

Interactions between Forest Policy, Education and Research in Turkey: Policy Documents' and Managers' Perspectives

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Abstract

The success of forest policy, research, and education depends on each fully considering the needs and knowledge of the other. Parallel to this approach, the goals of the present study were to express the role and content of aspects of forest education and research in the context of current Turkish forest policy documents. An additional aim of this paper was to reveal the viewpoints of senior managers of the Turkish forestry organization in terms of policy and research-education relationships. Content analysis was used in terms of analyzing the relevant components of forest policy documents and interviews with national forestry organization's senior managers, which allowed a more in-depth analysis. The findings showed that research and universities are the most important factors in the perspective of national forestry documents. Despite this result, meetings with senior managers of the forestry organization proved that there was no real institutional cooperation between the forestry organization and the faculty of forestry colleges and universities. Creating work groups and holding workshops are some current efforts in terms of strengthening the relationship between policy, research, and education in Turkish forestry. However, some further critical actions regarding strengthening communication, collaboration and institutional relations, developing participatory approaches, and reducing bureaucracy are needed.

Keywords: forest policy, forest administration, forestry education, institutional relations, content analysis, interviews

Introduction

The process of developing forest policy begins with information gathering and informatics. The goals of forest policy then need to be determined at the national, regional, and local levels. Various instruments can be used in the process to reach these goals. The main forest policy instruments in Turkey are: 1) legal instruments, 2) regulatory instruments, 3) economic instruments (taxes and incentives), 4) information-based instruments (education-research), 5) public relations and participation (Gümüş 2004, Kuvan et al. 2007, Erdönmez et al. 2010). Naturally, the forest policy cycle continues with implementation and evaluation. The members of faculties and forest research institutes take their place among various institutions related to information-based instruments through their scientific research studies and professional forest education activities. Scientists also make contributions in some stages of the policy-making and implementation process. For example, they play an advisory role by joining working teams, which support expertise groups, they also contribute to some nationwide planning processes and

projects such as 5-year development plans, strategic plans, and the "norm-staff determination" project. Furthermore, the main stakeholder groups in the forest policy process are: 1) the National Forestry Organization, 2) local administration, and other public institutions that have direct or indirect relations with forestry, 3) political parties, 4) the private sector, 5) nongovernmental organizations, and 6) universities and research institutions (Atmış et al. 2007, Erdönmez et al. 2010).

Education and research are among the information instruments of Turkish forest policy. Research and education concepts both have common and separate dimensions. Research is defined as "systematic study or investigation in a field, usually as a basis for new facts and interpretation" (Halsey 1998). Education is also identified as "knowledge, skill, or ability developed or obtained by such a process; learning" (Halsey 1998). The two concepts have different management processes. However, they have intersections in higher education. Teaching research results and the research process, and providing research experience are the main intersection points (Elken and Wollscheid 2016). Education and sci-

entific research are among the main functions of higher education (Özdem 2011) because research and education institutions, forestry faculties, and forestry vocational schools operate under universities in Turkey. In total, there are 184 universities, 112 of which are state universities, the rest are foundation universities. There are 12 forestry faculties, all of which are connected to state universities. There are 605 academic staff in forestry faculties in Turkey, 449 of whom are responsible for both research and lecturing, and the remaining 156 are research staff. There are also 5803 students in forest faculties and forestry vocational schools (CoHE 2017). The initial aim of forestry faculties was purely to train the workforce. However, the current aims of these faculties are varied: producing information, conducting scientific research, recruiting future researchers, increasing public awareness, supporting sustainable development, playing an active role in forest policy-making processes, and developing solutions to sectoral problems (Yurdakul Erol and Şahin 2016).

There are also forest research institutes that operate under the General Directorate of Forestry, 3 have thematic characteristics and 9 have regional characteristics. Approximately 200 researchers from various disciplines such as forest, forest industry and agriculture engineers, geological engineers, landscape architectures, biologists, and chemical engineers for research institutions (GDF 2017). The main duties of these institutions are to provide solutions to problems in forestry, conducting research regarding current knowledge, methods and technologies that contribute to national forestry organization, and sharing and monitoring research results.

Naturally, there are interfaces between science-education and policy in forestry. Science-policy interfaces are described as "social processes which encompass relations between scientists and other actors in policy process, and which allow for exchanges, co-evaluation, and joint construction of knowledge with the aim of enriching decision-making" (van den Hove 2007). Education is also an important component of these interfaces because of the aforementioned intersection points. As a result of these interfaces, many environmental problems including forestry-related issues have become an issue of policy agenda by the effect of science (Humphreys 2009). However, there are some problems in the context of interface and interaction between science and policy in forestry. Although the scientific community supports the policy-making process in terms of informing about policy commitments, providing input to policy debate, directing decision-makers about forthcoming issues, policy decisions do not translate all scientific results into decisions and actions in forestry (Mayer and Rametsteiner 2004). In this context, the main problems in forestry are categorized as the strategic use of knowl-

edge by policy, the strategic production of knowledge by scientists, and disparity between knowledge demand and supply (Wiesum et al. 2013, van Enst et al. 2014). Further, forest policy-making is different in different countries (Guldin et al. 2005) thus the interactions between science and policy have different characteristics and specific conditions (Clark et al. 1996, Koch 2018).

