

# Political Drivers of Forest Management in Mediterranean Countries: A Comparative Study of Tunisia, Italy, Portugal and Turkey



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**Abstract** - The ecological basis of forests in Mediterranean countries is quite similar, but the management of ecosystem services differs substantially. The question is which political factors drive the different forest management concepts. Our political analysis looks on private and public actors and their power and interests which shape the management of the ecosystem services of the forests in Tunisia and compares the results with Italy, Portugal and Turkey. We apply an analytical study of interests, conflicts and actor-centered power with a triangulation of qualitative data (document analysis, qualitative interviews and observations) in 2016-2017. We compare our results with the results of ALTERFOR project covering European countries. The study shows that in all cases the key actors are the state institutions, whereas the importance of other actors varies between the countries. In Tunisia and Turkey all forests are state-owned and the governmental institutions dominate forest management. However, in Portugal, actors from timber sector are considerably strong by providing incentives. A particularity of Tunisia is the noticeable impact of international organizations in forest management by the means of incentives and dominant information. In all cases, the shift from government to governance did not happen, but some indicators and previous experiences from other developing countries show the potential in Tunisia.

**Keywords:** actor-centered power, interests, forest governance, ecosystem services, Mediterranean countries

## 1. Introduction

The management systems of forests in the Mediterranean countries present diversity and particularities for each country despite the similarities in climate and vegetation. These differences are mainly noticeable in land ownership (private or state-owned forests) and in goal setting for ecosystem services. In countries where forests are in majority state-owned, the most powerful actor is the government, while in other countries presenting a great proportion of private forests, such as Portugal with only 3% of state-owned forests (Juerges et al. internal report 2017:167), actors related to timber-based activities are dominant. The interests of the actors may vary from ecosystem services' provisioning, supporting, regulating and cultural interests, leading not only to the shaping of forest management policy, but also to many conflicts of interests among different actors. It is possible to identify the political drivers behind the ecosystem services of forests. Such knowledge might be important for implementing innovative management ideas in practice and for learning from other experiences. For this purpose, we identified different actors and mapped their interests in ecosystem service categories (provisioning, supporting, regulating and cultural ones) after describing roughly the most visible conflicts for each case study. Then we aggregate the actors in three main categories (governmental, market and civil society), evaluate their overall power resources regarding different ecosystem services and determine the power mechanisms that they use. The results about the power of actors allow checking whether there is a shift from government (classical regulation with a strong state

actor formulating and implementing policies) to governance (modern regulation empowering civil society and market actors to share power with the state) (Krott 2008).

## 2. Materials and methods

### 2.1. Analytical framework

This work is based on the analysis of interests and power of actors implicated in forest management. Interest is defined by Krott (2005) as being "*based on action orientation, adhered to by individuals or groups, and designating the benefits the individual or group can receive from a certain object, such as a forest*". Power can be defined as "*the capability of an actor to influence other actors*" (Krott et al. 2013 in Juerges et al. internal report 2017:30). This power definition is used to assess the power of actors in the actor-centered approach (ACP) which has been developed by Krott et al. (2013). The theoretical roots of this approach are detailed elsewhere (in Krott et al. 2013). According to this actor-centered power approach, coercion, (dis)incentive, and dominant information are the mechanisms used by actors to influence other actors allowing, consequently, to evaluate these actors' power. These mechanisms are defined as following:

- Coercion: is defined as "*altering the behavior of the subordinate (other actors) by force*". This definition concerns physical (real) force, the threat of force and even bluffing with force that does not exist in reality. In addition, illegal harvesting is considered as coercion since it is a kind of disobedience to other actors' rules. However, influencing nature (cutting, planting trees) is not considered as coercion because it does not affect other actors directly. Other actions are considered as power by means of coercion such as implementing laws by the governmental authorities, fencing a forest (legally or illegally) to stop access to this area by recreationalists, climbing over the fence to access the forest, wood harvesting for domestic heating in an illegal way, etc. (Juerges et al. internal report 2017:30).
- (Dis)Incentive: is considered as "*altering the behavior of the subordinate by means of advantages or disadvantages*". (Dis) incentives can be material or immaterial. Material (dis) incentives concern money but also technical support such as machines, plants, etc. (e.g. subsidies for forest management activities, providing extension services by the state institutions for free, etc.) while immaterial incentives are based on social and psychological benefits (e.g. appealing to social conventions or to a moral purpose such as protecting some species from extinction) (Juerges et al. internal report 2017:31).
- Dominant information: can be defined as "*altering the behavior of the subordinate by means of unverified information*". In others words, the subordinate cannot check the validity and quality of information provided by the other actor, and the subordinate makes decisions by referring to this unverified information. This dominant information is provided by superior experts or can be based on particular ideologies (Juerges et al. internal report 2017:31).

