

Proposed Topic

Understanding water and forests interactions from the leaf to the landscape scale

Justification:

Forest and water related issues are of utmost importance; forests are crucial for the sustainable management of water resources and, at the same time, water is a key factor for the sustainability of forest ecosystems and their potential to provide ecosystem services. Moreover this interrelation will become even more important in a context of global change, with increased temperatures and uncertain future rainfall patterns and important land use changes. Despite this, water and forest management policies, strategies and plans are generally developed and implemented in a sectorial way, without considering the interrelated implications between these two key ecosystems and resources. Time has come to design new management strategies, decision-support tools and policies that effectively integrate knowledge from different scales and disciplines to ensure that forest management and planning takes into account impacts on the water cycle.

Scope:

The project will generate new cross-disciplinary multi-scale research aiming at developing new integrated knowledge for a better understanding of the impacts of forests and forestry (from the leaf to the landscape-basin scale) on the water cycle and for developing a new effective socio-eco-hydrological approach of forest management that will aim at optimizing water-related services (e.g., water quality and quantity) and minimizing water related risks (droughts, floods).

Specific research areas that need to be developed and **integrated using a multi-scale approach**, are:

- * improved knowledge on water processes in trees and forests
- * improved knowledge on how silviculture and forest management can make forests more water-use-efficient, more climate change adapted, and deliver water-related services;
- * improved knowledge on the hydrology of forest ecosystems (at small and mid-sized basins levels) in view of how the composition, density and distribution of the vegetation cover, land-use and management and disturbances affect water resources and related risks;
- *improved understanding of the trade-offs between on-site and off-site water-related ecosystem services and other ecosystem services at different scales;
- *improved understanding of different planning and economic instruments and policies that ensure a socially optimal provision of water and other forest related ecosystem services;
- *New socio-eco-hydrological decision tools will be developed.

Expected impact:

The research will have an impact in the development of (i) new integrated management strategies and decision-support tools that will link stand to mid-sized basin level decisions aiming at optimising the impacts of forestry on the water cycle as well as understanding trade-offs with other ecosystem services and (ii) adequate economic instruments and policy recommendations that look at forests and water in a integrated manner.

Institutions supporting the idea (at least from 3 countries)

XXXX (Spain), YYYY (France), ZZZZ (Morocco), HHH (Italy), OOO (Tunisia)

Mediterranean Forest Research agenda priorities: I, III, IV