Parallel to this approach, the study was focused on national aspects in the context of Turkish forest policy and science interaction. Therefore, the main aims of the study were to investigate the framing of science and education-related issues in national forest policy by using content analysis and to reveal the viewpoints of senior managers of the Turkish forestry organization in terms of policy, organization, and research-education relationships.

The process of formulating forest policy involves an intersection of varying and sometimes opposing interests, situations, and interpretations of various interests and pressure groups. Thus, forest policy development requires accurate data, proven knowledge, and up-to-date, reliable, transparent, and accessible information (Arnold et al. 2014). Cumulative and multi-dimensional research findings can be used to analyze problems related to forest policy and improve the success of forest management programs (Innes 2003, Krott 2005). In this context, formulating successful forest policy depends on close ties between policymakers and researchers (Janse and Konijnendijk 2007).

In addition, it is not possible to create an effective forestry sector without considering the relationships between policies, research, and education. Parallel to this approach, the success of forest policy, research, and education depends on one fully considering the needs and knowledge of the other (Yurdakul Erol 2015) because training and education on forests has a core role in forest development (Krott 2005). Professional forest education has a special role because experts are employed in decision-making, implementation, and evaluation processes in forestry (Erdönmez et al. 2010). These professionals can also work for universities, research institutions or non-governmental organizations. Thus, the knowledge level of these professionals has direct effects on policy processes.

Moreover, systematic input from experts is necessary to create sustainable natural resource-related policies. A diffuse link exists between research and policy-making. Also, research and policy change are seldom directly related (Spilsbury and Nasi 2006). It is generally accepted that despite the availability of adequate scientific information, policymakers frequently do not care for its use (Guldin 2003). However, forest policymakers claimed that the reason relevant data were not used often depended more on the research community than on

polymakers themselves. This occurs because, as Janse (2008) revealed, researchers fail to focus their projects on areas of actual informational need for policy-making. Reynolds et al. (2003) also expressed that scientists needed the contributions of decision-makers because the results of research were generally relevant to policy decisions. On the other hand, Szaro et al. (2000) reported that political commitment to research was inadequate and offered that research priorities should be improved to ensure the efficient and effective use of resources, and research strategy should be determined by considering current and emerging problems. Van den Hove (2007) pointed out that some general methodologic problems existed, such as the translation of scientific knowledge into relevant policy-related knowledge and the translation of policy knowledge into relevant science-related knowledge and transdisciplinary research studies.

Steel et al. (2004) reported that the most popular roles for scientists in natural resources management process were regarding working closely with managers to integrate results in management and reporting and interpreting the results for the participants of the decision-making process. Akhtar-Schuster et al. (2016) expressed that if scientists focused on the actual issues offered by global environmental governance then scientists would play an important catalytic role for faster progress in decision-making and problem-solving on issues regarding global environmental change. Besides, Watson (2005) highlighted that the results and analyses of scientific processes needed to be policy-relevant instead of being policy prescriptive.

As Côté (2002) reported, forest managers need to see research activities as a tool that can provide long-term benefits, and scientists need to understand the activities, decisions, and considerations of forest managers when selecting research activities. Weichselgartner and Kasperson (2010) also presented the importance of interaction and encouragement in the institutional context, which could be used to generate a mutual understanding in the science-policy-practice interface process.

However, credibility, relevance, legitimacy, and interaction are also important properties of research results in terms of building an effective science-policy interface (Sarkki et al. 2015). At this point, developing survey-based research and using appropriate methodology is very important in forestry (Stevanov et al. 2016) regarding the appropriate preparation of useful knowledge for the policy-making process and practice. Even so, the speed of scientists in terms of taking advantage of fresh opportunities that global environmental governance offers increases their effectiveness (Akhtar-Schuster et al. 2016).

The interaction of science and policy was investigated by Nagasaka et al. (2016a) in the Japanese National Forestry-related planning process and it was found

that scientific bodies had no influence in agenda-setting but made contributions by specifying alternatives and giving science-based advice. There was also an integrator role of scientists in the discussions of subcommittees. When these results are compared with a Swedish case, it is seen that scientists play an active role in proposing the organizational structure of national forest plan's policy process and they have direct influence on the policy-making process (Nagasaka et al. 2016b). However, the inadequate capacities of research institutions create a gap in terms of the role of science and research in the developing countries of Asia (Avishek et al. 2012). Apart from that, forest research in Europe is generally fragmented, far from having a multi-disciplinary structure and inefficient about addressing major challenges (Achten et al. 2011).

There are different interactions between forest policy and science in different countries and regions. Also, various scientists have different approaches and suggestions as a result of their research. Besides there are no appropriate or inappropriate way to integrate science into policy in forestry (Clark et al. 1996). Thus, considering national conditions and approaches is essential to decide the right way. Parallel to this approach, the present study has been conducted in the context of Turkish forestry.