### 2.2. Methods

The methodology of this work is based on triangulation of qualitative data (interviews, document analysis, participatory observations) which is used in social science research by making observations from different points of view increasing the precision and accuracy of the work (Neuman, 2014:166). Data was collected in 2016-2017. The interviews were realized face-to-face, with questionnaires, via email or phone calls. We selected by the snowball system best informed eight experts from different institutions linked to the forest sector (General Directorate of Forests (*interviews 1,2 and 3*); Forest Use Authority (*interview4*); Ministry of Environment (*interview 5*); Research institutions (*interviews6 and 7*) and the Northwest Silvo-Pastoral Development Office (*interview8*). In addition, the author had access and cooperation with the Tunisian General Directorate of Forests and other research institutions in the frame of previous research work which allowed a better understanding of the forest sector and the different actors involved. The validity of this comparison work is supported by the use of the same methodology in the European project entitled "Alternative models and robust decision-making for future forest management" (ALTERFOR) from which we used the obtained data, compiled in a detailed internal report (Juerges et al. internal report 2017), for the cases of Italy Turkey and Portugal.

### **2.2.1. The actor-centered power approach**

To measure the power of actors for the Tunisian case, we identified the main actors who have interest in forest ecosystem services at several levels. We specified and evaluated these actors' interests (strong interest (+++), medium (++), low (+), no interest (0)) or even if some actors are against specific ecosystem services (-). Next, we compared Tunisia to other European cases in terms of actors with strong interest in different categories of ecosystem services. In addition, we made an overall assessment of power resources of three main groups of actors (governmental, market and civil society) regarding all cases to get an overview and a comparison of power for these groups. Based on the tables we compared the overall power concerning different categories of ecosystem services and the power mechanisms used by strong actors (coercion, (dis)incentives, dominant information) in different cases. This approach provided a qualitative and relative judgment of different actors' power driving forest management.

### **2.2.2. About the selected cases**

#### **(a) Tunisia**

According to the second national forest inventory (2010), the forest area in Tunisia is estimated at 1.141.628 ha, from which more than 90% are state property (Boussaidi, 2012). In these areas owned and managed by the state, forest people have always been an issue. In fact, from a total number of population estimated at 10.982.754 inhabitants (National Institute of Statistics, 2014), 733.613 persons live in and around five kilometers from forests (Tounsi and Ben Mimoun 2012) and present a considerably high poverty rate (45.8%) compared to the average national one (15.5%) (Tounsi and Ben Mimoun 2012). The main conflicts existing in the Tunisian forest sector are between the governmental actors (responsible for law implementation and policy formulation and advocating nature protection and conservation) and other actors who are more interested in ecosystem services provisioning and especially forest people who live from forest resources.

#### **(b) Italy**

The total forest area in Italy is about 10.9 million ha with 9.3 million ha of real forests and 1.6 million ha of other wooded lands. This refers to nearly 36% of the total area of the country (Juerges et al. internal report 2017:85). There are roughly 66% of Italian forests which are privately owned with an intense fragmentation of ownership, while 34% of forests are public and characterized by a dominating role of municipalities (Juerges et al. internal report 2017:86). Italian forests are underused despite the important forest cover that doubled in the last 50 years (Juerges et al. internal report 2017:86). The main forest policy problem in Italy is the fragmentation and inconsistency due to the failure of the decentralization process which started in the seventies. In addition, due to a lack of vertical integration in terms of forest policy implementation, there are permanent conflicts between municipalities, protected areas' authorities and regional departments which feel as well embarrassed by sharing their decision-making with environmentalists (Juerges et al. internal report 2017:87; Juerges et al. Forthcoming).

#### **(c) Portugal**

Forests cover 35% of the total land area and are about 3.15 million ha. These forests are facing degradation due to repeated and severe wildfires. The majority of forests are privately owned (87%). A great priority is given to wood production in Portuguese forest management. However, there are different perceptions of priorities to formulate the forest policy and to implement multi-functional forestry (Juerges et al. internal report 2017:167; Juerges et al. Forthcoming).

