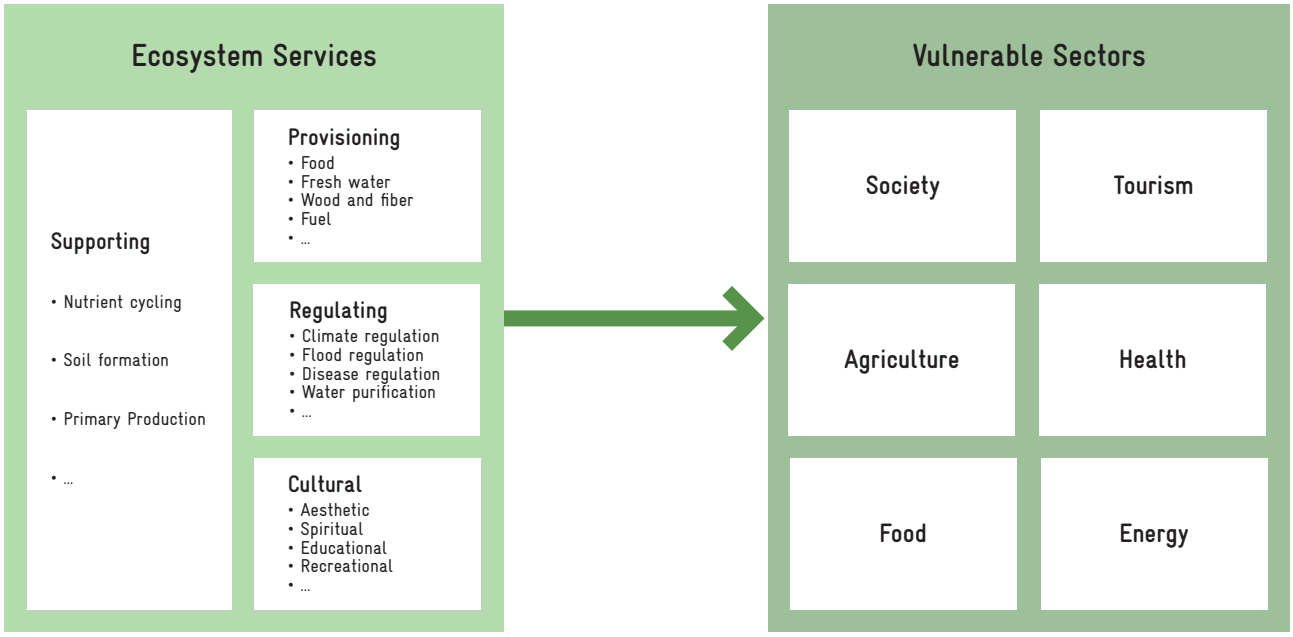

Figure 5: Sectors benefitting from ecosystem services.
Adapted from: CIFOR, World Agroforestry Centre and USAID (2009)

6. MAIN LESSONS LEARNT

Forest resources management is often done by stakeholders with few links with those benefiting from ecosystem services or bearing the consequences of the loss of ecosystem services. Likewise, sectors depending on forest ecosystem services are usually not involved in forest (adaptation) planning. (Adaptation) planners in other sectors do not necessarily recognize the potential role of forests in reducing societal vulnerability and the benefits they draw from forest ecosystem services. Planning for adaptation should **link non-forest actors with those engaged in forest management** or conservation.

Mainstreaming forests in development strategies and plans with regard to adaptation to climate change comprises two (complementary) approaches:

- **Adaptation for Forests** : Designing adaptation options that encourage the adaptive management of forests. This orientation is the responsibility of forest managers.
- **Forests for Adaptation** (i.e. Forest Ecosystem-based Adaptation) : Recognizing the role of forests in reducing societal vulnerability and encouraging the sectors benefitting from forest ecosystem services to participate in forest adaptation planning. This orientation focuses on the needs of partner sectors (water, agriculture, economy & trade, tourism, etc.) regarding the sustainable provision of forest goods and services in the context of climate change.