The interaction between science and policy in forestry has been evaluated generally in previous research; the present study involves both forest-related science and education because both are relevant to the forest policy process and also the two concepts have common and separate dimensions. Also, the results of Turkish forestry in terms of interactions between forest policy, research, and education could be an interesting sample for the related literature because almost all of the forests are managed by the government; the national forestry organization, forest faculties, and research institutions are completely public institutions. Thus, the literature will be extended with a case study in which all the components are managed by the government and also have some typical characteristics. Some of these characteristics can be listed as: i. Turkish forestry has a very deep-rooted history in terms of management system, ii. The country's forestry organizational structure has changed very often in its history, iii. There are many social and political pressures on forests and forestry, iv. The responsibilities and duties of the forestry organization are very complex, vi. Local directorates are present in all parts of the country but the decisions are generally taken centrally.

Material and Method

The main methods used in the study were content analysis and face-to-face interviews. Content analysis

is used in terms of analyzing the relevant components of both forest policy and forest research/education-related documents. Face-to-face meetings with senior managers allowed a more in-depth analysis.

Content analysis can be defined as a research method that makes replicable, objective, and valid inferences from texts related to the context of their use based on explicit rules (Krippendorff 1980, Weber 1990, Prasad 2008). When used properly, content analysis is a powerful data reduction technique; the major benefit of content analysis comes from the fact that it is a systematic, replicable technique for compressing many words of text into fewer content categories based on explicit rules of coding (Stemler 2001). Quantitative content analysis was used in the research. Also, the meanings of the contents were considered, so a qualitative characteristic was gained. The steps followed in this study in terms of this type content analysis include:

1. *Formulation of the research question and objectives:* Examination of the content and approaches of Turkish forest policy in terms of forest education and research.

2. *Selection of a sample:* The main current National forest policy documents include Forestry Expert Commission Report on Sustainable Forest Management of the 10th Five-year Development Plan (MoD 2014), Expert Commission Report on Forestry of the 9th Five-year Development Plan (SPO 2007), the Turkish National Forestry Programme (MoEF 2004), the Strategic Plan of the Ministry of Forestry and Water Affairs 2013-2017 (MoFWA 2012), and the Strategic Plan of the General Forest Directorate 2013-2017 (GDF 2012). The selected policy documents are the most up-to-date and extensive documents related with nationwide forestry and national forestry organizations.

3. *Forming content components:* These include "University - forestry faculty" "Research institutions" "forest education" "in-service training" "vocational high schools" "science-scientist" and "research-researcher." The word meanings and the scopes of research and science have some differences. Thus, research and science concepts were evaluated as two different components (*Research: "systematic study or investigation in a particular field, usually a basis for new facts and interpretation" (Halsey 1998) / "a detailed study of a subject, especially in order to discover (new) information or reach a (new) understanding" (Cambridge Dictionary 2018). Science: "any branch of systematized knowledge". (Halsey 1998) / "Knowledge from the careful study of the structure and behavior the physical world, especially by watching, measuring, and doing experiments, and the development of theories to describe the results of these activities" Cambridge Dictionary 2018).*

The components were determined by considering

the main factors of national forestry research and education and also the highlighted expressions of the current forest policy document (MoEF 2004, SPO 2007, GDF 2012, MoFWA 2012, MoD 2014). The exact components were then determined by classification of the expressions regarding their similarity. However, in the research stage, the mentioned expressions and others that had close meanings were counted and analyzed. For example, "professional forest education" and "education of forest engineering" were counted in the context of "forest education." However, if the expression "education" was used in the meaning of raising awareness of society or training, then it was not counted. Likewise, the expressions "seminar" and "conference" were considered in terms of "in-service training." On the other hand, these expressions were left out of the assessment if they were used as a tool for public relations activity with other interest groups. The components were searched in the Turkish language.

4. *Determining units and counting components:*

4.1. The content units were determined as sentences thus repetitions were prevented. The components were determined as "words and expressions."

4.2. The counting of the components was performed using frequencies. The documents were loaded in a computer and the components were searched. The related parts were then read and the frequencies determined. In this stage, the words were counted and the meanings were considered. Thus, the related meanings of the text were focused upon and evaluated instead of the words. In the context of this semantic evaluation, if a word was present more than once in a sentence its frequency was considered as 1. This counting was repeated three times for a document to maintain reliability. The counting was made at different times, not consecutively, so as to avoid interpretation in the same way. If the scores were different then the related document was analyzed once more.

5. *Data Analysis:* The related results are shown in Table 1. It was possible to determine how many times the components were referred to in the policy documents. The percentage of these elements in the document and the percentage in all five documents were analysed. In addition, the place of the component in the document was determined. In this way, the place and weight of the elements in the national policy documents were evaluated.

Face-to-face interviews were also organized with certain senior managers who have a range of tasks in the Ministry of Forest and Water Affairs and the General Directorate of Forestry. The participants were selected based on their decision-making power and relevance to the subject. The research focused on the forestry organization and senior manager's perspective because they have the authority for decision-making decisions concerning the participation and role of research and

education bodies in the policy-making process. In this context, their approaches have a determinant function in terms of shaping the model of the relations. Thus, the researcher's and educator's sides were taken out of sampling.