#### **(d) Turkey**

The area of forests in Turkey is 22.3 million ha and represents 28% of the total land (Juerges et al. 2017:259). Out of this area, 99.9% belongs to the state and only 0.01% are private forests (Juerges et al. internal report 2017:259). The majority of these forests are managed by the state forest organization named General Directorate of Forestry or Turkish Forest Service under the Ministry of Environment and Forestry (Sivrikaya et al. 2008).

Over the years, the Turkish forest management has evolved to become more oriented towards the multiple use of ecosystems concepts (Juerges et al. Forthcoming). The common conflict of setting priorities for the different ecosystem services and the way to implement their multiple uses does exist mainly within the state forest organization.

### 3. Results and discussion

#### 3.1. The different stakeholders' interests related to forest ecosystem service

The ecosystem services (ES) concept consists of the benefit that humans can obtain from ecosystems (MA 2005). The ecosystem services are classified into four main categories, namely *provisioning ES* (such as food, timber, water, fiber etc.), *supporting ES* (such as primary production, soil formation, etc.), *regulating ES* (climate and flood regulation disease regulation, water purification, etc.) and *cultural ES* (aesthetics, education, recreation, etc.) (MA 2005; Szücs et al. 2014; Blicharska et al. 2016).

##### 3.1.1. The case of Tunisia

In Tunisia the main actors interested in forests are the governmental actors (the General Directorate of Forests and the regional institutions representing it, state research institutions, Forest Use Authority responsible for forest products' sales, The Northwest Silvo-Pastoral Development Office, Ministries of Tourism, Agriculture and Environment interested in nature protection and ecotourism), market actors (mainly the industries of wood and non-wood products such as cork, rosemary, nuts...). International organizations are particularly interested in Tunisian ecosystem services by financing development projects and realizing studies (*interviews 2,5 and 8*). In addition, forest people living in and around forests have great interest in forest ecosystem services since they depend on them to survive.

Regarding ecosystem services provisioning, timber industries have interest in them. However, it cannot be considered as strong interest since 90% of industry's need is imported (Daly-Hassan et al. 2014). Non-wood products are more interesting for industries. For instance, there are five big enterprises of cork transformation which benefit from the resource and they export 100% of their products (*interview 4*). In fact, industrials buy a tone of cork (already harvested in the charge of the forest authorities) with an average price of 1700 Tunisian dinars (TND) (equivalent to 600 euros in August 2017), while one tone of cork gives, after transformation, 10 thousand bottle plugs sold for 0.5 euros per plug (*interview 4*). For the extraction of essential oil from rosemary, according to the National Institute of Statistics (2015), the total value of exported oil in 2014 was estimated at 11.219.336 TND, while in the Forest Use Authority activity's report of 2014, the total value of rosemary sales was 1.524.000 TND. Forest households are also interested in wood provision (especially fire wood which is for some of them the only source of energy, unlike in European countries where people have more options). In addition, they are particularly interested in non-wood products such as extracting traditionally essential oils from plants, bee-keeping, and transforming different types of nuts, especially pine nuts which are economically valuable (Hasnaoui 2014). Forest people benefit as well from grazing in forests to feed their livestock which provides 58% of the forest income for these people (Tounsi and Ben Mimoun 2012). Also, international organizations and research institutions show great interest in wood and non-wood product provision by working in the frame of development and research projects. All actors except industry which seeks increasing harvesting rate and access to the forest support Biodiversity and Habitats. Forest people, despite depending on the provision of wood (mainly fire wood) and non-wood products, contribute to the conservation by protecting and intervening in fire-fighting.

Soil protection is particularly an issue in Tunisia. Fixing sand dunes (for example in the northwest coastal line of the country) was realized in a natural way by planting trees (especially pine trees). These activities of soil protection are performed by the state in collaboration with international funds and research institutions.

With regards to cultural aspects, there is low to medium interest in these activities. As an example, the General Directorate of Forests, which manages 17 national parks and 27 natural reserves in Tunisia, does not apply any entry fees for entering these spaces despite the existence of law for some of them that refer to the obligation to pay entry-fees to access (*interview 6*). The following table (Table 1) illustrates these interests in different ecosystem services in Tunisia.