In other words, enhancing the role of forests in adaptation adds up to a dual agenda: enabling forests to weather the coming storm of climate change, and managing forests in a way that capacitates society in general and forest-dependent people and sectors in particular to cope with the coming changes[4].

7. FOREST RELATED ADAPTATION AND MITIGATION MEASURES: CREATING SYNERGIES

There are two fundamental concepts in the climate change debate: **adaptation and mitigation**. As we have previously learned, **adaptation** refers to adjustments in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. In contrast, **mitigation** refers to any anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases[32]. In a nutshell, **mitigation** tackles the **causes** of climate change, whereas **adaptation** tackles the **effects** of the phenomenon.

It is important to underline that many management actions taken in the context of adaptation, such as the prevention of large-scale forest fires through the installation of forest fire management schemes, also play an important role in climate change mitigation[33]. The new Lebanese national fire strategy approved in May 2009, for instance, is a good example of an integrated fire management approach that reduces the risk of intense and frequent forest fires, allowing for fire regimes that are socially, economically and ecologically sustainable, increasing ecological and social resilience in forested rural landscapes, and reducing carbon emissions.

On the other hand, mitigation measures (e.g. avoiding deforestation) can contribute to forest based adaptation to climate change, e.g. by maintaining local people's livelihoods that rely on the use of NTFPs.

Tapping the potential for **synergies between adaptation and mitigation** is an opportunity that benefits especially those activities dealing with natural resource management. Actively creating win-win solutions definitely is a good way to create a favourable balance between inputs and benefits.

8. FURTHER READING

Food and Agricultural Organization (FAO), 2010. Forests and Climate Change Working Paper 9: **Forests and Climate Change in the Near East Region**. [online] http://www.fao.org/forestry/24646-0acdf8232cda6c92cb3e7b460f00fbea.pdf

The primary objective of this document is to provide an overview of the actual and potential impact of climate change on forests and forest dependent people in the Near East region, of climate change mitigation opportunities in the forestry sector, and of needs for effective national and regional responses. The study examines the major issues and developments related to climate change impacts and responses in the region as regards forests and highlights related opportunities for regional action to address gaps and needs.

Seppälä R, Alexander B, Katila P (2009) **Adaptation of forests and people to climate change: a global assessment report. Report** No. IUFRO World Series, vol 22. International Union of Forestry Research Organizations (IUFRO), Helsinki. [online] http://www.iufro.org/science/gfep/adaptaion-panel/the-report/

The report provides a global assessment to date of the ability of forests to adapt to climate change. It presents the state of scientific knowledge regarding the current and projected future impacts of climate change on forests and people along with options for adaptation.

Robledo, C. and Forner, C. 2005. **Adaptation of Forest Ecosystem-based adaptation and the Forest Sector to Climate Change**. Forests and Climate Change Working Paper 2, Food and Agricultural Organisation, Rome, Italy [online] ftp://ftp.fao.org/docrep/fao/008/J6525e/J6525e00.pdf

This document is intended to assist policymakers and other professionals involved in the planning, project formulation or implementation of adaptation measures for climate change in forest ecosystems. It is of particular interest to the people who deal with national communications to the United Nations Framework Convention on Climate Change (UNFCCC).

Locatelli, B., Kanninen, M., Brockhaus M., Colfer C.J.P., Murdiyarso, D. and Santoso, H. (2008). **Facing an Uncertain Future: How forests and people can adapt to climate change**. CIFOR Forest Perspectives, Bogor, Indonesia [online] http://www.cifor.org/publications/pdf_files/Books/BLocatelli0801.pdf

This report presents the case for adaptation for tropical forests (reducing the impacts of climate change on forests and their ecosystem services) and tropical forests for adaptation (using forests to help local people and society in general to adapt to inevitable changes).