Snowball sampling was used. At the beginning of the research, the interviewees were determined in terms of their position in the organizational chart. The General Director of Combating Desertification and Erosion, Vice General Director of Nature Protection and Natural Parks, Vice General Director of Forestry, and head of the Strategy Development Department of the General Directorate of Forestry were determined as the main participants. The other interviewees were determined during the research. There were representatives from each forestry-related general directorate, which works under the Ministry of Forest and Water Affairs. A total of 15 face-to-face interviews were held with general directors, deputy general directors, the head of the Strategy Development Department, ministry advisors, the head of Research and Development, the head of Planning and Projecting, and other department managers. The semi-structured interview method was used; accordingly, the nature of the questions was determined before the meetings. However, the content was designed during the meeting depending on the responses and attitudes of the interviewees. Some open-ended questions were determined, which focused on: 1) the demands of the Ministry of Forestry and Water Affairs and General Directorate of Forestry from science and the supply level, 2) evaluation of previous research conducted by college and/or university faculty members on needs of the forestry sector; 3) consideration and participation of faculty members and research institutions in decision-making processes; 4) consideration of developing a satisfactory relationship between science/scientists and policy/policy-makers; 5) opportunities and the extent of collaboration and communication, and 6) suggestions for strengthening the above interactions.

Results

Analysis of Policy Documents Related to National Forestry in terms of Interactions between Forest Policy and Forest Research

The content of the national plans related to the demand of the forestry sector on the education and research institutions can be aggregated as: improving professional forest education system, supporting in-service training programs, developing cooperation regarding capacity building, research projects and their implementation, ensuring coordination in forestry-related processes. This part is the updated and expanded version of a part of the paper entitled "Historical development of

forestry education in Turkey and its reflections in the forest policy making process" (Yurdakul Erol 2015).

Furthermore, the results of content analysis provide some results regarding the weight of related factors. The Turkish National Forestry Program produced the largest number of components related to research and education (frequency (f) = 184, 39.1% of all components; Table 1). The term of "research and researcher" (f= 78) was the most highlighted issue in National Forestry Program. It was followed by "university-forestry faculty" (f=37) and "research institution" (f=35), respectively. Most of these components (%_{research-researcher}=71.8, %_{university-fac.}=78.4, %_{research institution}=80.0) occurred in the policy-strategy and action parts of the document (Table 2). The 10th Development Plan was the other document that contained the highest amount (f=112) of terms regarding research and education. The common words reported in the document were "university - faculty of forestry" (f=41) and "research-researcher" (f=35) (Table 1), and 78% of the "university - forestry faculty" and 48.6% of "research-researcher" words were related with policy-strategy and action parts.

The component "research and researcher" (f= 162, 34.4%) was the most common among the selected components, followed by "University and Faculty of Forestry" (f= 110, 23.4%), and "research institution" (f= 82, 17.4%). It is understood that research is the most highlighted factor from the perspective of forest policy docu-

Table 1. Distribution of key words related to forestry education in various national policy documents

Document	Factor					TOTAL
	Turkish National Forestry Programme	The 9th Development Plan Forestry Expert Commission Report	Strategic Plan of the General Directorate of Forestry	Strategic Plan of the Ministry of Forestry and Water Affairs	The 10th Development Plan Sustainable Forest Management Expert Commission Report	
University - Forestry Faculty (f)*	37	13	7	12	41	110
Percentage in the document (%)	33.6	11.8	6.4	10.9	37.3	100
Percentage in all documents (%)	7.9	2.8	1.5	2.5	8.7	23.4
Research Institutions (f)	35	14	12	3	18	82
Percentage in the document (%)	42.7	17.0	14.6	3.7	22.0	100
Percentage in all documents (%)	7.5	3	2.5	0.6	3.8	17.4
Forestry education (f)	5	12	6	2	8	33
Percentage in the document (%)	15.1	36.4	18.2	6.1	24.2	100
Percentage in all documents (%)	1.1	2.5	1.3	0.4	1.7	7
In service training (f)	10	9	7	9	6	41
Percentage in the document (%)	24.4	21.9	17.1	21.9	14.7	100
Percentage in all documents (%)	2.1	1.9	1.5	1.9	1.3	8.7
Vocational high school (f)	2	3	2	-	1	8
Percentage in the document (%)	25	37.5	25	-	12.5	100
Percentage in all documents (%)	0.4	0.6	0.4	-	0.2	1.7
Science-scientist (f)	17	9	6	-	3	35
Percentage in the document (%)	48.6	25.7	17.1	-	8.6	100
Percentage in all documents (%)	3.6	1.9	1.3	-	0.6	7.4
Research-researcher (f)	78	28	13	8	35	162
Percentage in the document (%)	48.2	17.3	8.0	4.9	21.6	100
Percentage in all documents (%)	16.6	5.9	2.8	1.7	7.4	34.4
TOTAL FREQUENCY	184	88	53	34	112	471
TOTAL PERCENTAGE (%)	39.1	18.7	11.3	7.2	23.7	100

*f (frequency) is used for the number of the factor was counted at the document.