**Table1:** Interests of selected actors in ecosystem services in Tunisia  
 +++: Strong, ++:Medium, +:Low, -:against, --: medium to strong against, 0: no interest  
 NGO: Non-Governmental Organization; ES: Ecosystem Services  
 Source: own field work

	Forest Owner and manager (state)	Wood and non-wood Industries	NGOs and Governmental actors representing nature conservation, soil protection	International organizations	Forest households (individuals)	Governmental actors and NGOs representing ecotourism, recreation, Hunting	State research institutions
<b>Provisioning ES</b>							
Wood provision	++	++	0	++	+++	-	++
Game provision	+/-	0	0	0	++	+++	0
Non-wood products provision	+++	+++	0	+++	+++	+	+++
<b>Supporting ES</b>							
Biodiversity	+++	--	+++	+++	++	++	+++
Habitats	+++	--	+++	+++	++	++	+++
<b>Regulating ES</b>							
Carbon sequestration	++	--	-	+++	0	0	+++
Climate regulation	++	0	0	+++	0	0	+++
Soil protection	+++	--	+++	++/+++	+	0	++/+++
<b>Cultural ES</b>							
Outdoor recreation	+	-	-	+	+	++	+
Tourism	+	-	-	++	++	++	+

### 3.1.2. Tunisia in comparison with Turkey, Italy and Portugal

The following table (table 2) presents the actors with strong interests in ecosystem services. It is important to mention that the table contains only actors with the relatively stronger interest as compared to other actors in their case. There might be some actors who have considerable interest, but who are not cited in the table since there are others with stronger interests. Table 2 allows identifying many important aspects of interests in forest ecosystem services.

The first aspect concerns the comprehensiveness of interests in ecosystem services. In other words, it shows whether actors are interested in all ecosystem services or focus on only a few of them. In Portugal there is more comprehensiveness regarding ecosystem services than in the other countries. The actors are strongly interested in 12 out of 13 ecosystem services while in Italy, Tunisia and Turkey there are respectively six, eight and ten from these 13 services. The orientation of these three countries actors is more focused on specific ecosystem services.

The second aspect is to identify which category of ecosystem services is most attractive. In all cases there are actors with strong interest in wood provision even though the number of these actors is different according to the importance and the multiple use of wood in the country. However, game and fish provision may interest fewer actors. Interests in regulating ecosystem services differ in the four countries. While carbon sequestration and climate regulation interest actors in almost all of the countries, wildfire reduction is a special issue in Portugal gaining strong interest from an important number of actors. The cultural ecosystem services are interesting strongly in Portugal and Turkey but not in Tunisia and Italy.

The third point is to identify for each country the ecosystem services in which the most actors are interested. In Tunisia the non-wood product provision is of great interest for different kind of actors (the state forest institutions, forest households, industries, research institutions and international organizations) in addition to supporting biodiversity in which state forests and research institutions, Non-Governmental Organizations (NGOs) and governmental institutions related to nature conservation (e.g. the Ministry of Environment) are interested. In Turkey the interest in ecosystem

services is more balanced with less focus of many actors on one particular service. This could be explained by the comprehensive multiple use approach of governmental actors which are the owners and managers of the Turkish forests (Juerges et al. internal report 2017:259). However, it is still possible to identify the ecosystem services that are gathering a relatively higher number of actors and which are pest control and non-wood products provision.

In Italy wood provision is the service with the highest number of strongly interested actors. However, this is not due to the importance of domestic wood provision as it is the case in Portugal, but it is due to the multiple use of this wood. While the Italian Ministry of Agriculture focuses on rural development and support for local economies by producing wood and other forest products, public forest owners consider forest products as a source of income for their institutions and have strong interest in them (Juerges et al. internal report 2017:94). Private forest owners and forestry enterprises have determined interests in wood provision (wood imports in Italy are very important and the domestic production of wood is used almost for energy purposes; about 65% of the domestic production is used as energy (Juerges et al. internal report 2017:86). The bio-energy actors are directly interested in the provision of wood, while wood and paper industry rely more on imported wood. Regarding Portugal, two main ecosystem services noticeably aggregate the highest numbers of actors. These services are wood provision and wildfire reduction. Wildfire is a big issue in Portugal (from 1980 to 2009 there were more than half a million fires which burned 3.2 million ha (Rego and Joaquim 2014)).

