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Linking the forest research in the Mediterranean area: A framework to improve research capacities and cooperation

Giovanni Di Matteo [a,*], Pierfrancesco Nardi [a], Paolo Ceci [a], Sofia Bajocco [a], Luigi Perini [a], Gema Herrero-Corral [b], Dunixi Gabiña [c], Giuseppe Scarascia Mugnozza [d,e]

[a] Consiglio per la Ricerca e la sperimentazione in Agricoltura, Research Unit for Climatology and Meteorology Applied to Agriculture, CRA-CMA, I-00186 Rome, Italy
[b] National Institute for Agricultural Research Forest, Grassland and Freshwater Ecology division, Ecology of Mediterranean forests research unit, INRA-EFPA, Domaine Saint Paul, Site Agroparc 84914 Avignon, France
[c] Mediterranean Agronomic Institute of Zaragoza, IAMZ-CIHEAM, 50059 Zaragoza, Spain
[d] University of Viterbo, Department for Innovation in Biological, Agro-food and Forest Systems, DIBAF, I-01100 Viterbo, Italy
[e] Consiglio per la Ricerca e la sperimentazione in Agricoltura, Agronomy, Forestry and Land Use Department, CRA-DAF, I-00184 Rome, Italy

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ABSTRACT

Building research capacity in forest science has been recognized internationally as important in order to produce a sound evidence basis for decision-making in policy and practice, even if there is currently little evidence on how to measure and consequently spread progress and innovations resulting from forest research, especially in a fragmented region such as the Mediterranean.

The paper aims at establishing a framework from 79 institutions undertaking forest research across thirteen Mediterranean countries for measuring their research capacities and the potential they reached to disseminate results and innovations in forest research. The methodology adopted makes use of common indicators thereby allowing comparisons across countries as regards the following: (i) research lines performed in forest research, (ii) budget generated by forest projects, (iii) overall full budget spent for forest research, (iv) number of forest projects implemented, (v) number of total researchers, permanent staff and non-permanent staff deployed in forest research, and (vi) ISI papers published in forest subjects.

Forest research capacities have tentatively been clustered to find similarities or dissimilarities across countries, in order to identify possible partnerships to be reached and to highlight causal indicators that affected the clustering.

The paper findings contribute to address how capacity for forest research in the Mediterranean area is developed and how to measure and evaluate the performances of research and innovation systems. They provided further contributions to existing debates in the literature in order to foster research collaboration in the forest sector, knowledge mobilization, innovation and proposals/policies for a common research framework in the European forest sector.

1. Introduction

Mediterranean forests and woodlands, which cover about 9% of the Mediterranean region's land area, require special attention because of the following: (i) they constitute a unique world natural heritage in terms of biological diversity, hosting around 25,000 species of vascular plants (50% are endemic species) and a high degree of tree richness and endemism with extraordinary genetic diversity, (ii) their conservation and appropriate management have crucial impacts on the sustainability of the region's most strategic water resource, (iii) they provide highly appreciated and unique non-wood products and non-market services, and (iv) their future (as being in a transitional zone) is seriously endangered by climate change (MFRA, 2009; Palahí et al., 2008; Scarascia Mugnozza et al., 2000). Rapid and abrupt land-use changes, mainly due to development pressures, urban sprawl and habitat fragmentation resulting from transport infrastructures, resource overexploitation and pollution, are few of the main factors impacting upon Mediterranean forests and driving their degradation. Advancing and integrating forest research are an essential prerequisite to create the basis for innovation and to provide the scientific expertise to develop efficient cross-cutting policies and new forest management models based on the key-role of forests. Much of recent literature on this topic suggests that the key to addressing this challenge is to identify ways to improve engagement between scientists, industry, communities and decision-makers through communication and collaboration, ultimately making science more democratic, credible, legitimate and therefore relevant to public policy processes (Hickey, 2013). On the other

* Corresponding author. Tel.: +39 06 69531228; fax: +39 06 69531251.
E-mail address: giovanni.dimatteo@entecra.it (G. Di Matteo).