Table 2. Distribution components' place related to forestry education in various national policy documents

Component	Document	Turkish National Forestry Programme		9th Development Plan Forestry Expert Commission Report		Strategic Plan of General Directorate of Forestry		Strategic Plan of Ministry of Forestry and Water Affairs		10th Development Plan Sustainable Forest Management Expert Commission Report		TOTAL	
		f	%	f	%	f	%	f	%	f	%	f	%
University - Forestry	Definition of the status and problem	8	21.6	7	53.8	3	42.9	4	33.3	9	22	31	28.2
	Policy-strategy and action	29	78.4	6	46.2	4	57.1	8	66.7	32	78	79	71.8
Research Institutions	Definition of the status and problem	7	20	8	57.1	7	58.3	3	100	9	50	34	41.5
	Policy-strategy and action	28	80	6	42.9	5	41.7	-	-	9	50	48	58.5
Forest education	Definition of the status and problem	3	60	7	58.3	3	50	2	100	3	37.5	18	54.5
	Policy-strategy and action	2	40	5	41.7	3	50	-	-	5	62.5	15	45.5
In service training	Definition of the status and problem	1	10	4	44.4	2	25.6	3	33.3	-	-	10	24.4
	Policy-strategy and action	9	90	5	55.6	5	71.4	6	66.7	6	100	31	75.6
Vocational high school	Definition of the status and problem	1	50	1	33.3	1	50	-	-	1	100	4	50
	Policy-strategy and action	1	50	2	66.7	1	50	-	-	-	-	4	50
Science-scientist	Definition of the status and problem	2	11.8	4	44.4	3	50	-	-	1	33.3	10	28.6
	Policy-strategy and action	15	82.2	5	55.6	3	50	-	-	2	66.7	25	71.4
Research-researcher	Definition of the status and problem	22	28.2	18	64.3	4	30.8	2	25	18	51.4	64	39.5
	Policy-strategy and action	56	71.8	10	35.7	9	69.2	6	75	17	48.6	98	60.5
TOTAL (definition of the status and problem)											171	36.3	
TOTAL (policy-strategy-action)											300	63.7	

ments in terms of forest education and research. In addition, universities, faculty members, and research institutions are accepted as important elements of forest policy development and education/research interaction.

Current nationwide programs and plans also have a greater number of components when compared with current strategic plans. Strategic plans contain only 18.5% of all the related terms. This situation shows that there is a gap between the nationwide documents and strategy documents. The harmony and integrity between different level documents is important in terms of consistency of implementations and also focusing and directing the implementations toward the same direction. Therefore, it is critical to express the relationships and related solutions as strategies and actions in strategic plans to maintain a compatible, sustainable, and long-term approach.

The place of the component is also important in terms of considering the contents of the policy documents. It is seen in Table 2 that with the exceptions of "forest education" and "vocational high school," more than half of the expressions occurred in the policy-strategy and action parts of the whole documents. It shows that many future-oriented approaches featured in policy documents rather than defining the status and problem.

When the distribution of components among the places in the whole documents was considered, it was found out that 63.7% of the terms occurred as a part of policy-strategy and action expressions. "In-service training" had the highest ratio of policy-strategy and action involvement (75.6%), followed by "university - forestry faculty" (71.8%) and "science-scientist" (71.4%).

Analysis of the Approaches of Senior Managers of the Forestry Organisation

Senior forestry organization managers expressed that there were some processes that were supported through participation of scientific bodies. The opinions of the scientific bodies were considered during the "norm staff" planning processes and were consulted during the development of the Forestry Information System. In addition, working teams were formed to conduct Strengths, Weaknesses, Opportunities, and Threats (SWOT) analysis during the strategic planning process. A draft was prepared and shared online for evaluation by the stakeholder groups. Scientific contributions of expert commission reports, which were prepared for national 5-year development plans, were also considered during the preparation phase. Participation of forestry organization staff representatives at meetings of the Deans of the Forestry Faculties was a method of communication. Aside from the institutional relationships, the Ministry of Forestry and Water Affairs and the General Directorate of Forestry had already built expertise fields and groups. These groups are supported by working teams organized to function for a limited period, and contain other participants such as universities, related public institutions, nongovernmental organizations, private sector representatives, and other experts. The contribution of scientific bodies to some forestry-related processes and projects is in maintaining technical support or as a stakeholder. In some nationwide processes such as working teams, they play an advisory role however, it is not a direct mechanism because the scientific bodies only work for periodic working teams, not for expertise fields or groups. In other words, it could be concluded that the scientific bodies have no direct effect or active role in decision or policy-making processes.

However, in our surveys, most meeting participants mentioned that no real institutional cooperation existed between the organizational units and the Faculty of Forestry, colleges, and universities (f=11). The managers also generally preferred to contact the expert faculty members individually rather than depending on formal institutional relationships (f=9). They used contributions from instructors through their personal relationships. Moreover, they highlighted that the scientific research studies of faculty members often did not reflect the demands of the organization (f=7). They also expressed

that the research studies conducted by the faculty members were not designed to help steer the future of the forestry organization ($f=4$). They believed that the mission and vision of the forest faculty tended to focus heavily on education and not on providing a contribution to the forestry sector ($f=4$).

Furthermore, representatives of the Nature Protection and National Parks units mentioned that they had strong working relationships with various researchers from different colleges and universities, especially in the context of their projects. However, representatives of this department expressed that they did not take contributions from these educational institutions while making institutional decisions.