The last aspect is to identify the role of governmental actors (in bold in the Table 2). In Tunisia state actors with their different functions and positions present strong interest in all ecosystem services. This could be explained by the state ownership of the forest. Similarly, in Turkey forests are state-owned and the state institutions from different fields are strongly interested in different types of ecosystem services except ecotourism and recreation. In Italy state actors dominate in terms of interest in supporting ecosystem services, especially in biodiversity where they have strongest interest without any competition from other actors. Regulating ecosystem services are also of great interest for them, while service provisioning is less important. In Portugal the state institutions are not dominant as compared to the other actors. The NGOs are attracted by supporting and regulating ecosystem services stronger than the state. This contradicts the European Union strategy claiming that the state should have more interest in supporting and regulating ecosystem services, while the provisioning of these services should be of interest for market actors. The cultural services are in general not in the focus of state institutions in all cases.

**Table 2: Comparative synthesis about the number and types of actors with the strongest interest in ecosystem services in the four cases**

-: does not exist

	Number of actors (categories) with strong interest in the ecosystem services (ES)				Type of the actor with strong interest in the ecosystem services			
	Tunisia	Turkey	Italy	Portugal	Tunisia	Turkey	Italy	Portugal
<i>Provisioning ES</i> Wood provision	1	2	5	3	- Forest households	- <b>Forest management institutions</b> - Timber industries	- Chartered agronomists and foresters - Industry (wood and pulp, bio-energy) - Forestry enterprises - Private forest owners - <b>Public forest owners</b>	- <b>Forest management institutions</b> - Timber industries - NGOs representing employment in forests
Game provision	1	0	0	1	- Governmental actors and NGOs (ecotourism, recreation, Hunting)	-	-	- Hunting NGOs
Non-wood products provision	5	3	1	0	- <b>Forest owner and manager (state forest institutions)</b> - Forest households - Non-wood industry - International organizations - <b>Research institutions</b>	- <b>Forest management institutions</b> - NGOs and <b>governmental actors of nature</b> conservation in forests - NGOs of ecotourism and recreation	- <b>Public forest owners</b>	-
Fish Provision	0	0	0	1	-	-	-	- Fishing NGOs
<i>Supporting ES</i> Biodiversity	4	1	3	1	- <b>Forest owner and manager (state forest institutions)</b> - NGOs+ <b>state institutions of nature conservation and soil protection</b> - International organizations - <b>Research institutions</b>	- NGOs and <b>governmental actors of nature</b> conservation in forests	- <b>Ministry of Environment</b> - <b>State forest service</b> - Environmental NGOs	- Nature and Environment conservation NGOs
Habitats	4	1	3	2	- <b>Forest owner and manager (state forest institutions)</b> - NGOS+ <b>state institutions of nature conservation and soil protection</b> - International organizations - <b>Research institutions</b>	- NGOs and <b>governmental actors of nature</b> conservation in forests	- <b>Ministry of Environment</b> - <b>State forest service</b> - Environmental NGOs	- Nature and environment conservation NGOs - Outdoor recreation NGOs

**Table 2 (continued)**

**-: does not exist; NGO: Non-Governmental Organization; ES: Ecosystem Services**

**Source: Own field work, ALTERFOR project (2017)**

	Tunisia	Turkey	Italy	Portugal	Tunisia	Turkey	Italy	Portugal
<b>Regulating ES</b>								
Carbon sequestration	2	1	2	1	- International organization - <b>Research institutions</b>	- NGOs and <b>governmental actors of nature conservation in forests</b>	- <b>Ministry of Environment</b> - Environmental NGOs	- Nature and environment conservation NGOs
Climate regulation	2	1	0	1	- International organization - <b>Research institutions</b>	- NGOs and <b>governmental actors of nature conservation in forests</b>	-	- Nature and environment conservation NGOs
Soil protection	4	2	0	2	- International organization - Research institutions - <b>Forest owner and manager (state forest institutions)</b> - <b>NGOS+ state institutions of nature conservation and soil protection</b>	- <b>Water and soil protection institutions</b> - NGOs and <b>governmental actors of nature conservation in forests</b>	-	- Water associations and companies - Nature and environment conservation NGOs
Water quality	0	2	2	3	-	- NGOs and <b>governmental actors of nature conservation in forests</b> - <b>Water and soil protection institutions</b>	- <b>Ministry of Environment</b> - Environmental NGOs	- Water associations and companies - Nature and environment conservation NGOs - Hunting and fishing NGOs
Wildfires reduction	0	0	0	5	-	-	-	- <b>Forest management institutions</b> - NGOs representing employment in forests - Outdoor recreation NGOs - Hunting and fishing NGOs - Water associations and companies
Pest control	0	3	0	2	-	- <b>Forest management institutions</b> - Timber industries - <b>Governmental actors of nature conservation in forests</b>	-	- <b>Forest management institutions</b> - Timber industries
<b>Cultural ES</b>								
Outdoor recreation and tourism	0	1	0	1	-	- NGOs of ecotourism and recreation	-	- Outdoor recreation NGOs