FAO (2011) **Climate Change for Forest Policy-Makers -An approach for integrating climate change into national forest programmes in support of sustainable forest management-** version 1 [online] http://www.fao.org/forestry/climatechange/64862/en/

This document is published as a key part of the effort by the Forestry Department of FAO and the National Forest Programme Facility to assist countries address emerging policy issues related to forests and climate change through integrating climate change considerations into national forest programmes. The document has been developed to help forest policy makers integrate climate change into existing NFPs, or forest policy frameworks, and to encourage consistent treatment of forestry issues in national climate change strategies and policies.

Kleine, M., Buck, A. &Eastaugh, C. (Editors, 2010). **Making African forests fit for climate change. A regional view of climate-change impacts on forests and people, and options for adaptation**. Thematic workshop 3-5 December 2009. IUFRO Headquarters, Vienna [online] http://www.iufro.org/science/gfep/african-policy-brief/

The policy brief is based on a detailed analysis of relevant information contained in the global assessment report and more than 250 additional literature references identified by the African experts. It aims to contribute to the development of effective adaptation strategies in Africa and facilitate related international efforts. The brief is available in French and English.

Regato, P. (2008) **Adapting to Global Change: Mediterranean Forests**. Malaga, Spain: IUCN Centre for Mediterranean Cooperation. ii+254 pp.[online] http://cmsdata.iucn.org/downloads/adapting_to_global_change.pdf

This publication represents a first step for developing a joint program of work and strategy on Mediterranean forest adaptation to climate change, including the input of international organizations like FAO, UNDP, GTZ, WWF and IUCN, partners and member organizations, forest managers and users, governments, research institutions and the private sector. It provides an overview of the Mediterranean forest conservation and management challenges posed by climate change and addresses relevant issues, like forests vulnerability to climate change; past climate change responses which may guide the future. The report is available in English, French and Spanish.

ProAct Network (2008) **The Role of Environmental Management and Eco-engineering in Disaster Risk Reduction and Climate Change Adaptation** [online] http://www.proactnetwork.org/proactwebsite/media/download/resources/Ecosystem-based-DRR/ProAct%20Network_Environmental%20Management%20for%20DRR%20Report_2008.pdf

This report provides an overview of practical experiences that deal with environmental management in relation to climate change, disaster risk reduction and climate change adaptation. It is essentially a collection of field data and literature that has a highly practical flavour, highlighting the multiple benefits that adaptation can offer.

Croitoru, L. and Sarraf, M. (2010). **The Cost of Environmental Degradation: Case Studies from the Middle East and North Africa**. The World Bank, Washington, DC. [online] http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2010/08/26/000333037_20100826001806/Rendered/PDF/562950PUB0Envi1AUGUST0201011PUBLIC1.pdf?

Environmental degradation is costly, to individuals, to societies, and to the environment. This book, makes these costs clear by examining a number of studies carried out over the past few years by the World Bank's Middle East and North Africa region. Even more important than estimating the monetary cost of environmental degradation (COED), however, are the clear guidance and policy implications derived from these findings.

UNEP Risoe Centre (2012) **Assessing International Funding for Climate Change Adaptation**: A Guidebook for Developing Countries [online] http://tech-action.org/

The guidebook reviews options for international financing of adaptation activities and projects in developing countries. It examines public and private sources of funding and also presents the key technical criteria and concepts used by public donors and private financiers in evaluating proposals.