Some other participants ($f=7$) stated that they took scientific publications into consideration during the decision-making process. They then employ consultancy services from various experts to acquire opinions on the drafting of the documents ($f=10$). The participants also remarked that the demands of the Faculty of Forestry members generally focused on supply of equipment and transportation vehicles for scientific research studies. These faculty members also had some need to support internships for students ($f=5$).

However, several representatives ($f=5$) mentioned that Faculty of Forestry members tried to employ a participatory method in some decision-making processes when they developed their curricula or conducted strategic planning. However, they also noted that faculty members were not successful in considering the demands of the National Forestry Organization. They provided constructive criticism about three aspects of the interrelationships: 1) The representatives were generally invited from local units of the forestry organization but not from central units, 2) The curricula developed by the faculty members did not meet the needs and demands of the organization, and also 3) Research studies conducted by the faculty members did not overlap with the needs of the organization.

The managers believed that politicians made forest-related policies; scientists were not seen as an important part of the policy-making process ($f=11$). The relationships were limited to technical, academic, and practical aspects of forestry and also provided insufficient input into decision and policy-making processes. The interviews were also designed to address problems related with relationships between the forestry organization and forestry research and education, the results of which are summarized below. Some examples of quotes from the interviews are given in Table 3.

- The relationships lacked an institutional structure ($f = 11$). The level and style of the dialogue depended on the attitudes of the managers and their personal relationships, rather than formal institutional rela-

tionships; thus, the relationships lacked a sustainable structure.

- A collaborative study culture had not developed within the forestry sector. Accordingly, some protocols had been developed between the institutions but the decisions were not generally implemented ($f = 8$).

- There is a lack of implemented legal and financial infrastructure related to the development of relationships ($f = 7$). Moreover, the fact that a bureaucratic approach dominated the management style made cooperation more difficult.

- National science policy had popularized international research topics, causing scientists to ignore issues with a national scope ($f = 7$). In addition, faculty members prioritized personal goals such as being promoted rather than making a contribution to society and to the forestry organisation ($f = 3$).

- There is no effective coordination between the goals and implemented projects of the two parties ($f = 5$).

- Scientists were generally reluctant to give constructive criticism related to the decisions and implementation of projects of the organisation, and the implementers were also reluctant in terms of considering research findings ($f = 8$).

- The prominent aim of the organisation focused on tangible suggestions, but the results of scientific studies had a considerable amount of detail ($f=4$). Thus, the nature of scientific publications became unintelligible for the decision-makers and implementers from the forestry organisation.

- The process of conducting research was very long compared with the need for data by the decision-makers who needed applicable results in a short time, this process therefore weakened relationships and interactions ($f = 4$).

- A participatory management culture had not been well adopted in all forestry-related institutions ($f = 11$).

- Forestry-based research studies should prioritize socioeconomic issues because Turkey cannot focus on technical problems without solving socioeconomic-based issues ($f = 6$).

- An effective organisational structure that had certain aims and tools should be developed that includes collaboration and future-based planning ($f=5$), and also the authority and responsibilities of various parties should be clearly defined ($f=3$).

- Total quality management and strategic management approaches should be integrated into forestry organisations ($f=3$).

Discussion

The findings show that there is extensive content about research and education in nationwide forest policy

Table 3. Example quotes of expressions

Expression	Example Quotations from the Interviewees' Speeches
The relationships lacked an institutional structure	"If officials of the department contact faculties regarding scientific support there is generally no feedback" "We prefer to contact the scientists who we met earlier rather than conducting studies with faculties." "There is no institutional relationship because there is no institutional stability, especially managers and other human resources' duty areas have changed so often." "There has been a relationship between the forestry organisation and forest faculties in the historical process, but this relation is far from sustainable inter-institution relations."
Collaborative study culture had not developed within the forestry sector	"Faculties determine the themes of graduate theses by themselves. However, forestry organisation and forestry faculties have to determine the topics of graduate theses through meetings so it could be possible to meet the scientific needs of the organisation and strengthen relations" "Supporting the cooperation in terms of graduate education of technical personnel could be an effective mechanism to strengthen the collaboration between the forestry organisation and faculties." "There is no joint project making culture in forestry organisations, but it is essential in forestry, and participation of scientific bodies is important in terms of making long-term decisions, forecasting, multi-criteria decision-making" "The researchers and decision makers have not given feedback about the results of research and implementations. This situation prevents the sectoral development and collaboration"
There is a lack regarding the legal and financial infrastructure implemented related to the development of relationships	"Lack of legal arrangements in supporting relations between scientific bodies and decision makers is the main factor that affects the institutionalization of relations" "It is not possible to sustain relations between the forestry organisation and scientific bodies on a volunteer basis without making financial support" "Lack of a legal arrangement in supporting relations between scientific bodies and decision makers is the main factor that affects the institutionalization of relations" "Many scientists from faculties have been invited to meetings but they didn't join because of lack of financial infrastructure"
National science policy had popularized international research topics, causing scientists to ignore issues with a national scope	"Most scientists from universities focus on scientific projects to meet the scientific criteria in terms of their academic career" "Scientists prefer to make research projects instead of supporting national forestry organisation's activities" "Scientists from universities try to make international publications, which are away from making suggestions to national level problems" "National science policy focuses on international criteria, which is why the scientists remain insensitive to local and national issues"
There is no effective coordination between the goals and implemented projects of the forestry organisation and forestry faculties.	"Forestry faculties don't share information about lectures and scientific studies. Thus, there is no effective mechanism to maintain coordination between the needs of the forestry organisation and education-research priorities" "Scientists from universities prefer to work independently and these scientists generally prefer not to integrate forestry departments or personnel to their projects; therefore, it is not possible to build coordination." "Research priorities should be determined in a systematic way and by depending on integrated long-term plans, because today, some of the research projects are determined by individual approaches."
Scientists were generally reluctant to give constructive criticism related to the decisions and implementation of the projects of the organisation, and the implementers were also reluctant in terms of considering research findings	"When a draft (e.g. legal arrangement, policy document, institutional decision) was sent to the faculties some views and suggestions were made by some scientists and it was away from an institutional approach." "After gaining field experience, the organisation began to find that consultation with faculty members was unnecessary" "The scientists don't care about the experience of the forestry organisation staff, and forestry staff don't care about the scientists because most believe that the scientists are distant from the forestry applications and they focus on theoretical subjects"
The prominent aim of the organisation focused on tangible suggestions, but the results of scientific studies had a considerable amount of detail	"Scientific research is made just for its contribution to science, not for a contribution to society and forestry implementation" "Scientists focus on a specific subject and so they don't have a general perspective to analyze the general or macro situation; thus, it is not possible to reflect the results policies." "The research results of forestry faculties are not generally related with the priorities of the forestry organisation."

