Supplementary 2. Examples of synergies and trade-offs between adaptation and mitigation in the agricultural and/or forestry sectors.

	Agricultural sector	*Forestry sector*
Synergies / linking between adaptation and mitigation (examples)	• carbon sequestration in agricultural soils can create an economic commodity for farmers (sequestered carbon) and make the land more valuable by improving soil and water conservation, thus enhancing both the economic and environmental components of adaptive capacity [6] • fallow systems transformed to continuously cultivated areas (to maximize production under heavier precipitation conditions) can increase the ability of soils to sequester carbon [63] • synergies could include practices to improve soil water-holding capacities by adding crop residues and manure to arable soils, which not only affects soil properties and nutrient cycling, but also lowers emissions [67] • soil carbon sequestration has synergies with adaptation, as this can result in better plant nutrient content and increased water retention capacity, leading to higher yields and greater resilience [117-118] • by increasing the amount of soil carbon, fertility and water retention are improved, thus leading to improved yields. Estimates show that for every 1 ton of carbon that is sequestered into degraded soil, maize yield increases by 10–20 kg/ha [18] • modeling suggests that investing substantially in adapting agriculture to climate change in some regions — Asia and North America — can result in substantial mitigation co-benefits, while the latter may be insignificant in Africa [119] • Conservation agriculture that increases soil carbon, and simultaneously generates higher yield and reduces labor requirements [18]	• several forest adaptation management strategies, like fire management, using drought-resistant varieties in planted forests, and the promotion of native species, will increase carbon sequestration beyond adaptation [107] • adaptation projects that reduce the vulnerability of communities in forested areas or in the surrounding region have the potential to avoid deforestation and forest degradation [20] • integrating adaptation into mitigation projects may increase their resilience to climate variations, the permanence of carbon storage, and their acceptance by local communities, as adaptation responds to local issues [20] • using drought-resistant varieties of tree species in planted forests to improve tree species' resilience to water stress while increasing carbon sequestration [20] • mitigation projects have the potential to facilitate the adaptation of forests to climate change by reducing anthropogenic pressures on forests, enhancing connectivity between forest areas and conserving biodiversity hotspots [20] • mitigation projects can protect the ecosystem services that are relevant for people's adaptation, such as water regulating services or the provision of forest products used as safety nets [20] • incentives for forest conservation and increasing forest cover would not only avoid greenhouse-gas emissions but would also result in benefits for local climate, water resources and biodiversity [6] • forestry mitigation projects (e.g. forest conservation, afforestation and reforestation, biomass energy plantations, agroforestry, urban forestry) can reduce water evaporation and vulnerability to heat stress [11] • mangrove plantations that protect coastal areas from storms and simultaneously sequester carbon [16,20] • coastal afforestation which stabilizes shorelines and provides protection against storms and other extreme events while simultaneously improving carbon sequestration [16] • afforestation and reforestation that increase carbon sinks and simultaneously reduce water evaporation and lower vulnerability to heat stress [6] • reforestation prevent flooding and erosion while sequestering carbon [11] • early warning systems and forest fire management can prevent/limit emissions from fires, but also help adapt to increasing climate variability and extreme events causing forest fires such as droughts or storms [11] • ecosystem management can contribute to a reduction in greenhouse gas emissions through improved land-use and reduced deforestation on the regional scale. Further, conserving and restoring naturally functioning ecosystems, which is often one of the goals of ecosystem management, can significantly contribute to buffering ecological responses to climate extremes such as droughts and wildfires. Moreover, ecosystem management helps build capacity for learning and adaptation at multiple scales. As a result, societies will be better prepared to respond to surprises and uncertainties associated with climate change [120]
	• positive synergies between agricultural production, on-farm biodiversity and carbon storage in agroforestry [121] • agroforestry provides a particular example of a set of innovative practices that are designed to enhance productivity in a way that often contributes to	

climate change mitigation through enhanced carbon sequestration, and that can strengthen the system's ability to cope with adverse impacts of changing climate conditions [57]

- shade use and reforestation in coffee can influence both climate vulnerability and carbon stocks [68]
- agroforestry in coffee production zones and upstream reforestation is expected to reduce the impacts of climate change on coffee production by improving water regulation and soil fertility and reducing landslides and erosion and provide mitigation benefits by enhancing carbon stocks in the landscape [20]
- agroforestry contributes to multifunctional landscapes that support mitigation and adaptation and can lead to improvements in livelihoods, whereby provision of fuel wood, timber, fruits and/or fodder is often associated with the co-benefits of improved soil fertility, water infiltration and below- and above-ground carbon sequestration [122-123]
- agroforestry and ecosystem conservation are key approaches in the integration of climate change adaptation and mitigation objectives, often generating significant co-benefits for local ecosystems and biodiversity. Synergies between climate change adaptation and mitigation actions are particularly likely in projects involving income diversification with tree and forest products, reduction of the susceptibility of land-use systems to extreme weather events, improvement of soil fertility, fire management, windbreaks, and the conservation and restoration of forest and riparian corridors, wetlands and mangroves [74]
- there is considerable potential for smallholder plantations especially to serve the dual purpose of mitigating GHG emissions while increasing local incomes and thereby strengthening the adaptive capacity [124]
- see also [125-126]

Trade-offs between adaptation and mitigation (examples)

- particularly in the distribution of scarce resources among rival activities [100]
- increasing fertilization and irrigation requires more energy, and unless this can be produced from non-fossil sources, emissions will increase [6]
- unavoidable clashes between water supply for agriculture and other water utilizing sectors (e.g. hydropower) [6]
- more sustainable practices to sequestrate more carbon can affect yields negatively [100]
- organic practices to increase soil organic carbon can lead to competition for feed for livestock or fuel, or even to decreases in average yields, thereby exacerbating forest conversion to agricultural land [127]
- the types of trees best suited to preventing flooding and protecting biodiversity may not be the most effective to sequestrate carbon [9]
- competition for land by mitigation projects would increase land rents, and thus commodity prices [6]
- in arid and semi-arid regions, afforestation strongly reduces water yields. This has direct and wide-ranging negative implications for adaptation options in several sectors such as agriculture (irrigation), power generation (cooling towers) and ecosystem protection (minimum flow to sustain ecosystems in rivers, wetlands and on river banks) [6]
- bioenergy crops might affect food prices negatively [6]
- large-scale afforestation and reforestation aiming at carbon sequestration could reduce runoff and water available off-site [128]
- carbon sequestration competing with ecosystem services relevant for adaptation [20]
- conserving forests and cultivating bioenergy crops on a large scale produce conflicts with respect to food supply, food prices (especially in the tropics) and water resource management [129]
- forest projects can limit local communities' access to forest resources [74]
- fast-growing tree monocultures for mitigation conflict with local tree and forest uses, making livelihoods more vulnerable when trees are planted in water-scarce areas conflicting with local water uses, and in some cases when "climate-smart" agroforestry practices conflict with the need for agricultural intensification to produce increasing amounts of food for a growing population [74]
- additional trees in shaded coffee systems to enhance carbon can reduce yields and increase pressures from disease [74]