### 3.2. Power of actors driving the management of forest ecosystem services

A first insight into different power resources in Tunisia, Turkey, Italy and Portugal is provided in Table 3. The actors are aggregated into three categories: governmental, market and civil society actors, while their power resources are indicated. These three categories enable to test a shift from government to governance, which is an important issue for forest and environmental policy (Juerges and Newig 2015; Arts 2014; Jedd and Bixler 2015). The governmental actors gather all the actors who have authority based on legislative, executive or jurisdictional responsibilities. Market actors are non-public actors interested in generating an economic benefit including enterprises and all non-state organizations representing the interest of the enterprises. Civil society actors are the non-public and non-economic interest actors like environmental organizations (Juerges et al. Forthcoming).

Table 3 shows that the governmental actors have strong power resources in all countries. Market actors' power differs from one case to another. In Portugal these actors are dominant and in Italy they are remarkably strong too. On the contrary, in Tunisia and Turkey market actors are weak.

Civil society actors are not strong in any country, but they get some influence in Portugal and Turkey. Land ownership is a strong power source of the governmental actors in Tunisia and Turkey. In Portugal private forests dominate and market actors compete with governmental actors to become the strongest, especially in regards to timber provision.

**Table 3:** Power resources of governmental, market and civil society in the different cases

+++ : Strong, ++:Medium, +:Low

Source: own field work, ALTERFOR project (2017)

	Governmental actors	Market actors	Civil Society actors
Tunisia	+++	+	+
Portugal	+++	+++	++
Italy	+++	++	+
Turkey	+++	+	++

Table 4 presents an overall evaluation of power resources in the four countries regarding different ecosystem services. The power support differs strongly in regards to different forest ecosystem services. Supporting of ecosystems has strong power assistance in all four countries. Concerning regulating ecosystem services, the power resources are in majority medium. The only two exceptions are soil protection in Turkey and wildfire reduction in Portugal, which get strong support. The power resources behind provisioning wood are in two countries strong and in two weak. In Portugal a strong wood industry pushes timber provision. In Turkey the General Directorate of Forestry represents the forest owner and has therefore the power to set two priorities: wood provision and biodiversity. In contrast to all other ecosystem services cultural ecosystem services, even outdoor recreation and tourism, are not subject to great power resources.

Regarding power mechanisms, coercion and dominant information are the most used. However, the dominant information is not highly applied by the Italian actors where coercion prevails. In addition, there is a relation between overall power resources and the number of power mechanism. Stronger power behind specific ecosystem services is based on a higher number of different power mechanisms.

**Table 4.** Power resources and mechanisms used by actors interested in different ecosystem services

-: does not exist; ES: Ecosystem Services

Source: own field work, ALTERFOR project (2017)

	Overall power resources				Strongly-used power mechanism(s) by actors			
	Tunisia	Turkey	Italy	Portugal	Tunisia	Turkey	Italy	Portugal
<b>Provisioning ES</b>								
Wood provision	Low to medium	Strong	Medium	Strong	Coercion	Coercion Incentives Dominant information	Coercion	Coercion Incentives Dominant information
Game provision	Medium	Low	Medium	Medium	Coercion	-	Coercion	-
Non-wood products provision	strong	Low to medium	Medium to Strong	Low	Coercion Incentives Dominant	Dominant information	Incentives	-

Fish Provision	-	-	-	Low	information	-	-	-	-
<b>Supporting ES</b>									
Biodiversity and Habitats	Strong	Strong	Medium to strong	Strong	Coercion Incentives Dominant information	Coercion Dominant information	Coercion	Coercion	Dominant information
<b>Regulating ES</b>									
Carbon sequestration	Medium	Medium	Low	Medium	Dominant information	Dominant information	-	-	-
Climate regulation	Medium	Medium	Low	Medium	Dominant information	Dominant information	-	-	Dominant information
Soil protection to strong	Medium	Strong	-	Medium	Coercion	Coercion Dominant information	-	-	-
Water quality	-	Medium	Low	Medium	-	Incentives	-	-	-
Wildfires reduction	-	-	-	Strong	-	-	-	-	Coercion Incentives Dominant information
Pest control	-	Medium	-	Medium	-	-	-	-	Coercion
<b>Cultural ES</b>									
Outdoor recreation and tourism	Low	Low to Medium	Low	Low to medium	-	-	-	-	-