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hand, research institutions are somewhat alone in finding the right way forward, as ministerial governing bodies tend to be tied up in existing research topics, therefore science often does not succeed in providing the knowledge needed in due time (Hickey, 2013; Stevanov et al., 2013; McKinley et al., 2012; Klenk and Hickey, 2013; von Teuffel, 2011). The existing debates about the overall role of science in policy making focus on the following: i) improving the quality of interactions between scientists and decision-makers within governments; ii) improving the synthesis and communication of science to society; iii) improving the transparency of scientific results offered to decision-making processes; and iv) increasing the strategic planning affecting science procurement and funding (Hickey, 2013 and references cited therein). The abovementioned studies also highlight that scientific requirements of peer-review publications are often in contrast with practice-oriented needs of practitioners. They investigated the transfer of scientific knowledge and discuss the institutional design of research organizations leading to application in practice. In this regard, Stevanov et al. (2013) evaluated how the provision of science-based policy advice met the demands of policy actors in 148 projects conducted between Serbia and Croatia. They identified useful methods to improve research evaluation by investigating besides the typical measures of research outputs (i.e., peer-review), the key-role that 'in-house' government research plays in producing science-based policy advice on forests, which is bound to scientific, political, and economic expectations. Similarly, McKinley et al. (2012) supported citizen science and participatory research approaches, which bring to varying extents resource managers, decision makers, and the public into the research process. Petrokofsky et al. (2013) proposed a bibliometric study for examining the existing knowledge base in relation to ten specific priority questions relevant to forestry research (T10Q) addressed to 481 individuals with a professional interest in forestry (i.e., researchers, stakeholders, policymakers and nongovernmental organization). Klenk and Wyatt (2013) and Klenk and Hickey (2013) calibrated a model embracing knowledge production and mobilization to foster forest research innovation and meet the needs of the Canadian forest sector. They separated research conducted by universities from that carried out by research institutes, concluding that whereas university-based research is governed by incentive structures of academia and funding councils (i.e., peer-reviewed papers, presentations at conferences, highly trained personnel), research institutes are ruled by the needs of their partners and thus reflect a reflexive problem-solving and innovation orientation. At the same time, the forest sector is increasingly under pressure and its political marginalization is progressive. This is due to few forest research institutions being successful in creating viable forest research frameworks to coordinate research on complex issues, to involve collaborative teams of researchers and partner organizations from different geographic areas, and to synergize their forest research capacities to pursue a common objective. At this purpose, the European Forest Institute (EFI) is developing its Regional Offices as the main instrument for pan-European networking (Päivinen, 2011).

In this context, we conducted an inventory of existing forest research activities and capacities among thirteen Mediterranean countries in order to establish a framework to measure performances, capacities and potential reached in disseminating results and innovations in forest research. In order to determine the effectiveness and the potential reached by the Mediterranean forest research framework, we used representative international research performance indicators related to budget, productivity, innovation and dissemination as well as to internationally accepted research results, personnel deployed and research lines (Meek and van der Lee, 2005; Sizer, 1990; Rudd, 1988). Based on data obtained, the main aim of the study was to perform a cluster analysis to identify similarities and/or dissimilarities in forest research capacities across surveyed countries in order to identify potential partnerships to achieve. Consistently, we would expect countries showing similarities to be grouped in the same cluster and similar research systems in terms of budget, personnel, publications and innovations to lead to potential collaborations and enhanced research potential. Conversely, countries that showed dissimilarities with each other would be expected to be split across different clusters. Moreover, relationship analyses among indicators were performed to address questions relating to causal indicators that affected the country clustering. The study also aims at providing further contributions to existing literature on research performance and research cooperation in the forest sector.

1.1. Analytical framework

Mediterranean forest research includes many researchers and numerous institutions from more than 20 different countries of the region; however, it is highly fragmented while forest research programs, competencies and capacities have often been locally managed (Scarascia Mugnozza et al., 2012). There is a huge diversity of stakeholders, in terms of ways of action, dimension, interaction with forest, or forestry related skills. This could be an obstacle for developing a research strategy for a sustainable and competitive forest sector. Indeed, efforts to strengthen forest research collaborations and capacities in Mediterranean countries have with some exceptions, been ineffective. Part of the explanation for this disappointing performance may be that few studies have attempted to assess the various factors that determine research capacity and performance in the forest sector. Another part of the explanation could be that the process of building a framework for the Mediterranean forest research is seldom considered in a system context, i.e., leading research collaborations across European countries (Haegeman et al., 2013; Scarascia Mugnozza and Matteucci, 2012; Scarascia Mugnozza et al., 2012; Päivinen, 2011; von Teuffel, 2011). Consequently, measuring the forest research potential is a key-point to establishing a starting point to build up a common research framework in the Mediterranean forest sector but also a rewarding task for the management of an institution (MFRA, 2009). In this context, a better knowledge of forest research capacity is becoming a more and more important element for the improvement of efficiency of forest research institutions involved even if the scientific and technological cooperation with the developing world over the last forty years has gone through a number of overlapping phases and has reflected different approaches and concepts (CIFOR, 2004; Kowero and Spilsbury, 1997; Gaillard, 2001; von Teuffel, 2011; Päivinen, 2011).

According to MFRA (2009) and Houllier et al. (2005) forest research capacity refers to accomplish the following goals: (i) capacity to perform forest research according to EU policy, and (ii) capacity to produce and disseminate results and innovations among actors concerned with forest issues (i.e., stakeholders, scientific community and politicians), taking into consideration their wide diversity and thus orienting their activities according to their changing needs. The first goal is reached by capacity to perform forest research, i.e., attract research funds from forest projects via multidisciplinary skills held by personnel and consistency of budget allotted to cover all expenses for research. These abilities depend upon the research focus of the institutions and whether or not these are aligned with national and/or EU research priorities. The ability of an institution to win research funds will therefore depend somewhat upon its capacity to fit within these priorities. The second goal is reached by capacities to produce and consequently disseminate quality research results and innovations among concerned actors. We should note that these capacities could be inter-related because productivity and dissemination in research are affected by the extent to which the researcher has succeeded in gaining funds for research, and in as far as the allocation of funds is influenced by past productivity.

2. Materials and methods

2.1. Cluster analyses

For the forest research capacity indicators corresponding to the thirteen Mediterranean countries, we performed a cluster analysis to identify similarities and/or dissimilarities among them. Clustering is

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