Table 3. (Continued)

The process of conducting research was very long compared with the need for data by the decision-makers.	"The forestry organisation demands brief and focused solutions from scientists but the scientific research has lots of details" "Research results should be presented in two ways: one for the scientific arena that has details, and the other for decision makers and implementers, which contains just results and suggestions in a simple way" "Sometimes it is not possible to reach absolute results after the research process but the decision makers and implementers do not approve of this situation" "Projects on a lot of themes and areas in forestry need to be an intersection of a few small-scale projects and preliminary research, and that makes the process longer." "There is no integration between research projects and this makes the situation difficult in terms of reflecting research results in the policy-making process."
A participatory management culture had not been well adopted in all forestry-related institutions	"Invitation and participation of forestry organisation representatives to scientific meetings held by the university is very limited" "There is communication between the forestry organisation and scientific bodies but the power and level of effecting decisions is very poor" "When a draft of a legal arrangement, strategic plan etc. is prepared, the scientists are asked for their opinion and their added contribution is very low" "The problem is dealing with the uncertainty of the policy-making process in terms of legal procedures. Thus, national level policies are made by politicians and the interest groups' effectiveness is very limited" "Legal regulations related with forestry have rarely been arranged by forestry experts. Generally, political pressures and demands of private institutions affect the legislation process".
Forestry-based research studies should prioritize socioeconomic issues	"Forest engineers need to have deeper knowledge about public relations, forestry administration, administrative law, and forest policy to be successful land managers and contribute to sustainable development." "Managers and implementing staff in the forestry organisation have not really internalized the importance of social sciences in forestry; however, to solve the problems both in central and local units, social science are of critical importance" "Forestry does not have problems regarding technical aspects in Turkey, but social issues cause deficiency in forestry applications and inter-institutional relations".
An effective organisational structure that had certain aims and tools.	"Although there are some examples of participation and team working, officials who have responsibilities make the final decision; authority and responsibilities regarding decision-making should be delegated to local managers". "There is a lack of work sharing and exact work definitions in the context of different institutional bodies, as a result of this, relations have been affected negatively." "Personnel changes in management and decision-making levels affect this situation in a negative way". "There is a lack of institutional culture regarding joint projects or decision-making in public institutions, and that includes forestry organisations in Turkey". "Lack of quality of human resources affects inter-institutional interaction, because the decisions and implementations are made by personnel of the organisations." "Plan-focused management should be an essential principle of the organisations; therefore, institutional objectives and decisions should replace the personal attitudes and relationships".
Total quality management and strategic management approaches should be integrated into forestry organisations	"Some decisions are made according to international processes like the European Union integration process. In this process, some decisions are away from scientific findings and the country's situation. This approach causes problem in terms of interaction between science and policy". "The national forestry organisation and forestry education have a traditional management style and they are away from catching current trends and enhancing good governance". "There is no sustainable system in terms of implementation and controlling mechanisms of strategic planning, in particular, there is a lack regarding electronic databases". "The lack of standards, criteria, and indicators in terms of monitoring the management process and monitoring is a problem in terms of supporting sustainable relations."

documents. An especially large amount of the components occurs in policy, strategy or action-related parts. In this context, universities, faculties, and research institutions are listed among the partners or stakeholders

of the related policy, strategy or action expression. Despite the content of national documents, the meetings with senior managers of the forestry organization prove that there is not a strong, continuous, and effective relationship between decision-makers and scientific bodies. These findings are supported by the questionnaire surveys, which were applied to different actors of the forestry organization. In this context, the first study's sample was senior managers from forest directorates in Turkey. It was found that political tendencies and preferences outweighed the determination and implementation of national forest policies, rather than scientific-technical information and data (Kuvan et al. 2011). The sample of the second study comprised managers and researchers from research institutes. The findings of this questionnaire research for Turkey showed that only 25% of research results were considered by forestry units (Daşdemir 2012). In addition, the questionnaire results from Şener (2012) also corroborate these findings and showed that just 4% of the participant researchers believed that research results played an active role in the policy-making process; most researchers believed that research studies had no effect on the process. Thus, it is possible to say that the components regarding research are present in national policy documents; however, their effect in decision and policy-making processes is not at an adequate level.