In practice power mechanisms are applied by specific actors. These actors are part of these three types: governmental, market and civil society actors. We will ask whether these different types make use of different power mechanism.

To start with, the governmental actors' power in Tunisia is based on coercion, since these actors are responsible for law implementation, for protecting forests and regulating their use. Tunisian forests are protection forests rather than production ones. For this, the authority tasks are a priority despite the difficulties that state institutions have been facing to implement laws after the revolution of 2011. The general Directorate of Forests, with its different departments, regional and local representations, is responsible for producing management plans, the implementation the forest code laws, protecting biodiversity (creating and managing national parks and natural reserves) and even coastal lines by fixing sand dunes (World Bank 2016 (not published); annual report of activities of the General Directorate of Forests, 2015). The Ministry of Environment also has power based on incentives from financing and implementing conservation projects (in general, it is foreign money obtained in the frame of international collaborations) and dominant information while collaborating to record, for example, the species status (*interview 5*). The state research institutions use dominant information to produce reports and papers especially in collaboration with forest institutions and international organizations. In Turkey, where similarly to Tunisia, almost all forests are owned by the state, governmental actors have strong power based on coercion, while the immaterial incentives by appealing to morals for a higher nature conservation are important as well. Additionally, in most cases the governmental actors use the dominant information to influence forest management (producing inventories, recording species status, statistics, etc.). In Portugal, in addition to immaterial incentives, the use of media and regional agencies as dominant information is a common way of influencing forest management models (Juerges et al. internal report 2017:177).

The power of market actors depends on the importance of wood industry in the country. Tunisia imports 90% of its need of wood and timber-derived products and the industrials do not appreciate the Tunisian wood since it has higher density than the imported one (Daly-Hassan et al. 2014). Thus, the timber industry's power to influence forest management in Tunisia is not strong. However, coercion and incentives might be applied by industrials interested in non-wood products (e.g. by illegally harvesting herbs outside the limit defined by the government), but it is still far from being a strong power. Similarly, in Italy market actors have medium power (and low interest) since the domestically produced wood has no great economic importance (only 24% of the net annual increment is utilized) and also, the economic value of this domestic wood production has halved during the last 50 years (Juerges et al. internal report 2017:86). Nevertheless, this domestic wood is valued by the bio-energy

industry. In Portugal, market actors strongly impact the wood and pulp industry and this power is essentially based on incentives by paying higher prices for some species than for others. These actors in Portugal also apply the mechanism of dominant information to influence forest management through expert knowledge and ideology (Juerges et al. Forthcoming). Market actors in Turkey use this unverified information by lobbying processes, participation in public discourse, etc. (Juerges et al. internal report 2017:265).

Civil society has low impacts on forest management compared to the market and governmental actors. Moral incentives and dominant information are the main mechanisms used by the civil society actors. In Tunisia, since the revolution, many actors have emerged trying to influence management by contributing to research projects or strategy/policy formulation. In the program of forest investment published in 2016, the civil society has contributed to the elaboration of this program by participating in workshops organized by the concerned state authorities. However, the role of civil society in Tunisia needs more time and autonomy since the different actors still depend on international funders, the governmental budget and even political parties (Abbou, 2016; Ben Hassen 2013) which makes their contribution in many cases an expression of the funders' agendas. In Portugal, the groups representing hunters have moderate power to influence legislation in favor of "associative hunting zones". In Turkey, the civil society has medium power as well, since the state is the strongest actor and the civil society just pushes and contributes in a second position to implement new legislations and use basically the unverified information disseminated in public discourses and lobbying processes.

The particularity of Tunisia, in comparison with the European cases, is the important impact that international organizations have by the means of incentives (financing development projects) and the dominant information spread by the reports and studies realized by overseas and national consultants. For example, the World Bank reports (e.g. second phase deliverable about forest and pastoral value chains development realized in 2016) call for adapting the legislative framework to improve the economic situation of forest people by adopting the co-management of resources as one of the possible solutions. The international organizations finance and collaborate even for the elaboration of forest strategies. The formulation of the Tunisian forest strategy (2015-2024) was supported by the German Corporation for International Cooperation GIZ.

