ASAP Research Programme

In a trans-disciplinary approach, the ASAP project aims to both develop and cement knowledge concerning agroforestry systems in southern Africa. This is carried out through the undertaking of six working packages* that each address a specific set of tasks. The following outlines the project's goals and methods in brief:

Carbon Sequestration

Trees, agricultural crops, grasses, shrubs and bushes all grow in agroforestry systems (AFS), all actively sequester carbon from the air, transforming it into plant tissues. Assessing the carbon sequestration potential of AFS requires the study of carbon partitioning in each system (i.e. above and belowground carbon stocks). Trees must be assessed in terms of their architecture, volume and biomass (tree measurements, terrestrial laser scanning technology, allometric biomass modelling) to asses carbon content. In the soils, carbon sequestration potential is assessed through site- and land-use specific surveys on soil carbon stocks.

Erosion and Hydrological Processes

Soil erosion is a main cause for land degradation in southern Africa. And water use, efficiency and distribution is of upmost important in dry environments and under a changing climate. Agroforestry practices have been shown to decrease soil erosion and influence water redistribution pathways. Soil surveys will be undertaken to analyse different soil properties influencing soil erodibility identifying vulnerable soil types. Wind erosion will be measured during the dry season, with dust deposition quantified. Water redistribution will be traced and related to possible limitations in multi-use landscapes by measuring hydraulic properties and water fluxes.

Tree-Crop-Livestock Interactions

The analysis of the environmental interactions between trees and crops of typical existing and potential AFS is crucial for the development of site-specific design. Comprehensive eco-physiological investigations and innovative microclimatic sensor technologies will be set up along the environmental gradients from the tree to open areas. The integrated analysis will enable the determination of the spatial variance of crop stress index and growth performance in relation to the AFS. Interactions between the individual abiotic and biotic components may affect the others and a compromise must be reached largely within three areas: light, water and nutrient.

* A further 4 working packages are concerned with education & demonstration, collaboration & exchange, knowledge transfer & dissemination and project coordination

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Biodiversity and Habitat

Land-use changes and increasing demands of lands for agriculture is a major threat for biodiversity worldwide. The development of multifunctional agricultural landscapes has to be holistic to support different needs of the society and be able to balance ecosystem services. A key challenge for implementing sustainable and resilient agroforestry systems is the integration of biodiversity and habitat protection. Best-practices agroforestry promoting biodiversity protection will be analysed and include for the development of management plans from the plot to the farm level. A special focus will be on woody species that are abundant and/or socio-ecologically important in terms of AFS as well as acknowledging the implication of non-native tree species.

Managing Agroforestry Systems

Core to the concept of AFS is the ability to produce multiple products from the same land holding, the development of best practice management and decision support systems in order to derive a defined product or set of products is paramount. Studying existing successful combinations, simultaneously the project will suggest modifications and trade-offs to traditional agricultural methods to allow for the inclusion of trees.

Contrasts between tree clusters belonging to different taxa, varying stand density and differences in site and stand conditions will assist in making improvements in matching planted taxa with site conditions, and to make recommendations on management operations to produce a specific range of products and ecosystem services.

Policy and Socio-Economic Impacts

A multi-level analytical approach will allow for a collaborative comparative analysis of the national contexts and regional local implementation of AFS in several countries in southern Africa. The aim is to study, first, the social and political impacts / effects of AFS at local and regional levels and, second, the policies, institutions, instruments, and political contexts informing AFS at national levels. Assessment of the social, political, and economic contexts guiding the establishment of AFS policies and the effects of utilising trees within agricultural land will critically examine the consequences of the use of trees within agricultural land on rural societies, people, and livelihoods in the case study regions.

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