9. OTHER RESOURCES

	The Forests and Climate Change Toolbox has been developed by CIFOR, USAID and ICRAF to build understanding and technical proficiency on issues of climate change and forests. The toolbox includes multi-media presentations on topics including mitigation, adaptation, carbon accounting and markets, and biofuels. http://www.cifor.org/fctoolbox/
	The **FOR CLIMADAPT project** «Adaptation of the Mediterranean forests to the climate change» is a European project of cooperation co-financed by the European Regional Development Fund (ERDF) extending over the period 2010-2013. It aims at encouraging and at putting in synergy the initiatives and the innovative experiments for an adapted management of the Mediterranean wooded ecosystems to the current and upcoming impacts of climate evolutions. http://www.forclimadapt.eu
	The **project QUALIGOUV** (MED) which is currently under implementation (2009-2012) tackles issues related to forest governance and assessment of the quality of forest management in protected areas. www.qualigouv.eu
	Fire Paradox is a project for joint research on forest fires financed by the European Union. It started in 2006 for a period of four years. The aim of this project is to develop new policies for fire management and forest fire risk reduction, adapted to the European constraints. www.fireparadox.org
	The UNDP **Community Based Adaptation** Programme (CBA) represents the community-based component of the GEF Strategic Priority on Adaptation. The SPA is an ecosystem-based climate change adaptation fund, designed to support ecosystem resilience in the face of climate change, including variability. CBA implements a number of activities in Morocco focusing on adaptation both in natural resource-dependent communities, water, agriculture, forestry and coastal zones. http://www.undp-adaptation.org/projects/websites/index.php?option=com_content&task=view&id=203
	In 2008, the Global Environment Facility (GEF) launched the **Adaptation Learning Mechanism (ALM)** project. The project is aimed to empower local communities in the implementation of adaptation practices on the ground, and to integrate climate change risks and adaptation into development policies and plans. The project also seeks to provide stakeholders with a common platform for sharing and learning. http://www.adaptationlearning.net/category/tags/forest

	The **Adaptation Partnership** seeks to encourage effective adaptation by catalyzing action and fostering communication among the various institutions and actors engaged in the effort to scale up adaptation and resilient development around the world. As part of this effort, the Adaptation Partnership commissioned a review of planned and existing adaptation activities in 12 sub-regions across Asia and the Pacific, Africa, and Latin America and the Caribbean. http://www.adaptationpartnership.org/index.php?option=com_content&view=article&id=4&Itemid=6
	The **UNFCCC's Database on Local Coping Strategies** is intended to facilitate the transfer of long-standing coping strategies/mechanisms, knowledge and experience from communities that have had to adapt to specific hazards or climatic conditions to communities that may just be starting to experience such conditions, as a result of climate change. The database can be searched by climate hazard, impact or coping strategy, or a combination thereof, by selecting from the scroll-down menus. http://maindb.unfccc.int/public/adaptation/
	UNFCCC's adaptation funding interface provides a platform to access and screen information on funding options available for adaptation worldwide. It provides a summary of adaptation funding options available from various sources, each with an information factsheet. The factsheet contains a description of the funding mechanism, example projects, contact information and relevant weblinks for further information. http://unfccc.int/adaptation/implementing_adaptation/adaptation_funding_interface/items/4638.php
	**Community Based Adaptation Exchange (CBA-X)** is a shared online resource designed to bring together and grow the CBA community. It provides a site for the exchange of up-to-date information about community-based adaptation, including news, events, case-studies, tools, policy resources, and videos.
	The mission of the **Adaptation to Climate Change in Morocco Project (ACCMA)** is to increase the knowledge and awareness about climate change and improve capacity to assess climate change vulnerability in different sectors in Morocco. http://www.pik-potsdam.de/~kropp/accma/fr/index_fr.html
	The **Climate Impacts: Global and Regional Adaptation Support Platform** (ci:grasp) is a web-based climate information service. It aims to support decision makers in developing and emerging countries to prioritise adaptation needs, and to plan and implement appropriate adaptation measures.

	**weADAPT.org** is an online 'open space' on climate adaptation issues (including the synergies between adaptation and mitigation) which allows practitioners, researchers and policy makers to access credible, high quality information and to share experiences and lessons learnt with the we ADAPT community. It is designed to facilitate learning, exchange, collaboration and knowledge integration to build a professional community of practice on adaptation issues while developing policy-relevant tools and guidance for adaptation planning and decision-making.

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Cover photo
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Imprint
This Handout has been elaborated in the framework of the GIZ Regional Project Silva Mediterranea-CPMF "Adapting Forest Policy Conditions to Climate Change in the MENA-region".

February 2013