The illegal use of forests is considered as coercion because illegal users avoid control. Tunisian forest people, who live in and around forests, have considerable power to avoid implementation of regulations and thus have coercive power. For example, they use the pinion of pine illegally by harvesting even before the adequate period and avoid public auctions to sell this product to industrials and big traders. Since 2010, the state institutions have not been able to organize auctions for pinions and they have not even got seeds for planting new stands (Hasnaoui 2014).

### 3.3. Discussion

In this study, actors interested in different ecosystem services were identified in four countries. Their different interests, their power resources and mechanisms to influence forest management are described and compared.

The results show that the governmental actors are the most powerful in all cases (except in the case of Portugal where they are still strong, but they compete with the market actors in terms of timber provision). This state domination means that there is no real shift of power from the government to the market and civil society actors (from government to governance). In a policy steered by conflicts, it is not possible that non-binding processes such as governance take the place of binding ones from forest government supported by the state power (Krott 2008). However, some actors can influence the formulation of these binding solutions. In Tunisia, the international organizations are becoming more and more powerful by benefiting from the weakness of the state budget (*interviews 2 and 5*). They are funding many projects (with donations or loans) and they may influence the formulation or the change of laws and policy. The currently suggested reform about the co-management of resources between forest people and the General Directorate of Forests was initiated in the national strategy 2015-2024 funded by the German Corporation for International Cooperation GIZ and then supported by other projects such as the World Bank. The estimation of a strong role of international organizations in Tunisia in the future is supported by other experiences from developing countries. In Bangladesh, international funders caused 17 policy changes from 1993 until 2012 and these changes are in majority substantive (Rahman et al. 2016). Also, in Armenia, by the means of dominant information and incentives, the World Bank consultants argued that the main cause of deforestation is the access of

local users to resources and proposed in their project to support production which allowed privatization of forest lands and a reform of forest administration that moved from the Ministry of Nature Protection to the Ministry of Agriculture. These changes that restrict the access of local people are in favor of transnational private companies leading to an increase in wood harvesting and exports (Burns et al. 2016).

The shift from government to governance may lead to fragmentation in forest policy. In Italy, the decentralization process has failed despite the fact that the process has started in 1977. However, up to now, no solid state institution organizations have been established to face different challenges of the sector. In fact, central institutions which kept the policy-making role have transferred all forest tasks to the regional institutions and provinces. These regional administrations are not all able to have effective policy and political actions, and they cannot play their political role in the sector interest, causing inconsistency and deficits in implementation (Secco et al. 2017). Thus, many responsibilities have been transferred back to central administration. The result of such a defective decentralization process was expressed by the total absence of a valid national forest program in Italy and the non-existence of comprehensive policy supported by coordinated budget allocation (Secco et al. 2017).

#### 4. Conclusion

The most powerful actors in all cases drive the forest management process and compete to realize their interests in forest ecosystem services. There is a link between forest management models and these powerful actors and their interests. In Portugal the orientation toward the maximization of timber provision is driven by the strong power of market actors in the country creating conflicts between actors interested in provisioning ecosystem services (market actors) and those focusing on supporting ecosystem services (state actors). In Turkey, there is a comprehensive forest planning from state actors (Juerges et al. internal report 2017: 259). The power of the Turkish governmental actors is not reduced despite the strong interest in timber and the existing conflicts related to the use of resources. In Tunisia the governmental actors (forest administration, nature protection, etc.) are still the strongest and forest management is more oriented toward supporting ecosystem services. In Italy, too, the governmental actors are the most powerful despite fragmentation due to the failure of the decentralization process. This strong position of governmental actors in all cases explains the absence, until today, of a power shift from government (governmental actors) to governance (market and civil society actors). However, in the case of Tunisia, where state institutions depend on foreign money, the role of international organizations is increasing and trying to push toward the market demand which might be critical for many ecosystem services. The success of forest management concepts in practice depends strongly on the most powerful actors driving the sector, pursuing specific interests in the ecosystem and ignoring others which might be important as well from a common interest point of view.

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#### Disclaimer

Responsibility for the information and views set out in this article lies entirely with the authors.

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