The other findings of the study showed that lack of inter-institutional cooperation and relationship caused an inadequacy of effective interactions between forest policy, education, and research. Effective communication and use of active communication tools is one of the most important factors that can strengthen this type of interaction. Parallel to the present research findings, communication has commonly been found as an important instrument to enhance policy-science interaction in forestry-based research (Ginsburd and Cowling 2003; Wiersum et al. 2013, Winkel and Jump 2014, Päivinen 2017). However, communication tools could be varied as web portals, independent science-policy platforms, media or journals (Willems and Lange 2007, Thomas et al. 2012, Ekayani et al. 2016, Peltomaa et al. 2016). Parallel to the mentioned studies on forest policy-science, interaction communication has a critical role; however, deciding on the right communication tool is very important. In the Turkish case, the starting point could be through increasing face-to-face communications by organizing related themed workshops, meetings or congresses.

Another core issue in terms of the development of interaction between policy, science, and education is observed as an extension of participatory management and a collaborative study culture in forestry-related institutions. Konijnendijk (2004), Watson (2005) and Vignola et al. (2009) also supported this approach and expressed the impor-

tance of participatory approaches as a tool to improve the integration between science and policy. Further, Sarkki et al. 2015 defined participation as one of the essential features of science-policy interface structures. Parallel to this approach, co-learning and co-production process between scientists, policymakers, and the general public is defined as an effective tool for solving environmental problems (López-Rodríguez et al. 2015). In this way, the problems with institutional cooperation and coordination, reflecting demands on decisions that were observed in the study, could be solved.

Some problems were highlighted regarding the long process of generating research results and the method of presenting the results to decision and policy-makers. The process of scientific research requires a deal of time. However, the demand of the decision-makers was to supply results in a short time. At this point, forecasting the information needs of the sector gains importance, especially for Turkish forestry. A nationwide strategic plan on determining research priorities is needed. This plan should be prepared with the participation of research institutions, universities, forestry faculties, and the forestry organization. In addition, this strategic plan should have binding arrangement characteristics. However, innovative adaptive management also has a critical role in strengthening relationships between the forestry organization, policy, and research-education in Turkey. It is also important to determine, formalize, and institutionalize the status and role of science, research, scientists, and researchers. In this context, Driscoll et al. (2011) expressed that the advisory function of knowledge and scientists should be used as one of the main guides of a policy-making system; however, the advisory model does not currently work efficiently in Turkey. An institutional status and legal background should be gained through these relationships. Currently, scientific bodies in Turkey give scientific advice at national planning processes and play a consultant role in working teams. Nevertheless, the power of these contributions in terms of affecting the policy process and decision-making process is at limited levels. One other way to strengthen the relation is through making laws. The participants also highlighted the need to strengthen the legal infrastructure. Law and legal contexts also have relationships with policy and science interaction (Williams et al. 2014, Huggel et al. 2015); therefore, legal issues should also be considered and investigated. This mechanism is a compulsory measure, whereas communication has volunteer mechanism characteristics. Yet Krott (2012) also noted that linear transfer of scientific knowledge into political practice did not work and the author suggested a policy-policy-science interface model. This model depends on communication between powerful stakeholders with less-powerful stakeholders and the use of scientific arguments in this process.

Conclusions

In conclusion, creating work groups and holding workshops are some current efforts in terms of strengthening the relationship between policy, research, and education in Turkish forestry. However, some further critical actions regarding strengthening inter-organizational relations should be made.

In this context, some critical points for Turkish forestry should be emphasized to reach a sustainable future and realize the goals of national forestry regarding the interaction between policy and research and education: 1) considering various aspects of policies in designing research studies, 2) strengthening a participatory approach in the policy-making process, 3) supporting communication and collaboration between forestry organizations, policymakers, and research/educational institutions, 4) strengthening the centralized national policy-making process and delegation of related planning and implementation authorities to provincial units, and 5) reducing bureaucracy and political effects.

In light of the highlighted suggestions of senior managers, a consultative role of scientific bodies that is supported by legal arrangements should be strengthened. An effective communication mechanism should also be developed to strengthen the relations and interaction. Moreover, the implementers should participate in research processes and assignments to other regions should not generally be permitted. As an alternative suggestion, researchers should participate in the implementation process in this way to make it easier for them to understand the prominent issues and problems that need attention. It may also be useful to analyze the relationships and interactions at regional and local levels to provide applicable and sustainable decisions.

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